

# FactoryTalk Motion Analyzer User Guide

Version 2.1

MOTION-UM004E-EN-P



**Original Instructions** 



### **Important User Information**

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

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**IMPORTANT** Identifies information that is critical for successful application and understanding of the product.

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Rockwell Automation recognizes that some of the terms that are currently used in our industry and in this publication are not in alignment with the movement toward inclusive language in technology. We are proactively collaborating with industry peers to find alternatives to such terms and making changes to our products and content. Please excuse the use of such terms in our content while we implement these changes.

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### **Overview**

FactoryTalk<sup>®</sup> Motion Analyzer<sup>™</sup> is a comprehensive motion-application design tool used for the analysis, optimization, selection, and validation of your motion control system. This software simplifies the machine design process, letting you quickly design and validate new machine concepts without purchasing or installing physical equipment. You can select from a wide range of Kinetix motors and drives, PowerFlex drives, and motors and gearboxes from our Technology Partners. The tool recommends solutions based on your application requirements and generates a bill of materials that can be exported into ProposalWorks for procurement.

Additional Resources

These documents contain additional information concerning related Rockwell Automation products.

Resource	Description
FactoryTalk Motion Analyzer User guide	Provides complete instructions for using FactoryTalk Motion Analyzer.

View or download publications at

<u>http://www.rockwellautomation.com/literature</u>. To order paper copies of technical documentation, contact the local Rockwell Automation distributor or sales representative.

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Alternately, obtain complete Corresponding Source code by contacting Rockwell Automation via the Contact form on the Rockwell Automation website:

http://www.rockwellautomation.com/global/about-us/contact/contact.pag

Please include "Open Source" as part of the request text.

A full list of all open source software used in this product and their corresponding licenses can be found in the OPENSOURCE folder. The default installed location of these licenses is C:\Program Files (x86)\Common Files\Rockwell\Help\<Product Name>\Release Notes\OPENSOURCE\index.htm.

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Customer Support Telephone — 1.888.382.1583 Online Support — <u>http://www.rockwellautomation.com/support/</u>

## Welcome to FactoryTalk Motion Analyzer

Double-click the [55] icon to launch the application. The application homepage displays.

NOTE: User can also launch the application from the Start menu. .



Rock 🖬 🗐 🕲 🖪 🛤 -		
FT Motion Analyzer Version: 20.228 Start Here	Library Recent All Projects	HIDE PANEL     Support & Updates     Email Support
<ul> <li>New Project</li> <li>Import Project</li> </ul>	E Ⅲ ☐ Select all	Feedback Video Tutorials Release Notes License
Tools Inertia Calculator	No results were found to match your criteria. Try modifying your criteria or Create a Project. Refer to the FactoryTalk Motion Analyzer User Guide or Press F1 for Help	e Release Notes License

Motion Analyzer is opened with following sections displayed on the Welcome Screen: Menu Bar, Quick access toolbar, Tab bar and Home tab.

### **Menu Bar**

The Motion Analyzer menu bar is a graphical control element which contains drop-down menus. It provides four main options: File, View, Tools and Help which are accessible across the application.

#### Figure: Menu bar



#### Table: Menu bar options description

Options	Description
File	Standard File menu options
View	Options related to application appearance
Tools	Additional tools
Help	Options related to support contact and documentation

### **File Menu**

The File menu is similar to the file menu in many computer applications. These files are stored in the local database and do not behave like normal files.



#### Figure: File Menu

#### Table: File menu options description

Options	Description	
New project	Create a new project	
Open	Open Projects	
Save	Save project	
Rename	Rename the project name	
Import	Import a project name	
Export to File	Exports a project to an XML file	
Close Project	Close the currently opened project	

User Profile	View and edit the User Profile	
Language Settings	Edit the Language Settings. By default, English is selected.	
Exit	Exit the application.	

### **View Menu**

# The View menu consists of options allowing to manipulate application appearance and layout.

#### Figure: View Menu



#### **Table: View menu options description**

Options	Description
Left Panes	Enable/disable left panes while a project is open
Right Panes	Enable/disable right panes while a project is open
Bottom Panes	Enable/disable bottom panes while a project is open
Reset Layout	Reset layout to default settings while a project is open
Project	Enable/disable the Project Tree panes while a project is open
Home Page	Open the Home Tab
Application Requirements	Enable/disable Application Requirements while project is open
Profile Editor Tool	Enable/disable the Profile Editor tool panel while project is open

### **Tools Menu**

The Tools drop-down menu consists of options allowing to open additional Motion Analyzer tools.

#### Figure: Tools Menu

FactoryTalk® Motion Analyzer			
File	View	Tools	Help
<b>%</b> [	ð 6	🗐 In	ertia Calculator

#### Table: Tools menu options description

Options	Description
Inertia Calculator	To open Inertia Calculator. Refer to <u>Inertia Calculator</u> on <u>page 14</u> .

### **Help Menu**

The Help menu consists of options allowing to contact Motion Analyzer support, access release notes and licenses, provide feedback, and open application help document.

#### Figure: Help Menu



#### Table: Help menu options description

Options	Description
Help Content	Open application help document
Import Sample Projects	A list of sample projects displays. User can import these projects into the application.
Motion Profile Templates	To import Motion Profile Templates and sample templates
About	To get the current application details: License: Displays the document with licenses in a PDF. If Adobe reader is not installed, the PDF is opened in a browser. Version: Displays the application and database version being used at the bottom of the page.
Feedback	Open questionnaire regarding Motion Analyzer feedback

### **Quick Access Toolbar**

The quick access toolbar contains:

- 1. Actions Toolbar: To cut, paste, copy, save, and delete the data.
- 2. User Profile: To set User profile.
- 3. **Inertia Calculator**: To calculate the inertia of objects with different shapes.
- 4. Library Page: To go to the Library page.

Figure: Quick Access Toolbar



### **User Profile**

**Personal Information** 

The user profile can be accessed by clicking user profile button on the quick access toolbar. After clicking the button, a model with user related settings will be displayed.

User profile consists of two sections:

- Personal Information
- Units Settings

In the personal information tab, the following information can be provided:

- First Name
- Last Name
- Job Function

- Company information:
- Company
- Industry
- Address
- City
- State
- Postal code
- Country
- Phone
- Location

Figure: Personal Information Tab

My Profile		×
Personal Information	Personal Information	
Units Settings		
	First Name	
	Motion	
	Last Name	
	Analyzer	
	Job Function	
	,	
	Company Information	
	Company	
	Company	
	Industry	
	Industry	
	Address Line 1	
	Address Line 1	
	Address Line 2	
	Address Line 2	
	City	
	City	
	State	

After providing the information data must be saved by clicking save button at the bottom of the section.

### **Units Settings**

In the units settings tab, the global default units can be set. It is possible to set all units to one of two predefined sets: metric or imperial or modify specific units selected by the user.

Figure: Unit Settings Tab

Personal Information Units Settings	Units Settings		
5	•	Set Metric Units	Set Imperial Units
	Linear Distance	Angular Jerk rad/s <sup>3</sup>	Inclination deg
	Diameter	Mass	Density
	m 🗸	kg 🗸	kg/m³
	Velocity m/s	Inertia kg·m² 🗸	Efficiency <b>pu</b>
	Acceleration m/s <sup>2</sup>	Force N	Lead <b>m/rev</b>
	Jerk m/s³ ↓	Torque Nm 🗸	Altitude <b>m</b>
	Angular Distance rad	Power kW -	Paper Size A4
	Angular Velocity rpm 🗸	Time s ↓	
	Angular Acceleration	Temperature • C 🗸	

After changing the default units, any changes must be saved by clicking save button at the bottom of the section.

**Inertia Calculator** 

The Inertia Calculator has several options for input parameters to calculate the Inertia for an application. There are two modes of Inertia Calculators in Motion Analyzer application.

- Standard Inertia Calculator: It can be accessed from the Tools Menu and it can be used always in any place but does not save the calculation.
- **Contextual Inertia Calculator**: It can be used only in place where is defined (currently on Transmission's page). It saves the calculation as well as the project and it can be reopened.

Perform the following steps to calculate the Inertia:

- 1. Click the [
- 2. Provide the following details:

#### Table: Inertia Calculator

Field	Description	
Name	Enter a name for the element.	
Element Type	Select the type of the element (solid cylinder or hollow cylinder).	
Material	Select the material of the cylinder: Standard or Custom. If the user selects Custom as the material, then the density value needs to be provided.	
Material Type	Select the material type of the cylinder.	
Density	Enter the density of the material.	
Outer Diameter	Enter the outer diameter of the inertia element.	
Inner Diameter	Enter the inner diameter of the inertia element if it is a hollow cylinder.	
Length	Enter the length of the inertia element.	
Mass	The mass of the cylinder is calculated based on the parameters.	
Inertia	The Inertia of the cylinder is calculated based on the parameters.	

#### Figure: Inertia Calculator



3. Click [Add]. The relevant values get saved to the project and reflected in the right panel as shown in the following image:

Name						
lement Type		• E				
Material						
Material Type	0 0000	•				
lass	Unit					
lass )	Unit kg	<u>.</u>				
lass nertia	Unit kg Unit kg · m²	▼ Name	Density kg/m³ 🗣	Mass kg 🗸	Inertia kg · m²	Action
nertia Can	Unit kg Unit kg · m <sup>2</sup> cel	Name     Demo	Density kg/m <sup>3</sup>	Mass kg 2120575.041	Inertia kg · m <sup>2</sup>	Action
ass iertia Can	Unit kg Unit kg · m² cel	Name     Demo	Density kg/m <sup>3</sup>	Mass kg 2120575.041	Inertia kg · m <sup>2</sup> 26507188.015	Action

4. User can edit or delete the existing Inertia, or user can also add a new Inertia to the same element.

Figure: Edit or Delete



Figure: Right Panel

The Total Mass and the Total Inertia are displayed as shown in the following image:





5. Click [Copy] to copy the Total Mass and the Total Inertia values to a clipboard.

### **Tab Bar**

The tab bar is located under the Quick Action Toolbar and allows to switch between the opened tabs.

Figure: Tab Bar

FactoryTalk® Motion Analyzer					- a x
File View Tools Help					
米哈哈會會會會					
Library					
FT Motion Analyzer	Library				HIDE PANEL
Start Here	Recent All Projects				Email Support
New Project	Select all		Ta Move to	≡ III ≜ Delete	Feedback Video Tutorials
1 Import Project					Release Notes
					License
Tools	Pele	No results were found to match your criteria. Try modifying your criteria or Create a Project.	Help		
Inertia Calculator		to the ractory law motion will yet out of date of respirator	i neip		

• To close the tab, hover the mouse on the tab and click the [X] icon.

Figure: Closing Tab

mple Proje	ct × •				
Sam	ple Project				Add Axis Add Bus
Selec	ct all				
□ ▼	Winder Axis				/ :
	Axis Type: Rotary		Transmission:	Belt Drive	
	Motor: MPL-B21	0V-XXXXXX			
	Drive: 2094-BM	P5-M			
	Box Pusher Axis				/:
	Axis Type:	Linear with Mechanism	Transmission:	Gear Reducer	
	Custom Mechanism:	BALL SCREW			
	Motor:	MPL-B320P-XXXXXX			
	Drive	2094-BC01-MP5-M			

- List of currently opened tabs can be toggled by clicking the [≡] at the right side of the tab bar.
- Click the tick icon to display the current tab. Click a tab name in this list and the selected tab displays.



	Close All Close Other
	✓ Sample Project
	• User can Drag and drop the tabs to move them across the tab bar.
Home Tab	The home tab is opened by default when the Motion Analyzer application is launched. It consists of a left-hand panel with start here, section, and tools, a middle area with library view, and a right-hand panel with release notes, feedback, support, and licenses links.
Library Page	The Library page is opened by default when the Motion Analyzer application is launched. It consists of a left-hand panel with Start Here section to start creating projects or to import projects, and Inertia Calculator tool, a middle area with Library view, and a right-hand panel with Email Support, Feedback, and Licenses links.
Left Panel	The left panel allows user to create new empty project, import project XML and open Motion Analyzer additional tools.

Figure: Left Panel



#### Table: Left panel options description

Options	Description
New Project	Create new empty project
Import project	Import project from XML
Inertia Calculator	Open Inertia Calculator

### Library

The library section consists of three tabs: recent, all projects, components. On the recent tab the list of 10 recently modified projects is displayed. On the All-Projects tab, a list of all projects is available along with search input and pagination. On the components tab, a list of all standalone components which can be imported to the project is available along with search input and pagination.

	Figure: Recent Tab		
Library			
Recent All Projects			
Select all		📳 Move to	≡ III ÎÎ Delete
NAME	CREATED	LAST MODIFIED	ACTIONS
Labeling Machine	Jun 25, 2023	Jun 25, 2023	:
UFFS_Machine	Jun 25, 2023	Jun 25, 2023	:
Sample Project	Jun 25, 2023	Jun 25, 2023	:

Figure: All Projects Tab

•		
Recent All Projects		
	=	= ::
All items search	3 Results 50	~ ~
Library		
Select all	+ New Folder 🕞 Move to 📋 Dele	ete
AME	CREATED LAST MODIFIED ACTI	ONS
Labeling Machine	Jun 25, 2023 Jun 25, 2023	
	Jun 25, 2023 Jun 25, 2023	
VFFS_Machine		

Projects and components are listed on library tabs in the grid with name, created, last modified, creator, shared and actions column headers. Each row contains the values for each of those columns and represents single

project or component. Clicking actions button on specific row will pop up context menu with delete and shared options.

Figure: Project/Component Actions Context Menu

Apr 17, 2	2023	:
	Rename	
	Delete	
	Move to	

#### Table: Left panel options description

Options	Description
Delete	Delete project/component from library
Rename	To rename the project/component
Move to	To move the project/component.

Search input is available on all projects tab and components tab and allows to find project with the specific name.

#### Figure: Search Input

All projects search

Pagination component displayed on those tabs changes dynamically depending on number of results. Number of displayed results per page can be changed by selecting value in the show select input.

Figure: Pagination Show Select Input



If there is less or equal results to the value selected in show select input the pagination will be displayed in simplified form with the results number and show select input displayed.



	Show
5 Results	50 💌

When there are more results than selected in show input the pages numbers, pagination arrows and jump to input will be displayed. Entering page number to jump to input and confirming it by pressing enter will change current page. If there is more than 6 pages on the pagination "…" button will appear allowing to jump to the first page not visible on the pagination.



	Shov	v								
117 Results	10	•	•	1	 5	6	7	 12	•	Jump to

### **Right Panel**

The right panel consists of options allowing to check view application's version release notes, send email to Motion Analyzer support, and provide feedback regarding the application and to view Motion Analyzer licenses. Panel by default is expanded for resolution width higher than 1440px and can be collapsed by clicking Hide Panel button. For the width lower than 1440px panel by default is collapsed and can be opened by clicking Show Panel button. For the width less than 1440px panel is displayed on top of the middle section and does not distort the appearance of the application.

Figure:	Right	Panel
---------	-------	-------



#### Table: Right panel options description

Options	Description
Show/Hide Panel	Open/collapse right panel
What's new	Open document with release notes
Support	Create new e-mail to Motion Analyzer support
Feedback	Opens a link to provide feedback to the Motion Analyzer Team
License	Open document with licenses

Figure: Collapsed Right Panel



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# **Project**

The Project Pane provides a Windows Explorer-style graphical user interface for navigating through the Motion Analyzer project.

### **Create Project**

1. Open the File menu, and click [+ New Project].

Figure: Create New Project



A new Project homepage displays with a sample project name.

Figure: New Project

FactoryTalk® Motion Analyzer - Ur	ntitled 168770	02424216			٥	×
File View Tools Help						
* @ & 🗎 🗑 🗐	ER/					
Project	₽ =	Untitled 1687702424216				
O Preferences				Add Axis Add	Bus	•
Architecture Overview						[TN
Power Analysis						LB
Bill of Materials						0°a
Project Report						tit
			To begin work, add a Bus or an Axis.			

- 2. On the Quick access toll bar, click the [
- 3. The Save Project dialog displays. Provide the Project name and Click [Save].

Project Name	Project Name Test Project
Test Project	

#### Figure: Save Project

#### The project pane tree displays the following features: Table: Project Pane Main Nodes Description

Node	Description
Preferences	Open the project preference.
Architecture Overview	Open the architecture overview
Power Analysis	To calculate the Power Analysis of a power supply for the selected power bus.
Bill of Materials	Open the bill of materials
Project Report	Open the project report

### **Manage Projects**

Motion Analyzer allows users to manage the Projects by creating folders and store them inside in groups. User can move and delete the Projects or the Folders.

On the Library page, the following tab displays:

- Recent: Displays the recent projects.
- All Projects: Displays the list of all available Projects and Folders.

Motion Analyzer provides the following functionalities to manage Projects:

- 1. Select All: To select or deselect all the Project(s) or Folder(s).
- 2. New Folder: To create new folders to store the Projects/sub Folders. This feature is only enabled in the "All Projects" tab view.
- 3. Move to: To move the selected Projects/Folders to respective folders.
- 4. Delete: To delete the selected Project or Folder.
- 5. View: List View or Tile View
- 6. Rename: To rename the Project or the Folder.
- 7. Search: To search for a Folder or Project.

Chapter 2 Project

	Figure: Library
Library	
Recent All Projects	
	5
0	≡ III Show
All items search	4 Results 50 👻
Library	2 3 4
Select all	+ New Folder 🕞 Move to 👘 Delete
NAME	CREATED LAST MODIFIED ACTIONS
Test Project	Jun 25, 2023 Jun 25, 2023
Labeling Machine	Jun 25, 2023 Jun 25, : Rename 6
VFFS_Machine	Jun 25, 2023 Jun 25, 1
P Sample Droject	Iun 25 2023 Iun 25 5

### **Create New Folder**

Perform the following steps to create a Folder:

- 1. Click [+New Folder].
- 2. The New Folder dialog displays. Provide a folder name and click [Create].

Figure: New Folder

Folder name	
Test Dama	
resc Denio	

The new folder will be created on the Library page as shown in the following image:

ibrary			
Recent All Projects			
۹. All items search		5.0	≡ : Show
		5.	
► Library			
Select all	+ New Folder	Move to	1 Delete
AME	CREATED	LAST MODIFIED	ACTIONS
New Demo	Jun 25, 2023	Jun 25, 2023	:
Test Project	Jun 25, 2023	Jun 25, 2023	ł

User can create multiple folders and sub folder based on the requirement.

**Move Project-Folder** 

Perform the following steps to move the Project or Folder:

- 1. Select the Project or Folder from the list.
- Click the [ ] icon.
   Click [Move to].
- - Figure: Move

Recent All Projects		
		= :
All irems search		Show
- Miller Job Gr	3 Results	50 ¥
Library		
Select all	+ New Folder 📑 Move to	Delete
ME	CREATED LAST MODIFIED	ACTIONS
Test_Demo	Mar 6, 2023 Mar 6, 2023	:
powersharing_id_demo	Feb 27, 2023 Feb 27, 2023	:
Untitled 1674559838479	jan 24, 2023 jan 24, 2023	:
	Renam	

4. The 'Move to' dialog displays. Select the destination folder from the list and click [Move].

Figure: Move To

Select location	
EL Library	
Test_Demo	

The "Project was successfully moved to the library" message displays. If multiple projects are selected and moved then "Selected items were successfully moved to the Library" message displays.



			_
All items search		2 Results	Show 50 -
Library			
Select all	+ New Folder	Ta Move to	) Delete
AME	CREATED	LAST MODIFIED	ACTIONS
Test_Demo	Mar 6, 2023	Mar 6, 2023	:
powersharing_id_demo	Feb 27, 2023	Feb 27, 2023	:

The Project will be relocated to the destination folder.

#### Figure: Destination Folder

Library			
Recent All Projects			
			= :
All items search		1 Results	Show 50 ₹
Library      Test_Demo			
Select all	+ New Folder	Ta Move to	🕽 Delete
AME	CREATED	LAST MODIFIED	ACTIONS
Untitled 1674559838479	jan 24, 2023	Jan 24, 2023	:

Note: User can select the multiple folders and Projects at the same time and move them to a dedicated location. User can also right-click on one of the folder/project and move them.



ibrary				
Recent All Projects				
				= :
۹. All items search			4 Results	show 50 ₹
Library     Select all		+ New Folder	G Move to	) Delete
AME		CREATED	LAST MODIFIED	ACTIONS
Test01	Delece	Mar 6, 2023	Mar 6, 2023	:
SampleProject01	Move to	Jan 24, 2023	Mar 6, 2023	:
Test_Demo		Mar 6, 2023	Mar 6, 2023	:
powersharing_id_demo		Feb 27, 2023	Feb 27, 2023	:

Both the Folder and the Project can be moved to the destination Folder.

Note: While importing the Projects, user can select the destination location to save the Project.

Figure: Save



While browsing through the Folders, the Navigation panel displays the Folder structure.



Design and Designed			
Recent All Projects			
			= :
Q All items search			Show
A AN ACTO SCOLO		1 Result	s <u>50</u> *
Library + Test_Demo			
Select all	+ New Folder	Ta Move to	1 Delete
IAME	CREATED	LAST MODIFIED	ACTIONS
VFFS_Machine	Mar 6, 2023	Mar 6, 2023	:

**Delete Project-Folder** 

Perform the following steps to delete the selected Project or Folder:

- 1. Select the Project/Folder from the list.
- 2. Click [Delete] or click the [
- 3. The 'Delete Project' or 'Delete Folder' dialog displays. Click [Delete].

IMPORTANT: Be careful while deleting the Folders. This action will delete the entire content under the Folder and there is no backup option to retrieve the data.

#### Figure: Delete Project

ibrary				
Recent All Projects				
				E III Show
All items search			5 Result	s <u>50</u> <del>-</del>
Library     Select all	Delete Folder ×	+ New Folder	Move to	1 Delete
ME	Are you sure you want to delete Test_Demo folder? This will also remove everything inside	CREATED	LAST MODIFIED	ACTIONS
🗹 🖿 Test_Demo	Delete Cancel	jun 25, 2023	jun 25. 2023	:
🔲 🖿 New Demo		jun 25, 2023	jun 25, 2023	:
Labeling Machine		jun 25, 2023	jun 25. 2023	:
VFFS_Machine		jun 25, 2023	jun 25, 2023	:
Sample Project		jun 25. 2023	Jun 25. 2023	:

NOTE: User can select the Folders and Projects at the same time and delete them.

User can also delete the selected Folder/Project from the main tool bar.

Figure: Delete Icon

2			
Motion Analyzer	Library		
Start Here	Recent All Projects		
<ul> <li>New Project</li> </ul>			=
1 Import Project	All items search		5 Results 50
••• •1•*	Library     Select all	+ New Folder	ve to 🍵 Dele
Tools	NAME	CREATED LAG	T MODIFIED ACTI
Inertia Calculator	E Test_Demo	jun 25. 2023 jun	25. 2023
	🗋 🖿 New Demo	jun 25. 2023 jun	25, 2023
	C Labeling Machine	jun 25. 2023 jun	25. 2023
	VFFS_Machine	Jun 25, 2023 Jun	25. 2023

**Project-Folder View** 

User can switch between the List View and Tile View.

Figure:	L	ibrary.	View

Recent All Pr	rojects				
ৎ All items searc	h				5 Results
Library     Select all				+ New Folder	🖬 Move to 🛛 🍵 Delete
Vertical Form Fill	Test01	SamplePro	Test_Demo	powershar	

NOTE: In the Tile view, user need to right-click on the tile to view the actions.

### **Rename Project-Folder**

Perform the following steps to rename the Project/Folder:

- 1. Select the Project/Folder and click the [ ] icon under Actions.
- 2. Click [Rename].
- 3. The Rename dialog displays. Rename the Project/Folder and click [OK].



Figure: Rename Project

Chapter 2 Project

### Search

User can preform search operation to find a Project or Folder by name. This search operation is carried in the entire repository from the Homepage library and display the results.

Figure: Search

Library			
Recent All Projects			
All items search		1 Result	≡ III Show s 50 ≠
• Library			
Select all	+ New Folder	a Move to	🖞 Delete
NAME	CREATED	LAST MODIFIED	ACTIONS
powersharing_id_demo	Feb 27, 2023	Feb 27, 2023	:

# **Project Preferences**

The Project Preferences menu allows the user to store the Customer Information.

- 1. On the left panel, double-click the [Preferences] menu and the Project Preferences screen is displayed.
- 2. Provide the following information:

Table: Project Preferences		
Field	Description	
Customer Information		
Client	Name of the client.	
Phone	The phone number of the customer.	
Email	The Email ID of the customer.	
Address	The address with street, city, state, postal code, and country.	
Site		
Altitude	The altitude of the client's location.	
Temperature	The temperature of the client's location.	
Use		
Industry	Provide the type of Industry where the project is used. Click [Add] to add the new records.	
Application	Provide the application name, the project is used for. Click [Add] to add the new records.	
Tip: In the Customer Ir	formation section, all the fields are limited to 50 characters.	

3. Click the [ ] icon on the Quick access tool bar on the top left corner to save the changes.

Figure: Save Project Preferences

FactoryTalk® Motion Analyzer - Sample Projec	t	
e View Tools Help		
0 6 🗎 🗊 💿 🗊 🛤		
oject ₽ ≡	Sample Project	Project Preferences
Preferences		
<ul> <li>Architecture Overview</li> </ul>	-	
Power Analysis	Projec	ct Preferences
Bill of Materials	Customer Information	Customer Information
a moject neport	Site	Client
	Use	John Doe
		Phone 5555555555
		Email John@Doe.com
		Address
		Street
		City
		State
		Postal Code
		Country
# **Architecture Overview**

Architecture Overview provides a user interface to access, add, remove, or modify the components like axes, buses, dual axes, and clusters in the Motion Analyzer project. Each component is presented in a hierarchical manner.



### Figure: Sample Project Tree

#### **Table: Project Pane Description**

Feature	Description					
Overview	Open the axis overview					
Motion Definition	Open motion definition					
	Set up Axis: open Set up axis					
	Profile Editor: Open Profile Editor					
Components	Open the following components:					
	Custom Mechanism: Provides the list of available Mechanisms to configure.					
	Transmission: Provides the list of available transmissions to configure.					
	Motor: Provides the list of available motors to configure.					
	Drive: Provides the list of available Drive to configure.					
Solution Search	Open solution search					

Analysis Open axis analysis

Right-click on the components to view their context menus available. From the Architecture Overview tab, user can access the Library allowing to import axes created within the scope of the current project or save axes from current project to the Library allowing to reuse them in the other projects. Click the [Select all] checkbox or the individual component's checkbox to select the components in the project.

Figure: Architecture Overview

FactoryTalk* Motion Analyzer - Sample Proje	ct				_	٥	×
File View Tools Help							
× 0 6 🗎 🕯 🔍 🛤							
Project 🕂 🖶	Sample Project	Project Preferences	Motion Definition: Set up A	Axis Overview - Box Pusher			
• Preferences					Add Axis Add But		•
Architecture Overview						-	
Winder Axis	Deselect all						
<ul> <li>Box Pusher Axis</li> </ul>	Vinder Axis				1 :		2
- Dverview	-	25		B-1-B-1			+11
- O Motion Definition	Axis Type: Rotar	У	Transmission:	Beit Drive			
Set up Axis	Motor: MPL-	B210V-AAAAAA					6225
Profile Editor	Drive. 2094	-DMPS-M					
<ul> <li>Components</li> </ul>	Box Pusher Axis				1 :		
Custom Mechanism	And Sugar	Line an weath March Science	Transmission	Case Badevice			
<ul> <li>Transmission</li> </ul>	Axis type:	Cinear with Mechanism	transmission:	Gear Reducer			
Motor	Custom mechanis Motor	MDL B3300 YYYYYY					
O Drive	Drive-	2004.0C01.MDC.M					
O Solution Search	Drive.	2034-0001-111-3-11					
<ul> <li>Analysis</li> </ul>							
Power Analysis							
Bill of Materials							
Project Report							

Table: Architecture Overview						
Options	Description					
Add axis	Add a new axis					
Add bus	Add a new bus					
Library	Open the library					
Select all	Select all components					

Axis

Axis is the base element in Motion Analyzer and can be added to the project, click [add axis] or import it from the user's library. Axis can be a standalone component, can be added to bus (more in Bus), cluster (more in Cluster), or be merged with another axis into dual axis (more in Dual Axis). Axes can only be merged into dual axis containers if the drive family has dual axis drives. Double click on the axis name or select the rename option from the axis context menu to rename the Axis. Click [Edit] from the axis context menu to edit the axis.

:

:

:

÷

### Figure: Standalone Axis

- X Axis
- Z Axis
- Y Axis
- X2 Axis

Options	Description	
Chevron	Show/collapse axis details	
Axis name	Double-click to rename the axis	
Share	Share the axis with another user	
Comments	Add comments to the axis	
Add to library	Add axis to the library	
More actions	Show the axis context menu	

Click [More Actions] or right-click on the axis to open the Axis context menu.

Figure: Axis Context Menu

/ :
Edit
Rename
Duplicate
Delete
Add to Bus
Remove from Bus
Add to Cluster
Remove from Cluster
Add to Dual Axis
Remove from Dual Axis
Add to PIM
Remove from PIM
Q, Solution Search
🖌 Analysis

On the axis, click [Chevron] to toggle the Axis details. They consist of selected axis types and components e.g., for rotary axis: transmission, motor, and drive. For the new axis by default, the rotary motion type is selected. On the axis, click [Edit] to change the rotary motion type in the set-up axis section.

#### Figure: Rotary Axis Details

•	New Axis	l.		/ :
	Axis Type:	Rotary	Transmission: None	
	Motor:	VPL-B1306C-XXXXXXX		
	Drive:	2198-DSD016-ERSX		
_				

Table: Axis Context Menu	Table: Axis Context Menu						
Options	Description						
Edit	Click to edit the axis						
Rename	Click to rename the axis						
Duplicate	Click to duplicate the axis						
Delete	Click to delete the axis						
Save to library	Click to save axis to the library						
Share	Click to share axis with another user						
Add to bus	Click to display a list of buses to which the axis can be moved (disabled if none of the buses meet the requirements or there is no bus added)						
Remove from bus	Click to remove the axis from the bus (disabled if selected axis is not in the bus)						
Add to cluster	Click to display a list of clusters to which the axis can be moved or add the axis to a new cluster (disabled if axis does not meet the requirements)						
Remove from cluster	Click to remove the axis from the cluster (disabled if selected axis is not in the cluster)						
Solution search	Click to open to solution search tab						
Analysis	Click to open the axis analysis tab						
Additional components	Click to open additional components tab						

Bus

Click [Add bus] to added Bus to the project. Double click the new Bus to rename or select the rename option from the bus context menu. In the bus section, the user can select AC line voltage, phase, and voltage tolerance. The Motion Analyzer validates the power requirements based on the selected voltage against the phase and vice versa. The bus section also displays the information about power summary status and the number of clusters and axes inside the bus.

### Figure: New Bus

						Add Axis	Add	Bus
Select all								
Power Bus AC Line Voltage 415	Ţ	Phase 3	·	Voltage Tolerance - 10 % 415 + 10 %	O Power Summary	Clusters: 0 Pims: 0	Axes: 0	:

Ensure to provide valid voltage and phase, else an error message displays as shown in the following image:

#### Figure: Power Requirements

			Add Axis Add Bus
Select all			
Power Bus			O Power Summary Clusters: 0 Pims: 0 Axes: 0
AC Line Voltage 415	Phase	Voltage Tolerance - 10 % 415 + 10 %	
The selected voltage is not sufficient	The selected phase is not suitable		

After the user selects the phase, the AC line voltages are filtered. If the AC line voltage is selected and the user selection does not match the phase, the AC line voltage value gets reset. After adding a new empty axis to the bus its drive power requirements are inherited from bus values if selected and the edition of them in the axis is disabled. If the axis with filled drive power requirements is moved to a new bus without AC line voltage and phase selected the values are copied from axis drive power requirements and the edition of them in axis is disabled. If the axis and bus have different voltages and phases selected then the axis cannot be moved to the bus.

Figure: Axis in the bus with selected Voltage and Phase

						Add Axis	Add Bus
Select all							
Power Bus					O Power Summary	Clusters: 0 Pims: 0	Axes: 0
AC Line Voltage	•	Phase 3	<u> </u>	Voltage Tolerance - 10 % 415 + 10 %			

**NOTE**: The power requirement validation of Voltage and Phase also depends upon the validation of axes power requirements that are children of the selected bus. These power requirements are also validated even though no axes are added to the bus.



Figure: Locked drive power requirements for axis in bus

- 1. On the axis context menu, click [Add to bus] and select the matching bus to meets the requirements mentioned above for the Moving axis.
- 2. On the axis context menu, click [Remove from bus] to the Axis.

Figure: Add to bus

	/ :
	Edit
	Rename
	Duplicate
	Delete
Power Bus	Add to Bus
	Remove from Bus
	Add to Cluster
	Remove from Cluster
	Add to Dual Axis
	Remove from Dual Axis
	Add to PIM
	Remove from PIM
	Q Solution Search
	Analysis

3. Right-click on the bus to open the Bus context menu.

#### Figure: Bus Context Menu

Select all Power Bus AC Line Voltage		Phase		Voltage Tolerance	Rename Duplicate	O Power Summary	Clusters: 0	Pims: 0	Axes: 1	:	
400 → New Axis 1	•	3	•	- 10 % 400 +					1	:	

l'adie: bus context rienu	
Options	Description
Rename	Rename the bus
Duplicate	Duplicate the bus
Delete	Delete the bus

**Power Inheritance**: If the power requirements are not defined in the axis and the axis is added to the bus, the axis inherits the power requirements from the bus. Also, if the axis with defined power requirements is added to a bus with no power requirements, then the bus inherits the power requirements from axis.

### Cluster

To create a new cluster the bus, and the axis with K5700 drive must be created first and the axis must be moved to the bus. When those requirements are met add to cluster option in the axis context menu is enabled.

1. Double click on the name or select the rename option from the cluster context menu to rename the Axis.

		Figure: Cluster			
Select all					
Power Bus			O Power Summary	Clusters: 0 Pir	ns: 0 Axes: 1
AC Line Voltage 415	Phase 3	Voltage Tolerance - 10 % 415 + 10 %			
Axis Type: Rotary Motor: CM222-BC0 Drive: 2198-5130	04012AXZCA ERSX	Transmission: None			

- 2. On the axis context menu, click [Add to cluster]. This displays a new cluster option or an existing matching cluster.
- 3. Click [New cluster] to move the axis to the new cluster and click the existing cluster name to move the selected axis to that cluster.
- 4. On the axis context menu, click [Remove] to remove the Axis from the cluster.
- 5. In the cluster context menu, under add to bus option, click the bus name to move the Cluster to another bus with the same power.
- 6. On the cluster or in the cluster's context menu, click [Split] to split the Cluster.

The splitting cluster will remove it and move all its children to the parent node what in this case always will be a bus in which cluster was.



Figure: Add to Cluster

7. Right-click on the cluster title bar to open the Cluster context menu.

### Figure: Cluster Context Menu



Table: Cluster Conte	xt Menu
Options	Description
Rename	Rename the Cluster
Duplicate	Duplicate the Cluster
Delete	Delete the Cluster with all its children
Split	Delete the cluster and move the children to the bus
Add to bus	Display a list of buses to which the cluster can be moved (disabled if none of the buses meet the requirements or there is no other bus added)

## Power Interface Module -PIM

Power Interface Module - PIM

ArmorKinetix<sup>®</sup> Power Interface Modules (PIM) provide the interconnectivity between the Kinetix<sup>®</sup> 5700 common DC bus architecture (in-cabinet) and the On Machine<sup>™</sup> decentralized units (DSM, DSD). The PIM mounting is similar to other Kinetix<sup>®</sup> 5700 modules (e.g. DAI) and connects to a common DC bus. It provides the interconnect for both power and communications to the first DSM or DSD unit as part of a daisy chain arrangement. Multiple PIMs can be used within a common DC bus arrangement with each servicing up to 24 DSD/DSM units mounted On Machine.

As the DSM motor contains a drive inside and cannot be powered directly, we need to connect the DSM Motor to a power supply through a PIM module.

Perform the following steps to add the DSM-configured axes to the PIM module:

NOTE: Ensure that the axis contains DSM components. For an axis without a DSM component, the PIM feature is disabled.

- 1. On the architectural overview page, click the ellipsis icon [ ]of the axis containing any DSM components.
- 2. Click [Add to PIM] and then click [New PIM].

	Add Axis Add E	Bus
Select all		
Power Bus	O Power Summary Rename	:
AC Line Voltage Phase Voltage Tolerance 415 _ 3 10 % 415 + 10 %	Duplicate Delete	
	Add to Bus Remove from Bus	
Cluster	Add to Cluster Remove from Cluster	1
□ ► New Axis 1	Add to Dual Axis Remove from Dual Axis	
New PIM	New Bus	
🗆 🕨 🛦 New Axis 2	Q Solution Search	

3. Select the list of the available buses.

### Figure: New PIM

O Power Summary	Edit Rename Duplicate Delete
	Add to Bus Remove from Bus
	Add to Cluster Remove from Cluster
	Add to Dual Axis Remove from Dual Axis
New PIM	New Bus Power Bus
	Q Solution Search

4. The respective axis is added to the selected PIM module. The PIM name along with the Power Consumption displays.

### Figure: Axis added to PIM

	Add Axis Add Bu
Select all	
Power Bus	O Power Summary Clusters: 0 Pims: 2 Axes: 10
VC Line Voltage         Phase         Voltage Tolerance           480         •         3         •         10         % 480         • 10         %	
O Delta_Robot_Pim     Power Consumption / Allowed Power Consumption :	Not yet calculated ① Total Axes: 5 Axes with brake : 5/16
DSM_Delta_Robot_Joint_1	/ 1
DSM_Delta_Robot_Joint_2	/ 1
DSM_Delta_Robot_Joint_3	/ :
DSD_Delta_Robot_Joint_4	/ 1
□ ► O DSD_Delta_Robot_Joint_5	× :
Converyor_Pim     Power Consumption / Allowed Power Consumption :	Not yet calculated ① Total Axes: 3 Axes with brakes / Allowed axes with brake : 0/16
DSD_Infeed Conveyor	/ 1
DSD_Outfeed Conveyor	/ :

NOTE: If a bus is present inside the PIM, the user can add the PIM and Power Bus at the same time.

5. When the axis is added to the PIM, the [Brake] checkbox is enabled and user can brake, if required.

Figure: Brake

0	Delta_i	Robot_Pim	Power Consumption / Allowed Power Consumption : Not yet calculate	ted ①	Total Axes: 5 Axes with brakes / Allowed axes	with brake : 5/16	:
•	Axis	DSM_Delta_Robot_Joint_1 Type: Rotary	Transmission: Spur Gear	Brake:		1	:
	Drive	e: 2198-DSM024-ER5X-80753F-XX1XAX e: 2198-DSM024-ER5X		Power Consump	otion: Not Yet Calculated ①		
۲	0	DSM_Delta_Robot_Joint_2				1	:
٠	0	DSM_Delta_Robot_Joint_3				1	:

6. User can add multiple axes to a PIM.

### Figure: Multiple Axes

Delta_Robot_Pim	Power Consumption / Allowed Power Consumption : Not yet calculated $\bar{\mathbb{O}}$		Total Axes: 5 Axes with brakes / Allowed axes with brake : 5/1	. :
DSM_Delta_Robot_loint_1			/	:
Axis Type: Rotary	Transmission: Spur Gear	Brake:		
Motor: 2198-DSM024-ERSX-B0753F-XX1XAX Drive: 2198-DSM024-ERSX		Power Consumption:	Not Yet Calculated ①	
OSM_Delta_Robot_Joint_2			/	:
Axis Type: Rotary	Transmission: Spur Gear	Brake:		
Motor: 2198-DSM024-ERSX-80753F-XX1XAX Drive: 2198-DSM024-ERSX		Power Consumption:	Not Yet Calculated ①	
DSM_Delta_Robot_Joint_3			/	:
Axis Type: Rotary	Transmission: Spur Gear	Brake:		
Motor: 2198-DSM024-ERSX-B0753F-XX1XAX Drive: 2198-DSM024-ERSX		Power Consumption:	Not Yet Calculated ①	

**NOTE**: User can internally move the axis from one PIM to another PIM.

- 7. Other Features:
  - a. Rename: To rename the PIM, double-click on the PIM name and rename it.

```
Figure: Rename PIM
```

Select all	Li.							
Power B	lus							
AC Line Volt 480	tage.	<u>.</u>	Phase 3	•	Voltag	e Tolerance 96 480	+ 10	96
	Delta	Robot Pim		Po	ower Con	sumption /	Allowed	Power Consumption :
	• •	DSM_Delta_R	lobot_joint_1					
	• •	DSM_Delta_R	tobot_joint_2					
		DSM_Delta_R	lobot_joint_3					
	• •	DSD_Delta_R	obot_joint_4					
	• •	DSD_Delta_R	obot_Joint_5					

b. Existing PIM: Once a PIM module is created, user can assign axis to the existing PIM modules.

Figure: Existing PIM

	O Power Summa	Edit	
		Rename	
		Duplicate	
		Delete	
		Save to Library	
		Share	
	Axes with brea	Add to Bus	
		Remove from Bus	
		Add to Cluster	
	_	Remove from Cluster	
Break:		Add to Dual Axis	
Power Consumption:	Not Yet Calculated	Remove from Dual Axis 1	
New PI	M 🕨	Add to PIM	
Existing	) PIM >	PIM Module 1	_
	2	Q Solution Search	3
		Analysis	

c. Remove from PIM: To remove the axis from the PIM module.

#### Architecture Overview

### Figure: Remove from PIM

		Total Axes: 2 Axes with brakes / All	owed axes with brake : 0/16	:
				:
Brake:			Edit	
			Rename	
Power Consumption:	Not Yet Calculated (i)		Duplicate	
rower consumption.	Not		Delete	
			Add to Bus	•
			Remove from Bus	
			Add to Cluster	►
Brake:			Remove from Cluster	
			Add to Dual Axis	►
Power Consumption:	Not \	/et Calculated (j)	Remove from Dual Axis	
			Add to PIM	►
			Remove from PIM	
			Q Solution Search	
			🖌 Analysis	

d. Duplicate PIM: User can duplicate the PIM module. Right-click on the PIM section and click [Duplicate].

Figure: Duplicate PIM

)	Conve	ryor_Pim	Rename	tion / Allowed Power
•	0	DSD_Infeed Conveyor	Duplicate 🔸	
•	0	DSD_Outfeed Conveyor	Add to Cluster  Remove from Cluster	
•	0	DSD_Pusher Axis		

The duplicated PIM module displays on the Architecture Overview page as a copy.

### Figure: Architecture Overview

Conveyor_Pim	Power Consumption / Allowed Power Consumption : Not yet calculated $\oplus$	Total Axes: 3 Axes with brakes / Allowed axes with brake : 0/16	:
DSD_Infeed Conveyor		/	:
DSD_Outfeed Conveyor		/	:
DSD_Pusher Axis		/	:
Copy] Conveyor_Pim	Power Consumption / Allowed Power Consumption : Not yet calculated $\bar{\mathbb{O}}$	Total Axes: 3 Axes with brakes / Allowed axes with brake : 0/16	:
Copy] DSD_Infeed Conveyor		1	:
Copy] DSD_Outfeed Conveyor		/	:
🗌 🕨 🥥 [Copy] DSD_Pusher Axis		/	:

User can double-click on the PIM name and rename it.

# e. Brake: To provide brakes for a given number of axes into groups in a PIM considering power consumption.

Figure: Brake

Select all		
Power Bus  AC Line Voltage  480	Voltage Tolerance • - 10 % 480 • 10 %	O Power Summary Clusters: 0 Pims: 3 Axes: 13
Delta_Robot_Pim	Power Consumption / Allowed Power Consumption : Not yet calculated $\bar{\mathbb{O}}$	Total Axes: 5 Axes with brakes / Allowed axes with brake : 5/16
OSM_Delta_Robot_joint_1      Axis Type: Rotary Motor: 2198-DSM024-ERSX.80758F-XX1XAX Drive: 2198-DSM024-ERSX	Transmission: Spur Gear	Brake:     Power Consumption: Not Yet Calculated ①
□     ▼     ●     DSM_Delta_Robot_joint_2       Axis Type:     Rotary       Motor:     2198-DSM024-ERSX-80753F-XX1XAX       Drive:     2198-DSM024-ERSX	Transmission: Spur Gear	Brake: Power Consumption: Not Yet Calculated ①
DSM_Delta_Robot_Joint_3		/ :
DSD_Delta_Robot_Joint_4		/ :

- 8. The maximum number of axes allowed in a PIM module is 16.
- 9. In a PIM module, 16 axes can contain maximum of 16 brakes, and brake validation is not required.
- 10. The following table describes the number of brakes allowed in a PIM module along with the brake validation:

No of Axes in PIM	Total Axes Allowed With Brakes	<b>Brake Validation</b>
0	0	Not required
1	1	Not required
2	2	Not required
3	3	Not required
4	4	Not required
5	5	Not required
6	6	Not required
7	7	Not required
8	8	Not required
9	9	Not required
10	10	Not required
11	11	Not required
12	12	Not required
13	13	Not required
14	14	Not required
15	15	Not required
16	16	Not required
17	15	Required
18	14	Required
19	12	Required
20	10	Required
21	8	Required
22	6	Required
23	4	Required
24	2	Required

Figure: Brake Validation

Here is the chart describing the number of brakes allowed in a PIM module.





# 11. The allowed brake values automatically change based on the number of axes in a PIM module.

Figure: Brake

Select all			
Power Bus			O Power Summary Clusters: 0 Pims: 3 Axes: 23
AC Line Voltage Phase 480 - 3	Voltage Tolerance - 10 % 480 + 10 %	$\sim$	
Delta_Robot_Pim	Power Consumption / Allowed Power	Consumption : Not yet calculated $\oplus$	Total Axes: 15 Axes with brakes / Allowed axes with brake : 15/16
□ ► Ø DSM_Delta_Robot_Joint_1			/ :
□ ► Ø DSM_Delta_Robot_Joint_2			/ :
□ ► Ø DSM_Delta_Robot_Joint_3			/ :
□ ► Ø DSD_Delta_Robot_Joint_4			/ :
□ ► Ø DSD_Delta_Robot_Joint_5			/ :
□ ► ⊘ [Copy] DSD_Delta_Robot_Joint_	5		/ :
□ ► ⊘ [Copy] [Copy] DSD_Delta_Robot	_Joint_5		/ :
□ ► 🥥 [Copy] DSM_Delta_Robot_Joint_	1		/ :

# **Dual Axis**

To create dual axis two axes with the same, the K5700 drive model must be created first. When those requirements are met add to dual axis option in the axis context menu is enabled. Dual-axis can be standalone, placed in the bus by clicking add to bus option and selecting compatible bus or in the cluster by add to cluster option and selecting compatible cluster or creating a new one. In the dual axis title bar, there is information about the selected drive for both motors.

Dual Axis Drive	Drive: 2198-D020-ERSX	<del>«  </del> >
► □ Z Axis		/:
► □ Y Axis		∕ :

- 1. Click [Split] or the split option from the dual-axis context menu to split the Dual-axis into two separate axes.
- 2. Right-click on the dual axis title bar to open the Dual-axis context menu.

Figure:	Dual-Axis	Context	Menu
---------	-----------	---------	------

Dual Axis Drive	Duplicate		⇔
► □ Z Axis	Delete Split	/	:
► □ Y Axis	Add to Bus Remove from Bus		:
► □ X2 Axis	Add to Cluster	1	:

Table: Dual-Axis Context Menu	
Options	Description
Duplicate	Duplicate the dual axis
Delete	Delete the dual axis with all its children
Split	Split the dual axis into two separate axes
Add to bus	Display a list of buses to which the dual axis can be moved (disabled if none of the buses meet the requirements or there is no bus added)
Remove from bus	Remove the dual axis from the bus (disabled if selected dual axis is not in the bus)
Add to cluster	Display a list of clusters to which the dual axis can be moved or add dual axis to a new cluster (disabled if dual axis does not meet the requirements)
Remove from cluster	Remove the dual axis from the cluster (disabled if selected dual axis is not in the cluster)

### **Merge Dual-Axis**

User should have a drive that supports dual axis. User should have two axes of same type of drive and power requirements, then user can merge them to one dual axis drive group. This means one drive manages two axes.

Perform the following steps to create a dual-axis:

 Create two axes with different motors and same drive from the K5700 model family.
 Alphabet "D" in the Drive Product catalog number indicates the Dual-Axis drive.

### Figure: Drive Selector

	Drive Selec	tor				
Fam	Table View	v				
arch 2198-	D ×	<b>Y</b> Filter				7 Results
wer R	equirements					
oltage		Phase	Voltage Tolerance			
20		2	10 04 400 + 10	04		
This	Axis is configured as a part of	of the Power Bus. To update the Powe	r Requirements, you need to chan	79 nge the Power Bus requirements.		
This	Axis is configured as a part o	of the Power Bus. To update the Power Ivtr. Cont. Current [A (0-Pk)]	r Requirements, you need to chan Ivtr. Peak Current [A (0-Pk)]	nge the Power Bus requirements. Rated Power [kW]	Voltage Range [V]	Frame Size
This elect	Axis is configured as a part o Catalog Number 2198-D006-ERSx	of the Power Bus. To update the Power Ivtr. Cont. Current [A (0-Pk)]	Ivtr. Peak Current [A (0-Pk)]	Rated Power [kW]	Voltage Range [V] 195 - 528	Frame Size
This select	Axis is configured as a part of Catalog Number 2198-D006-ERSx 2198-D012-ERSx	of the Power Bus. To update the Power Ivtr. Cont. Current [A (0-Pk)] 3.5 7.1	r Requirements, you need to chan  Ivtr. Peak Current [A (0-Pk)]  8.5  16.9	Rated Power [kW]	Voltage Range [V] 195 - 528 195 - 528	Frame Size
This ielect	Axis is configured as a part of Catalog Number 2198-D006-ERSx 2198-D012-ERSx 2198-D020-ERSx	J         J           of the Power Bus. To update the Power         Ivtr. Cont. Current [A           (0-Pk)]         3.5           7.1         11.3	Ivtr. Peak Current [A           (0-Pk)]           8.5           16.9           28.3	Rated Power [kW]  1.7  3.4  5.5	Voltage Range [V] 195 - 528 195 - 528 195 - 528	Frame Size 2 2 2 2
This elect	Axis is configured as a part of Catalog Number 2198-D006-ERSx 2198-D012-ERSx 2198-D020-ERSx 2198-D032-ERSx	J         J           of the Power Bus. To update the Power         Ivtr. Cont. Current [A           (0-Pk)]         3.5           7.1         11.3           18.4         18.4	IVTr. Peak Current [A           (0-Pk)]           8.5           16.9           28.3           45.2	No         No           Inge the Power Bus requirements.         Rated Power [kW]           1.7         3.4           5.5         8.9	Voltage Range [V] 195 - 528 195 - 528 195 - 528 195 - 528 195 - 528	Frame Size 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
elect	Axis is configured as a part of Catalog Number 2198-D006-ERSx 2198-D012-ERSx 2198-D020-ERSx 2198-D032-ERSx 2198-D032-ERSx	J         J           Ivtr. Cont. Current [A         (0-Pk)]           3.5         7.1           11.3         18.4           32.5         32.5	Iver. Peak Current [A           (0-Pk)]           8.5           16.9           28.3           45.2           80.6	Rated Power [kW]           1.7           3.4           5.5           8.9           15.9	Voltage Range [V]           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528	Frame Size 2 2 2 2 2 4
Select	Axis is configured as a part of Catalog Number 2198-D006-ERSx 2198-D020-ERSx 2198-D020-ERSx 2198-D032-ERSx 2198-D057-ERSx 2198-D05016-ERSx	J         J           Ivtr. Cont. Current [A (0-Pk)]         3.5           7.1         11.3           18.4         32.5           5.3         5.3	Iver. Peak Current [A           (0-Pk)]           85           16.9           28.3           45.2           80.6           16	Rated Power [kW]           1.7           3.4           5.5           8.9           15.9           3.6	Voltage Range [V]           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528           195 - 528	Frame Size           2           2           2           2           4           2

2. Ensure that the Power Requirements are same for both the axes. *Figure: Power Requirements* 

morkinetix Dist	ributed S Axis Overview - Ger	neral_Mo   Motion Definition: S	et up A	Motion Definition: Profile E	Components: Drive - Gener	
				Previous Step G	io to Axis Overview Go to Solu	tion Search
Û	Motor	PRODUCTS	Ô	Drive	PRODUCTS	Â
dd box	MPL Low Inertia Servo Motor	Diff MPL-84560F-xxxxxxx	• <	Kinetix 5700 Servo Drive	2198-D006-ERSx	đ
	Drive Selector					
Family V	Table View					Show
<b>T</b> Filter					10 Results	50 -
Filter	irements			]	10 Results	50 -

The two axes displayed in the Project summary page.

Fiaure:	Proiect	Summarv	Page
riguic.	1 10/000	Guinnary	i ugo

	Power Bu	15						O Power Summary	Clusters: 0	Pims: 2	Axes: 10	:
4: 	C Line Volta 80	age	•	Phase 3	•	Voltage Toleran - 10 % 480 	0 <u>+ 10</u> %					
	□ ▼	General_N	lotion_Axis_	_1							/	:
		Axis Type:	Rotary			Transmission:	Belt Drive					
		Motor:	MPL-B4560	F-XXXXXXX FRSX								
-		brive.	2130-2020-									
	•	General_N	lotion_Axis_	_2								:
		Axis Type:	Rotary			Transmission:	Chain & Sprocket					
		Motor:	VPC-B2153A	A-XXXXAS								
		Drive:	2198-D020-	ERSX 🔶								

Click the ellipsis icon of one axis, the available options display.
 Click [Add to dual axis] and select the required axis to merge.

	Edit Rename Duplicate Delete				
	Add to Bus Remove from Bus				
	Add to Cluster Remove from Cluster	Þ			
General_Motion_Axis_1 🔶	Add to Dual Axis 🔶 🔶 🕨				
	Remove from Dual Axis				
	Add to PIM				
	Remove from PIM				
	Q Solution Search				

Figure: Add Dual-Axis

5. The two axes are merged and displayed under the same drive as shown in the following image:

### Figure: Same Drive

Dual Axis Drive	Drive: 2198-D020-ERSX	++→ :
□ ► General_Motion_Axis_1		/ :
□ ► General_Motion_Axis_2		/:

6. This drive manages both axes.

### **Split Dual-Axis**

The Dual-Axis will have one drive to manage, but when the user splits the Dual-Axis, it divides into two separate axes with a drive for each having the same configurations.

The Dual-Axis can be split in the following ways:

- Split one of the axis on Architecture Overview Page
- · Add new drive to one of the axis that Dual-Axis consists
- Delete a drive from one of axes which Dual-Axis component
- Delete one of the axes which made up the Dual-Axis

# Split Option on Architecture Overview Page

Perform the following steps to split a Dual-Axis using Split option:

Click the Split icon on a Merged Dual-Axis.

Figure: Merge Dual-Axis

Du	al Axis Drive	Drive: 2198-D020-ERSX	<b>→</b>	♣
•	🗌 Z Axis		/	:
•	□ Y Axis		/	:

1. The axes are separated as shown in the following image:

Figure: Axes Separated

► Z Axis	/:
► YAxis	/:

## **Add New Drive**

Perform the following steps to split the Dual-Axis by adding a new drive for one of the axes which Dual-Axis consists of:

- 1. On the Project with Dual-Axis, open the Drive Component page.
- 2. Add a new drive as shown in the following image:

roject 🕂 🛛	Power Analysis Sample Proj	Components: Drive - Z Axis					
O Preferences		-					
Architecture Overview	Motor		0	Drive		0	
• 3. Power Bus	FAMILIES	PRODUCTS		FAMILIES	PRODUCTS		
<ul> <li>Dual Axis</li> </ul>		WSC-82154A-8000ES			2198-0020	JUGA 🛛	
▼ Z Axis	There are no families	s selected	<	There are no fami	lies selected		<
- Dvervlew							
Motion Definition							
<ul> <li>Components</li> </ul>	and the second sec						
Custom Mechanism		Confirm Split		×			
o Transmission	Drive	Reconfiguring your drive selection v	vill revoke your dual axis. )	Are you sure			
Motor	E Family Very T	you want to continue?					
Drive			Confirm	Cancel			
<ul> <li>Solution Search</li> </ul>			Committee	or	_		
<ul> <li>Analysis</li> </ul>	9. Search	Filter		1124 Results 50	1 2 3 4 5	23 🕨 Jump to	
<ul> <li>Y Axis</li> </ul>							
<ul> <li>X2 Axis</li> </ul>	Power Requirements						
<ul> <li>[Copy] Z Axis</li> </ul>							
<ul> <li>Power Analysis</li> </ul>			- 10 % 415 *	10 %			
Ib Bill of Materials							
Project Report							
	Select Catalog Number	Ivtr. Cont. Current [A (0-Pk)]	Iver. Peak Current [A (0-Pki]	Rated Power [kW]	Voltage Range [V]	Frame Size	
	2094-0C01-M01-M	4	10	u	324 - 528	1	
	2094-8C01-M01-M		21.5	3.9	324 - 528	1	

The Confirm Split warning dialog will be displayed. This action will split the Dual-Axis.

3. Click [Confirm] and the Dual-Axis that are components of Dual-Axis will be separated.

# **Delete Drive**

Perform the following steps to split a Dual-Axis by deleting a drive from one of the axes which is component of Dual-Axis:

1. On the Drive component page, if the user deletes a drive, the confirm split warning dialog will be displayed.

### Figure: Confirm Split

Figure: Confirm Split

Motor		8	Drive		1
FAMILIES	PRODUCTS VPC-82154A-xx	oof5 📋	FAMILIES	PRODUCTS 2198-0020-ERSx	(
There are no families	elected		There are no families se	lected	
Drive	onfirm Split		×		
R	econfiguring your drive sele ou want to continue?	ection will revoke your dual axis.	Are you sure		
Family View Te Y		Confirm	Cancel		
Family View Te Y	Filter	Confirm	Cancel over 1124 Results 50 - 4 1	2 3 4 5 23 🕨	Jump to

### 2. Click [Confirm] and the driver will be removed.

### Figure: Driver Deleted

iransmissi	ons	1	5	Motor		ê Di	rive 🗊
+ Add Transmissi	OR	+ Add Gearbox	<	FAMILIES PRO	DOUCTS C-82154A-xxxxFS	•	+ Add Drive
Family View	Drive Sele	ector				/	
Search		<b>T</b> Filter		1124 Results	Show 50 ▼ < 1 2 3	4 5 2	Jump to
wer Requirer	nents						

3. The axes which are components of Dual-Axis will be separated.

►	/:
► □ Y Axis	/:

# **Delete Axis**

Perform the following steps to split a Dual-Axis by deleting either axis of Dual-Axis:

1. Click the ellipsis icon of one of the axes which is component the Dual-Axis and click [Delete].

Figure: Delete Axis

Select all				
Power Bus		O Power Summary	Clusters: 0 Pims: 2 Axe	:2
AC Line Voltage Phase 3	Voltage Tolerance			
Dual Axis Drive	Drive: 2198-D020-ERSX		<del>(</del> )>	:
General_Motion_Axis_1			1	:
□ ► General_Motion_Axis_2			Edit Rename Duplicate	
			Add to Bus Remove from Bus	•
			Add to Cluster Remove from Cluster	,
			Add to Dual Axis Remove from Dual Axis	
			Add to PIM Remove from PIM	
			Q Solution Search	

2. The Delete axis warning dialog will be displayed. Click [Accept].

#### Figure: Delete Axis

Select all		
Power Bus		O Power Summary Clusters: 0 Pims: 2 Axes: 2
AC Line Voltage Phase 480 • 3	Voltage Tolerance           •         -         10         96         480         +         10         96	
Dual Axis Drive Delete	Axis	× 🚸 :
Removin	ig one of the axis from dual axis will revoke your dual axis. want to continue?	Are you
General_Motion_Axis	Accept	Cancel

### The axis will be deleted and the Dual-Axis will be split.

### Figure: Axis Deleted

Power Bus	Phase		Voltage Tolerance		O Power Summary	Clusters: 0	Pims: 1	Axes: 1	
480	3	•	- 10 96 480 + 10	96					

### Duplicate Architecture Overview Items

Motion Analyzer allows user to duplicate the following Architectural Overview elements:

- Standalone Axis
- Dual-Axis
- Cluster
- Power Bus

**Standalone** Axis

Perform the following steps to duplicate a standalone Axis:

1. Right-click on a selected axis and click [Duplicate].

(Or)

Click the ellipsis icon of an axis that needs to be duplicated and click [Duplicate].

#### Figure: Duplicate Standalone Axis

Select all				
Power Bus		O Power Summary	Clusters: 0 Pims: 1	Axes: 1
AC Line Voltage Phase	Voltage Tolerance - 10 % 480 + 10	96		
☐ ► General_Motion_Axis_2 ←	Edit			/ :
	Rename Duplicate <b>4</b> Delete			
	Add to Bus Remove from Bus			
	Add to Cluster   Remove from Cluster			
	Add to Dual Axis Remove from Dual Axis			
	Add to PIM Remove from PIM			
	Q Solution Search			

This creates a copy of the selected axis with same data such as Axis type, Motor family, and Driver details.

Figure: Duplicated

Power Bus						0	Power Summary	Clusters: 0	Pims: 1	Axes: 2	
AC Line Voltage 480	•	Phase 3	•	Voltage Tolerance - 10 % 480	+ 10 9	Ь					
□ ► General_M	otion_Axis	_2								1	

- User can also create a copy of axis by duplicating a cluster. This creates a copy of all the Axes or Power Bus available in within a Cluster.
- User can also duplicate an element outside the cluster in the same way.

**NOTE**: It is recommended to rename the copied element.

# **Dual-Axis**

Perform the following steps to duplicate a Dual-Axis:

1. Right-click on a selected Dual-Axis header and click [Duplicate].

### Figure: Duplicate Dual-Axis

Power Bus		O Power Summary	Clusters: 0 Pims:	3 Axes:	2
AC Line Voltage Phase 480 - 3	Voltage Tolerance - 10 96 480 + 10 96				
Dual Axis Drive	Drive: 2198.D020-ERSX			⇔	:
General_Motion_Axis_1	Delete Split			1	:
□ ► General_Motion_Axis_2	Add to Bus Remove from Bus			1	:
	Add to Cluster				

A copy of the selected Dual-Axis is generated with same data.

### Figure: Duplicated

Select all				
Power Bus		O Power Summary Clusters: 0 Pims:	3 Axes:	4
AC Line Voltage Phase 3	Voltage Tolerance - 10 96 480 + 10 96			
Dual Axis Drive	Drive: 2198-D020-ERSX		⇔	:
General_Motion_Axis_1			1	:
General_Motion_Axis_2			1	:
Dual Axis Drive	Drive: 2198-D020-ERSX		⇔	:
F [Copy] General_Motion_Axis_1			1	:
□ ► [Copy] General_Motion_Axis_2			1	:

2. User can also duplicate a Dual-Axis drive within a Cluster.

**NOTE**: It is recommended to rename the copied element.

## Cluster

Perform the following steps to duplicate a Cluster:

1. Right-click on a cluster header and click [Duplicate].

Figure: Duplicate Cluster

ver Analysis Sample Proj		
	Add Axis	Add Bus
Select all		
Power Bus	O Power Summary Cluster	s: 1 Axes: 9
AC Line Voltage Phase 415 9	Voltage Tolerance - 10 96 415 + 10 96	
Cluster	Rename	
Dual Axis Drive	Driv Delete	⇔
► □ Y Axis	/	:
► □ Z Axis	/	:
Dual Axis Drive	Drive: 2198-D020-ERSX	
Copy] Y Axis	/	:
Copy] Z Axis	/	:

### A copy of the selected cluster is generated with same data.

### Figure: Duplicated Cluster

Cluster				
Dual Axis Drive	Drive: 2198-D020-ERSX		<b>«</b> þ	•
► ☐ Y Axis		/	:	
E Z Axis		/	:	
Dual Axis Drive	Drive: 2198-D020-ERSX		ф	•
[Copy] Y Axis		/	:	
[Copy] Z Axis		/	:	
Copy] Cluster				
Dual Axis Drive	Drive: 2198-D020-ERSX		<b>₩</b>	•
Copy] Y Axis		1	:	
[Copy] Z Axis		1	:	

NOTE: It is recommended to rename the copied element.

# **Power Bus**

Perform the following steps to duplicate a Power Bus:

1. Right-click on a Power Bus header and click [Duplicate].

Figure: Duplicate Power Bus

Select all			
AC Line Voltage Phase Voltage Tolerance 480 • 3 • 10 % 480 • 10 %	O Power Summary Clusters: 0 Pims: 0 Duplicate	Axes:	4
Dual Axis Drive	Drive: 2198-D020-ERSX		:
Fopy] General_Motion_Axis_1		1	:
□ ► [Copy] General_Motion_Axis_2		/	:
Dual Axis Drive	Drive: 2198-D020-ERSX		:
General_Motion_Axis_1		1	:
General_Motion_Axis_2		1	:

A copy of the selected Power Bus is generated with same data.

### Figure: Duplicated Power Bus

Copy] Power Bus				O Power Summary	Clusters: 0	Pims: 0	Axes:	2
AC Line Voltage 480 •	Phase 3	✓         10         %         480         +         10         %						
Dual Axis Drive		Driv	ve: 2198-D020-ERSX				⇔	:
□ ► [Copy] General_M	otion_Axis_1						1	:
Copy] General_M	otion_Axis_2						1	:

**NOTE**: It is recommended to rename the copied element.

This page has been intentionally left blank

# **Define your profile**

Profile Editor allows user to create a variety of industry-standard motion profiles to define motion and the load based on the type of axis (linear/rotary) in a project. Motion profile consists of various types of motion segments with some additional loads and units based on the axis type. These profile editor values are persisted even after the tab is closed and can also be displayed on Overview page.



Figure: Profile Editor

Table: Profile Editor Featu	res
Feature	Description
Profile Toolbar	To add, move, and remove profile segments or an entire motion profile
Segment Load Window	Each profile segment type has an associated Segment Parameters window. Highlight a particular profile segment in the motion profile, that segment's parameter window becomes available for entering data. The default profile segment type is an Index profile segment.
Segment Plot Window	Displays a plot for a single profile segment in the motion profile. The x-axis is time, and the y-axis can be adjusted to display various motion curves (for example, Distance, Velocity, or Acceleration.
Profile Plot	Displays the entire motion Profile Plot that consists of a series of profile segments. The plot can be adjusted and analyzed with the two sub-windows that accompany the plot.

Set up Axis

The application templates allow users to provide pre-configured complex mechanism application data. These templates convert the complex

mechanisms into Motion Analyzer mechanism data and Motion profiles with additional inertia and loads.

### Rotary Complex Template

The Rotary Complex template is used to calculate Complex Load Data for Unbalanced Load and Crank application types.

Perform the following steps to add the Rotary Complex template to the Motion Profile:

- 1. Under the Motion Definition menu, click [Set up Axis].
- 2. Under the Motion Type, select the Rotary Complex template and click [Next Step].

orKinetix Distributed S	Axis Overview - New Axis 1	Motion Definition: Set up A	Motion Definition: Profile E	
Set un A	vie			Go to Axis Overview Next Sto
Select	XXIS			
Motion Type	OR	Applic	ation template	
O Linear	O Ca	orriage Cut Off	O Cutter H	Knife Drive
	J	-		<u>_</u> , _
0	٢	•	0	
O Rotary	O Po	wer Speed O Pre	ess Roll Feed (Tim O Press Ro	oll Feed (Ang
$\bigcirc$	(			
0	0	١	0	
Rotary Complex	O Ur	balanced Load O Wi	nder/Unwinder	
$\textcircled{\begin{tabular}{ c c c c } \hline \hline$	g		<b>0</b> _ <u>+</u>	
1	0	0		

Figure: Rotary Complex Template

3. The 'Confirm changes' dialog displays. Click [Confirm]. *Figure: Confirm Changes* 



4. The Rotary Complex template page displays along with the template description.

5. Provide the load data details: Table: Rotary Complex Template				
Field	Description			
Motion Type	Select the Motion type			
Repeating (360 ° unwind)	Here the first and last points should be identical so that the motion profile can be repeated (for example, zero and 360 °). Motion Analyzer software assumes that rotation may continue indefinitely in either direction.			
Limited range (no Unwind)	The first and last points indicate the maximum and minimum positions permitted.			

### Figure: Rotary Complex

#### Rotary Complex

A complex rotary load (inertia, torque and friction) changes based on the angular position of the input shaft. A basic rotary load is constant for all angular positions of the input shaft. The rotary complex load table separates the dynamic load values from the motion profile. No motion is defined in this step. All motion is defined in the profile editor. The complex load table is merged into the motion profile to calculate application requirements for each step of the axis workflow. This feature supplements the Crank Slider and Unbalanced Load application templates.

Load	
Motion Repeating ( Limited Ran	360* Unwind) ige (No Unwind)
Min Position	Unit rad 🖕
Max Position 6.28	Unit rad 🖕

Table: Inertia Table	
Field	Description
Position	Driving shaft angle with reference to the starting angle.
Inertia	Load inertia for the given shaft angle.
External Torque	Torque applied at the given position.
Friction Torque	Torque loss due to friction.
	To add a row above the selected row. The new row is generated with the average value from the top and bottom rows.
•	To add a row below the selected row. The new row is generated with the average value from the top and bottom rows.
Ô	To delete the selected row.
Import	To import load data from an external file (.csv) into the Complex Load Data table.
Export	To export load data as an external file in .csv format from the Complex Load Data table.
Clear	To delete all the rows.
Repopulate Sample date	To repopulate the sample load data.

### • Inertia Table Actions:

6. The Inertia table displays.

- User can edit the labels in the Inertia Table and the relevant changes will be affected in the limited range motion type.
- If user changes the units in the Position column, the same units are reflected in the limited range motion type.
- Every column in the Inertia table has its own unit's selector and the value may change based on the units selected.

- User can also edit the load data by exporting the load data, editing the fields in a spreadsheet, and re-uploading the Load data by Import option.
- Click [Next Step] on the top right corner. Based on the provided parameters, the Motion Profile is defined on the Profile Editor page.
- 2. Refer to "Define your profile" section to proceed further.

**Carriage Cut Off Template** This application is typically cutting strip material into pre-set lengths with a 'Flying Shear' (heavy-duty knife on a moving carriage). The shear must be stationary relative to the material (for example, moving at line speed) when the cut is made, and the cut takes a fixed time.

Strip material is unwound from a reel at constant surface speed and fed via separately driven leveler rolls. After the cut is complete, the shear is stopped then moved back to its start position. It must accelerate to match the line speed at the correct position to cut the required length of material.

Perform the following steps to add the Carriage Cut Off template to the Motion Profile:

- 1. Under the Motion Definition menu, click [Set up Axis].
- 2. Under the Application Template, select the Carriage Cut Off Template and click [Next Step].



Figure: Application Template

3. The 'Confirm changes' dialog displays. Click [Confirm].

### Figure: Confirm Changes



### The Carriage Cut Off template page displays.

### Figure: Carriage Cut Off



Туре	Field	Description
Load	Carriage Mass	Total mass of the linear moving parts.
	Drive Roll Diameter	Diameter of the roll, driven from the motor.
	Friction Coefficient	Coefficient of friction of the sliding bearing.
Process	Calculate Timing Based On	<ul><li>Choose the option on which the timing should be calculated:</li><li>Line Speed: The speed of the line.</li><li>Cuts per Minute: Number of cuts made per minute.</li></ul>
	Max Average Line Speed	Provide the value when the maximum design speed of the constant-speed sections of the line is known. This speed does not refer to the peak velocity of the feeder section, which is determined by application.
	Cuts per Minute	Provide the value when the number of cuts made by the system per minute is known.

# 4. Provide the load data details:

	Cut Length	The length of the cut. To cut longer lengths than this critical length, the line speed must be reduced.
Motion	Моче Туре	<ul> <li>Select the Motion type:</li> <li>Trapezoid: Select this option when the application needs to accelerate to a maximum velocity and then travel at that velocity for a specified time or distance. A trapezoidal move of the virtual axis produces a trapezoidal load profile.</li> <li>Triangle: Select this option for a Triangular load profile.</li> </ul>
	Jerk	This value sets the amount of S-curve of the Load Profile. For Trapezoid, the default Jerk value is 0%.
Timing	Cycle Time	Calculated cycle time for the specified load profile.
	Cut Time	Time required for the carriage to synchronize accurately with the material.
	Settling Time	This is the time required for the system to achieve the required position accuracy before the cut commences. The finer the required accuracy, the longer the settling time value.
	Move Time	Time through which the load profile takes place.

NOTE: Ensure to provide valid parameters to calculate.

5. Click [Next Step]. The Confirm changes dialog displays.

NOTE: This dialog displays even if the user clicks [Previous Step] on top right corner or the user wanted to leave the application template page.

6. Click [Cofirm].

Figure: Confirm Changes

Confirm changes	
Applying changes to the Application	n Template will reset the current Motion
Profile to the default one for given	Application Template. Do you want to
continue?	

- 7. Based on the given parameters, the Motion Profile is defined on the Profile Editor page.
- 8. Refer to "Define your profile" section to proceed further.

The Crank Mechanism is an arm attached at a right angle to a rotating shaft by which reciprocating motion is imparted to or received from the shaft. The Crank Slider template is used to calculate the load profile for a given application.

Perform the following steps to add the Crank Slider template to the Motion Profile:

- 1. Under the Motion Definition menu, click [Set up Axis].
- 2. Under the Application template, select the Crank Slider template and click [Next Step].

### **Crank Slider Template**





3. The 'Confirm changes' dialog displays. Click [Confirm]. *Figure: Confirm Changes* 



The Crank Slider template page displays.





### 4. Provide the load data details:

Table: Load Data				
Туре	Field	Description		
Crankshaft	Crank Radius	The distance between crankshaft and crank pin.		
	Crank Inertia	The inertia of the crank alone when the connecting rod is disconnected.		
		Or the user can calculate the inertia using the [ ] icon. Refer to Inertia Calculator section.		
Linear Mass	Sliding Mass	The mass of the load attached to the connecting rod at the gudgeon pin.		
	Sliding Mass Offset	The minimum distance between the crankshaft and the path of motion of the slider.		
-------------------------	--	--		
Connecting Rod	Connecting Rod Length	The distance from the crank pin center to the gudgeon (wrist) pin center.		
	Connecting Rod Mass	The total mass of the connecting rod.		
	Conrod Centre of Gravity Offset	The location of the center of gravity of the connecting rod along its length starting from the point where it meets the crank arm		
	Conrod Inertia	The inertia of the connecting rod about its own center of gravity.		
		Or the user can calculate the inertia using the [ ] icon. Refer to Inertia Calculator section.		
Force on Linear Mass	Determines whethe the crank shaft or t	r the end force is applied to the sliding mass based on the angular position of he linear position of the sliding mass.		
	Crankshaft Angle	<ul> <li>The angular rotation of the crankshaft at which the force is applied to the sliding mass. Start force must be within one positive or negative revolution and less than the end force angular position.</li> <li>Start: The starting angle for the Crank load profile. 90° indicates vertical and gravity has no effect.</li> <li>End: The ending angle for the Crank load profile.</li> </ul>		
	Slider Position	<ul> <li>The linear position at which the over is applied to the sliding mass. The position is measured relative to the crank shaft. The crank shaft is considered 0 position. Start force must be less than the End force position.</li> <li>Start: The distance between gudgeon (wrist) pin and crank shaft center when force is applied.</li> <li>End: The distance between the gudgeon (wrist) pin and crank shaft center when force stops.</li> </ul>		
Force	Start	The magnitude of the force at the start point.		
	End	The magnitude of the force at the end point.		
Rows	Define the number of rows in the Rotary Complex output.			
Export to Logic Cam	To transfer the geometrical data to the clipboard for pasting into the Logix Cam. The master axis is a virtual axis, and the slave axis is the crank axis. A trapezoidal move of the virtual axis produces a trapezoidal load profile at the gudgeon pin. The master data must increase positively so only that part of the cam that satisfies this requirement is exported.			

Based on the provided parameters, Motion Analyzer calculates the inertia table, complex graph, and simulation automatically NOTE: Ensure to provide valid parameters to calculate and animate the simulation. A toast message displays if invalid parameters are provided.

The Inertia table displays.

### Figure: Inertia Table

Inertia Table

					-
	Position rad	Inertia kg · m²	External Tor	Friction Torq Nm	Linear positi m
1	0	0.1455555555555	0	0	2
2	0.216661562316537	0.170225606722607	0	0	1.984454297479782
3	0.433323124633075	0.237886465325039	0	0	1.939022804222131
4	0.649984686949612	0.331390954685437	0	0	1.867209914616795
5	0.86664624926615	0.427922114356199	0	0	1.774478188643771
6	1.083307811582687	0.505681250273609	0	0	1.667679583524897
7	1.299969373899225	0.549714209391246	0	0	1.55428972446559
8	1.516630936215762	0.554646911753881	0	0	1.441542061081439
9	1.7332924985323	0.523669712024709	0	0	1.335634099843009
10	1.949954060848837	0.4652906294229	0	0	1.241202482556078
11	2.166615623165375	0.390299184937549	0	0	1.16118756394288
12	2.383277185481912	0.310195672173827	0	0	1.097059569205609
13	2.599938747798449	0.236539938365836	0	0	1.049255767618557
14	2.816600310114987	0.180114424713506	0	0	1.017653093523673
15	3.033261872431525	0.149500414255694	0	0	1.00195656138662
16	3.249923434748062	0.149500414255694	0	0	1.00195656138662
17	3.4665849970646	0.180114424713506	0	0	1.017653093523673
18	3.683246559381137	0.236539938365836	0	0	1.049255767618557
19	3.899908121697675	0.310195672173827	0	0	1.097059569205609

Table: Inertia Table				
Field	Description			
Position	Driving shaft angle with reference to the starting angle.			
Inertia	Load inertia for the given shaft angle.			
External Torque	Torque applied at the given position.			
Friction Torque	Torque loss due to friction.			
Linear Position	The motion of a point along a straight line.			
Export	To export load data as an external file in .csv format from the Complex Load Data table.			

NOTE: User cannot edit the labels and rows in the Inertia Table.

Show 30 Results 50 +

5. The Complex Load Graph displays the data on the graph. Hover the mouse pointer on the graph line to view the values.

### Figure: Complex Load Graph



- 6. The simulator displays the animated view of crank slider.
- 7. Click [Tools] to change the view the slider action .



Table: Tools	
Field	Description
3D view	3D view
Axis rotation	
Y-Axis (degree)	Angle of axis rotation on Y-axis. Use [Reset] to reset the Y-axis view to Zero.
Z-Axis (degree)	Angle of axis rotation on Z-axis. Use [Reset] to reset the Z-axis view to Zero.
Animation speed	The speed of the axis. Range: 1-8.
Play/Stop	To run the simulated crank image through the specified motion profile
Inclination angle	To change the Plane units and Crankshaft units. This action will change the inertia table view.

8. On the animation, point the cursor on any entry field, and the Parameter entry details display.



9. Click [Next Step]. The Confirm changes dialog displays.

NOTE: This dialog displays even if the user clicks [Previous Step] on top right corner or the user wanted to leave the application template page.

10. Click [Confirm].

Figure: Confirm Changes

Applying changes to the Application Template will reset the current M	
	notion
Profile to the default one for given Application Template. Do you war	nt to
continue?	

11. Based on the given parameters, the Motion Profile is defined on the Profile Editor page.

Refer to "Define your profile" section to proceed further.

# Cutter Knife Drive Template 🛛

This application is typically cutting strip material such as steel into pre-set lengths by means of a rotary knife (heavy-duty knife blades mounted on a pair of rotating drums). The blades must be stationary relative to the material (for example, moving at line speed) when the cut is made and the cut takes place over a fixed drum angle.

Strip material is unwound from a reel at constant surface speed and fed via separately driven leveler rolls. After the cut is complete, the drum is adjusted forward or backward relative to the material in order to cut the required length. It must return to line speed at the position required to cut the required length of material.

When the cut-length is equal to the circumference of the locus of the knife blade tip, it is said to be the synchronous cut length. In this special case, the knife drums rotate at a steady speed.

Perform the following steps to add the Cutter Knife Drive template to the Motion Profile:

- 1. Under the Motion Definition menu, click [Set up Axis].
- 2. Under the Application Template, select the Cutter Knife Drive Template and click [Next Step].



Figure: Application Template

3. The 'Confirm changes' dialog displays. Click [Confirm].

# Figure: Confirm Changes

Confirm changes		×
Are you sure you want to change Axis type?		
	Confirm	Cancel

# The Cutter Knife Drive template page displays.

### Figure: Cutter Knife Drive Template

						Previous Step Go to Axis Overview
Cuti	ter Knife Di	rive				
Load Total Knife Inertia 0.01	Unit kg - m²	, 🗐	Process Calculate Timing Based On Line Speed			Rotary Knife
Contact Angle 0.1	Unit rad		Cuts per Minute	Unit m/s		
Effective Diameter 0.05	Unit M		Cuts per Minute			
Blades Per Knille 1 Cutting Force	Unit		Min Cut Length at Max Line 0.06	Unit M	<u>.</u>	Effective Diameter
1	- <u>N</u>		-			¥ •••
Motion () Cosine Compensation Linear			Timing Cycle Time 6	Unit S	•	Servomotor
Cosine	Unit		Cut Time 0.25	Unit S	<u>.</u>	
			Settling Time 0.01	Unit S	•	
			Move Time 5.49	Unit S		

# 4. Provide the load data details:

Table: Loa	nd Data			
Туре	Field	Description		
Load Total Knife Inertia		Inertia of the knife assembly at the drive shaft.		
		Or the user can calculate the inertia using the [ ]icon. Refer to Inertia Calculator section.		
	Contact Angle	Time the material must be stationary in an accurate position.		
	Effective Diameter	As illustrated in the Cutter Knife Drive (Rotary Knife) diagram, this is the diameter of the circle passing through the cutting edge.		
	Blades Per Knife	Number of blades around the circumference of the knife.		
	Cutting Force	Maximum force required to cut through the material. Cutting force is essentially constant while maximum torque occurs at the first point of knife contact.		
Process	Calculate Timing Based On	Choose the option on which the timing should be calculated: • Line Speed: The speed of the line.		
		Cuts per Minute: Number of cuts made per minute.		

	Max Average Line Speed	Provide the value when the maximum design speed of the constant-speed sections of the line is known. This speed does not refer to the peak velocity of the feeder section, which is determined by application.
	Cuts per Minute	Provide the value entry when the number of cuts made by the system per minute is known.
	Min Cut Length at Max line speed	This data is required when you select the option to enter data based on Max Average Line Speed. This is the critical condition on which the sizing process is performed. To cut shorter lengths than this critical length, the line speed must be reduced.
Motion	Cosine Compensation	The Cosine Compensation is used to make sure that while the press cutter knife is in contact with the material being cut, the horizontal component of the knife's velocity matches the material speed.
	Jerk	This value sets the amount of S-curve of the Load Profile. For Trapezoid, the default Jerk value is 0%.
Timing	Cycle Time	Calculated cycle time for the specified load profile.
	Cut Time	Time required for the carriage to synchronize accurately with the material.
	Settling Time	This is the time required for the system to achieve the required position accuracy before the cut commences. The finer the required accuracy, the longer the settling time value.
	Move Time	Time through which the load profile takes place.

NOTE: Ensure to provide valid parameters to calculate.

5. Click [Next Step]. The Confirm changes dialog displays.

NOTE: This dialog displays even if the user clicks [Previous Step] on top right corner or the user wanted to leave the application template page.

6. Click [Confirm].

Figure: Confirm Changes



7. Based on the given parameters, the Motion Profile is defined on the Profile Editor page.

Refer to "Define your profile" section to proceed further.

# **Power Speed Template**

The Power Speed template is used to enter torque and speed values that are used to calculate the power requirements for the application.



Perform the following steps to add the Power Speed template to the Motion Profile:

- 1. Under the Motion Definition menu, click [Set up Axis].
- 2. Under the Application template section, select the Power Speed template and click [Next Step].

Figure: Power Speed Template

3. The 'Confirm changes dialog displays. Click [Confirm].

Figure: Confirm Changes



4. The Power Speed template page displays.

#### Figure: Power Speed Template



# 5. Provide the Power and speed values: Table: Power Speed Template

Table. Tower opeca Template	
Field	Description
Power Option	Select the power option:
	• <b>Power/Speed</b> : Use this template when the torque and speed values are known at the load for the application.
	<ul> <li>Continuous Power Range: Use this template when three of the following values are known: maximum torque, minimum torque, maximum speed, or minimum speed.</li> </ul>
Continues Power	Provide the Continues Power value along with their units.
Max Speed	Maximum speed for the application.
Min Speed	Minimum speed for the application. Ensure that this value doesnot exceed the Max speed. This field is disabled if the Power option is Power/Speed.
Max Torque	Maximum torque value for the application. This field is disabled if the Power option is Power/Speed.
Min Torque	Minimum torque value for the application.

- 6. Click [Next Step] on the top right corner. Based on the provided parameters, the Motion Profile is defined on the Profile Editor page.
- 7. Refer to "Define your profile" section to proceed further.

# Press Roll Feed (Time) Template

This application is typically cutting strip material such as steel into pre-set lengths by means of a press shear (heavy-duty knife). The material must be stationary when the cut is made, and the cut takes place over a fixed amount of time of the driving crank whose speed is varied to match the cut rate. Strip material is unwound from a reel at constant surface speed and fed via separately driven leveler rolls into one end of a looping pit (a free-hanging loop of material providing storage). On the other side of the loop, a pair of feeder rolls grips the material and moves it forward the required cut length and then stops. After the cut is complete, the material is moved again. The average velocity of the nip/feeder rolls must be equal to the constant velocity of the unwinder and leveler rolls. Perform the following steps to add the Press Roll Feed (Time) template to the Motion Profile:

- 1. Under the Motion Definition menu, click [Set up Axis].
- 2. Under the Application Template, select the Press Roll Feed (Time) Template and click [Next Step].

Figure: Application Template



- 3. The 'Confirm changes' dialog displays. Click [Confirm].
  - Figure: Confirm Changes

Confirm changes		×
Are you sure you want to change Axis type?		
	Confirm	Cancel

The Press Roll Feed (Constant Time) template page displays.

### Figure: Press Roll Feed (Constant Time) Template



### 4. Provide the load data details:

Table: Loa	nd Data					
Туре	Field	Description				
Load	Moving Material Mass	The mass of the material in the loop and on the flat before the Nip/Feed rolls.				
	Bias Force	The force required to overcome the force of gravity on the loop.				
	Drive Roll Diameter	The diameter of the roll in direct contact with the strip, driven from the motor.				
	Total Roll Inertia	The total inertia of the strip material at the drive shaft.				
		Or the user can calculate the inertia using the [ ] icon. Refer to Inertia Calculator section.				
Process	Calculate Timing Based On	<ul><li>Choose the option on which the timing should be calculated:</li><li>Line Speed: The speed of the line.</li><li>Cuts per Minute: Number of cuts made per minute.</li></ul>				
	Max Average Line Speed	Select this option for data entry when the maximum design speed of the constant-speed sections of the line is known. This speed does not refer to the peak velocity of the feeder section, which is determined by Motion Analyzer software.				
	Cuts per Minute	Provide this value when the number of cuts made by the system per minute is known.				
	Max. Cut Length at Max Speed	This data is required when you select the option to enter data based on Max Average Line Speed. This is the critical condition on which the sizing process is performed. To cut shorter lengths than this critical length, the line speed must be reduced.				

Motion	Move Type	<ul> <li>Select the Motion type:</li> <li>Trapezoid: Select this option when the application needs to accelerate to a maximum velocity and then travel at that velocity for a specified time or distance. A trapezoidal move of the virtual axis produces a trapezoidal load profile</li> <li>Triangle: Select this option for a Triangular load profile.</li> </ul>
	Jerk	This value sets the amount of S-curve of the Load Profile. The default Jerk value is 0%.
Timing	Cycle Time	Calculated cycle time for the specified load profile.
	Cut Time	Time required for the carriage to synchronize accurately with the material.
	Settling Time	This is the time required for the system to achieve the required position accuracy before the cut commences. The finer the required accuracy, the longer the settling time value.
	Move Time	Time through which the load profile takes place.

NOTE: Ensure to provide valid parameters to calculate.

5. Click [Next Step]. The Confirm changes dialog displays.

NOTE: This dialog displays even if the user clicks [Previous Step] on top right corner or the user wanted to leave the application template page.

6. Click [Confirm].

Figure: Confirm Changes

Confirm changes	×
Applying changes to the Application Template	will reset the current Motion
Profile to the default one for given Application	Template. Do you want to
continue?	

- 7. Based on the given parameters, the Motion Profile is defined on the Profile Editor page.
- 8. Refer to "Define your profile" section to proceed further.

This application is typically cutting strip material such as steel into pre-set lengths by means of a press shear (heavy-duty knife). The material must be stationary when the cut is made and the cut takes place over a fixed angle of the driving crank whose speed is varied to match the cut rate. Strip material is unwound from a reel at constant surface speed and fed via separately driven leveler rolls into one end of a looping pit (a free-hanging loop of material providing storage). On the other side of the loop, a pair of feeder rolls grips the material and moves it forward the required cut length and then stops. After the cut is complete, the material is moved again. The average velocity of the nip/feeder rolls must be equal to the constant velocity of the unwinder and leveler rolls.

Perform the following steps to add the Press Roll Feed (Angle) template to the Motion Profile:

- 1. Under the Motion Definition menu, click [Set up Axis].
- 2. Under the Application Template, select the Press Roll Feed (Angle) Template and click [Next Step].

# Press Roll Feed (Angle) Template

		Figure: Press	s Roll Feed (Angle	e) Template	
					Go to Axis Overview Next Step
Set up Axis Select					
Motion Type	OR		Application template		
O Linear		O Carriage Cut Off	O Crank Slider	O Cutter Knife Drive	
				<b>(</b> )	
<b>(</b> )		0	١	0	
O Rotary		O Power Speed	O Press Roll Feed (Tim	Press Roll Feed (Ang	
		$(\mathcal{F})$	<b>BO</b>		
0		0	•	•	
O Rotary Complex		O Unbalanced Load	O Winder/Unwinder		
$\textcircled{\ }$		20	<mark>₿</mark>		
Ū		0	0		

3. The 'Confirm changes' dialog displays. Click [Confirm]. *Figure: Confirm Changes* 

Confirm changes	×
Are you sure you want to change Axis type?	
	Confirm

The Press Roll Feed (Constant Angle) template page displays.

### Figure: Press Roll Feed (Constant Angle)



# 4. Provide the load data details:

- ...

Туре	Field	Description	
Load	Moving Material Mass	The mass of the material in the loop and on the flat before the Nip/Feed rolls.	
	Bias Force	The force required to overcome the force of gravity on the loop.	
	Drive Roll Diameter	The diameter of the roll in direct contact with the strip, driven from the motor.	
	Total Roll Inertia	The total inertia of the strip material at the drive shaft.	
		Or the user can calculate the inertia using the [ ] icon. Refer to Inertia Calculator section.	
Process	Calculate Timing Based On	<ul><li>Choose the option on which the timing should be calculated:</li><li>Line Speed: The speed of the line.</li><li>Cuts per Minute: Number of cuts made per minute.</li></ul>	
	Max Average Line Speed	Select this option for data entry when the maximum design speed of the constant-speed sections of the line is known. This speed does not refer to the peak velocity of the feeder section, which is determined by Motion Analyzer software.	
	Cuts per Minute	Provide this value when the number of cuts made by the system per minute is known.	
	Max. Cut Length at Cuts/Min	This data is required when you select the option to enter data based on Cuts/min. This is the critical condition on which the sizing process is performed. To cut longer lengths than this critical length, the line speed must be reduced.	
Cut Angel The crank angle during which the material must be position. This value is only required for Press Roll Fe applications.		The crank angle during which the material must be stationary in an accurate position. This value is only required for Press Roll Feed - Constant Angle applications.	

Motion	Move Type	<ul> <li>Select the Motion type:</li> <li>Trapezoid: Select this option when the application needs to accelerate to a maximum velocity and then travel at that velocity for a specified time or distance. A trapezoidal move of the virtual axis produces a trapezoidal load profile</li> <li>Triangle: Select this option for a Triangular load profile.</li> </ul>
	Jerk	This value sets the amount of S-curve of the Load Profile. The default Jerk value is 0%.
Timing	Cycle Time	Calculated cycle time for the specified load profile.
	Cut Time	Time required for the carriage to synchronize accurately with the material.
	Settling Time	This is the time required for the system to achieve the required position accuracy before the cut commences. The finer the required accuracy, the longer the settling time value.
	Move Time	Time through which the load profile takes place.

NOTE: Ensure to provide valid parameters to calculate.

5. Click [Next Step]. The Confirm changes dialog displays.

NOTE: This dialog displays even if the user clicks [Previous Step] on top right corner or the user wanted to leave the application template page.

6. Click [Confirm].

Figure: Confirm Changes



Based on the given parameters, the Motion Profile is defined on the Profile Editor page.

7. Refer to "Define your profile" section to proceed further.

**Unbalanced Load Template** The Unbalanced Load template allows user to enter parameters for an unbalanced load application. Motion Analyzer assumes that the axis of rotation is parallel to the ground if no axis angle is entered and that unbalanced masses create a gravity-related torque. Secondary Inertia, Secondary Mass and Axis Separation parameters are required to consider gravity-induced torque values.

Perform the following steps to add the Unbalanced Load template to the Motion Profile:

- 1. Under the Motion Definition menu, click [Set up Axis].
- 2. Under the Application Template, select the Unbalanced Load Template and click [Next Step].

### Figure: Application Template

					Go to Axis Overview Next S
Set up Axis Select					
Motion Type	OR		Application template		
O Linear		O Carriage Cut Off	Crank Slider	O Cutter Knife Drive	
				<b>•</b> • •	
0		0	0	0	
O Rotary		O Power Speed	O Press Roll Feed (Tim	O Press Roll Feed (Ang	
$\bigcirc$		$(\mathcal{T})$			
0		0	0	0	
O Rotary Complex		O Unbalanced Load	O Winder/Unwinder		
$\textcircled{\bullet}$		3-0-			
0		0	0		

3. The 'Confirm changes' dialog displays. Click [Confirm]. *Figure: Confirm Changes* 



The Unbalanced Load template page displays.





#### 4. Provide the load data details:

Table: Load Data	
Field	Description
Primary Inertia	The inertia of any balanced load about its own axis of rotation. For example, if the main mass is a circular table which is driven about its own axis of symmetry, then Primary Inertia is equal to the table inertia. Or If the user has the measurements and other details of the balanced load, click the [ ] icon to calculate the inertia of the balanced load. Refer to Inertia Calculator section.
Losses	The losses consist of the torque lost in the system due to friction.
Axis Separation	The distance between the secondary mass' center of gravity and the axis of rotation.
Start Angle	The starting angle for the Unbalanced Load profile.
Secondary Inertia	The moment of inertia of the unbalanced mass about its own center of gravity. Or If the user has the measurements and other details of the unbalanced load, click the [ ] icon to calculate the inertia of the unbalanced load. Refer to Inertia Calculator section.
Secondary Mass	The unbalanced mass.

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Axis Angle	The starting angle of rotation. Zero indicates that at the start of the motion profile, the center of gravity lies vertically below the center of rotation. This is the position of the load if it is allowed to swing freely. Positive rotation is clockwise. NOTE: Based on the angle selected, the unbalanced diagram changes its axis.
Row Count	Number of rows

Based on the provided parameters, Motion Analyzer calculates the inertia table and complex load graph automatically. NOTE: Ensure to provide valid parameters to calculate. The Inertia table displays.

Figure:	Inertia	Table
<u> </u>		

nertia	a Table			
				35 Results 50 -
	Position rad	Inertia kg · cm²	External Tor Nm	Friction Torq Nm
1	0	309.3614031429124	0	1
2	0.184799567858223	309.361 <mark>4</mark> 031429124	0.717430945676021	1
3	0.369599135716446	309.3614031429124	1.410430640960623	1
4	0.554398703574669	309.3614031429124	2.05539981239241	1
5	0.739198271432893	309.3614031429124	2.630374808393533	1
6	0.923997839291116	309.3614031429124	3.11577554508167	1
7	1.108797407149339	309.3614031429124	3.495072282542923	1
8	1.293596975007562	309.3614031429124	3.755348525299344	1
9	1,478396542865785	309.3614031429124	3.887740878070807	1
10	1.663196110724008	309.3614031429124	3.887740878070808	1
11	1.847995678582231	309.3614031429124	3.755348525299344	1
12	2.032795246440455	309.3614031429124	3.495072282542923	1
13	2.217594814298678	309.3614031429124	3.115775545081671	1
14	2.402394382156901	309.3614031429124	2.630374808393534	1
15	2.587193950015124	309.3614031429124	2.055399812392412	1
16	2.771993517873347	309.3614031429124	1.410430640960624	1

Table: Inertia Table			
Field	Description		
Position	Driving shaft angle with reference to the starting angle.		
Inertia	Load inertia for the given shaft angle.		
External Torque	Torque applied at the given position.		
Friction Torque	Torque loss due to friction.		
Export	To export load data as an external file in .csv format from the Complex Load Data table.		

NOTE: User cannot edit the labels and rows in the Inertia Table.

5. The Complex Load Graph displays the data on the graph. Hover the mouse pointer on the graph line to view the values.



6. Click [Next Step]. The Confirm Changes dialog displays.

NOTE: This dialog displays even if the user clicks [Previous Step] on top right corner or wanted to leave the application template page.

7. Click [Confirm].

Figure: Confirm Changes

Confirm changes	×
Applying changes to the Application Templa	te will reset the current Motion
Profile to the default one for given Application	on Template. Do you want to
continue?	

- 8. Based on the given parameters, the Motion Profile is defined on the Profile Editor page.
- 9. Refer to "Define your profile" section to proceed further.

The Winder/Unwinder template provides the required inputs to calculate the Motion Profile for Winder or Unwinder applications.

Perform the following steps to add Winder/Unwinder template to the Motion Profile:

1. Under the Motion Definition menu, click [Set up Axis].

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Winder/Unwinder

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- 2. Under the Application Template, select the Winder/Unwinder template and click [Next Step].
- 3. The 'Axis Type' dialog displays. Click [Confirm].

Figure: Confirmation

Axis Type		×
Are you sure you want to change Axis type?		
	Confirm	ancel

4. The Winder/Unwinder template displays.





# 5. Provide the following details: Table: Bus Context Menu

Options	Description		
Winder/Unwinder Type	<ul> <li>The type of the Winder/Unwinder: Center Driven or Surface Driven.</li> <li>Center Driven: The roll is driven directly via a shaft at its center of rotation. For a Center Driven application, Rotary Load is selected, and the roll is modeled as Inertia and Torque in a Multi-segment profile. No further load information needs to be added.</li> <li>Surface Driven: The roll is driven by the friction of rollers pressing onto the circumference of the web. For a Surface Driven application, Linear Load and Belt Drive are selected and the roll is modeled as Mass and Force in a Multi-segment profile.</li> <li>Important: The driving roll/rolls data should be added as Drive Roll and Idler Roll</li> </ul>		
Motion Type	Select either Wind or Unwind for the application. This setting determines the direction of pull from the web tension.		
Diameter			
Empty Diameter	Minimum reel diameter when the roll is completely unwound.		
Full Diameter	Maximum reel diameter when the roll is completely wound.		
Ratio	Ratio of the Maximum/Minimum diameter of the roll.		
Inertia			
Empty Roll	Inertia of the reel when it is completely unwound.		
Material Only	Inertia of the reel when it is at full diameter or completely wound.		

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Range	Ratio of Maximum/Minimum inertia values. A large inertia range value is more difficult to control.		
Web Tension			
Min	Minimum web tension for the application. It is used to calculate the Tension Ratio.		
Max	Maximum allowable web tension for the material. The value is used for sizing purposes.		
Ratio	Ratio of the Maximum/Minimum tension values		
Max Web Speed	Design speed of the material running through the machine.		
Max Web Power	Maximum web tension multiplied by the maximum web speed. This power is regenerated continuously during unwind and should be catered for by suitably rated dump resistors or a regenerative power supply. Motion Analyzer software underestimates this rating by approximately 10%.		
Motion Profile Parameter			
Acceleration Time	Shortest required acceleration time from zero to maximum web speed.		
Deceleration Time	Shortest required deceleration time from maximum web speed to zero.		
Jerk	This is the jerk for the acceleration/Deceleration of the profile segment.		
Mirror	This option is used only when a Wind and Unwind axis share a DC power rail. The two axes are first sized as normal (for example, Profile Mirror is set to Off). The Winder is then set to Profile Mirror. This matches the two axis motion profiles as if they were connected by the web. This is necessary only to check the system sizing. In this mode the motor winding temperature of the Winder axis will be underestimated.		

6. Click [Next Step] on the top right corner. Based on the provided parameters, the Motion Profile is defined on Profile Editor page.

Figure: Motion Profile



7. If the user selects Surface Driven winder type, by default the Belt Drive is selected under the components.

Note: In this case, user cannot delete the Belt Drive.

#### Figure: Surface Driven Winder



8. Click [Belt Drive], the components page displays.





- 9. User can update the parameters and click [Update Mechanism]. Note: Ensure to provide valid parameters.
- 10. The updated values get reflected on the components section of the profile tree.
- 11. Refer to "Define your profile" section to proceed further.

# **Profile Editor Toolbar**

The Profile toolbar contains buttons and pull-down menus to add, move and remove the profile segments or an entire motion profile.

Figure: Profile Toolbar Features



Chapter 5 Define your profile

Table: Profile Editor Tool	bar Features				
Feature	Description				
Cut	To remove the selected profile segment in order to place it in another location in the motion profile.				
Сору	To create a copy of the selected profile segment in order to replicate the segment in another location in the motion profile.				
Paste	To replace the selected profile segment with a cut or copied profile segment.				
Remove	Deletes the selected profile segment. You can also click the drop-down arrow and select the Delete All option to delete all of the segments in your motion profile.				
Invert Segment	To invert an index profile segment about the x-axis.				
Undo	Undo last action				
Redo	Redo last action				
Previous Segment	Selects previous Segment				
Next Segment	Selects next Segment				
Add	To add profile segments to the end of your motion profile or selected segment.				
Insert	To add profile segments to the start of your motion profile or before selected segment.				
Clear	Clears profile				

# **Action Toolbar**

The Profile Editor Action Toolbar allows you to add, insert and modify plot profiles for Motion, Inertia, Torque and Friction. Modifications include cutting, copying, pasting, and deleting segments. You may also undo and redo recent actions, invert segments, and navigate forward and back through segments, and download your plot profile. Adding a segment to your plot profile will append the new segment to the end of your plot profile, while inserting a segment allows you to place a new segment in between existing segments.

#### Figure: Action Toolbar

ACTIO	NS											
Ж	Ū	¢,	Ô	n	$\bigcirc$	$^{\downarrow\uparrow}$	<	>	Ŧ	Add 🔻	Insert 🔻	Clear

Table: Action To	olbar	Description
	Cut	Cut the selected segment from the plot profile.
л ГЪ	Сору	Copy the selected segment to the clipboard.
۰. ۲	Paste	Paste a cut or copied segment into the plot profile.
Ô	Delete	Delete the selected segment.
Ð	Undo	Undo last action.
G	Redo	Redo last undone action
1 <sup>†</sup>	Invert	Invert the plot profile.
<	Back	Navigate back one segment.
>	Forward	Navigate forward one segment.

1	Import Profile	To import a profile. Refer to <u>Import Motion Profile</u> on <u>page 115</u> section to import a Motion Profile.
Add 🔻	Add	Add a new segment to the end of the plot profile. The following types of segments can be added: Acceleration/Deceleration Index Cruise/Dwell Cam Index Advance Inertia Torque Friction
Insert 🕶	Insert	Inserts a new segment between two existing segments. The segment types available in the 'Add' drop-down are also available in the 'Insert' drop-down.
Clear	Clear	Clear data from the plot profile.

NOTE: Use the mouse wheel to scroll up/down and zoom in/out within the Profile Editor.

# **Edit Graph**

(rpm)

12.70

10.60

8.50

6.40

4.20

2.10

0.00

1. On the right pane, click the [11] icon. The Profile Editor panel displays.

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₽ =



Figure: Edit Graph

- 2. Using the following options, the User can change units, toggle on/off the plots and the axes:
- a. Initial Conditions: To edit the Profile name, initial velocity, and initial position along with their units.
  - b. Motion: To view the change in velocity, position, acceleration, jerk, and time while moving the cursor on the graph at a given time. The Profile Editor panel allows the User to change the

	units, hide/show a parameter, and the Y-axis toggle button allows the User to toggle the Y-axis on/off on the plot and may also be used to gain space.
	c. Segment Loads: To view the Load Inertia and Applied torque values. The Profile Editor panel allows the User to change the units, hide/show the parameter, and the Y-axis toggle button allows the User to toggle the Y-axis on/off on the plot and may also be used to gain space.
	d. Additional Loads: To view the Inertia, torque, and friction values. The Profile Editor panel allows the User to change the units, hide/show the parameter, and the Y-axis toggle button allows the User to toggle the Y-axis on/off on the plot and may also be used to gain space.
	<b>NOTE:</b> Only the initial condition can be edited. The other options are used to change the display options (hide/show, change UoM) and does not affect the profile. User can change the units, toggle on/off the plots and the axes, but cannot support swapping of axes.
	<ol> <li>Each colored line indicates a unique parameter in the motion profile.</li> </ol>
	4. Use the View option [ ] to hide/show the graph of a particular parameter.
Edit Segment	Perform the following steps to edit a segment:
-	<ol> <li>Select the type of a segment, the selected segment gets highlighted, and the respective edit panel and the graph displays in the second plot as shown in the following image:</li> </ol>



2.90

3.00

3.20

3.30

3.10

3.40

TIME (s)

2.80

2.50

2.70

2.60

# 2. Each Profile Segment Type has a different associated Segment Edit window:

t
Description
Provides parameters for an Acceleration or Deceleration profile segment.
Provides parameters for an Index profile segment. An Index profile segment consists of an Acceleration, a Cruise, and a Deceleration.
Provides parameters for a Cruise or Dwell profile segment. The profile segment is considered a Cruise if the velocity at the end of the previous profile segment is non-zero and is considered a Dwell if that velocity is zero.
Provides parameters for a Cam profile segment.
To select more advanced velocity, acceleration, and jerk profiles for an Index profile segment.

### Segment Loads

Load Inertia	Load inertia for a given segment.
Applied Torque	Torque applied at the given position.
Friction	Torque loss due to friction.

# Accel/Decel

Provide the following parameters for Acceleration/Deceleration:

#### Table: Accel/Decel

Parameter	Description			
Data Entry Permutation	Select an option to provide the profile segment parameters: • Time Distance • Time Velocity • Time Acceleration • Distance Velocity • Distance Acceleration • Velocity Acceleration			
Jerk	Provide a value to set the amount of S-curve of the Acceleration/Deceleration profile segment. Increasing the percent jerk increases the amount of S-curve.			
Motion Type	<ul> <li>Select whether to input Incremental or Absolute parameter values.</li> <li>Incremental values represent the change either in the distance or time that occurs during the profile segment.</li> <li>Absolute values represent the total distance or time elapsed throughout the entire motion profile.</li> </ul>			
Distance/Time/Velocity/Acceler ation	Provide the parameter for any one of the Distance/Time/Velocity/Acceleration based on the Data Entry Permutation selection to define the profile segment.			

# Figure: Accel/Decel

Edit	Segment	:					
n A	cceleration	/ Deceleration					
						Segment Load	ds
Segment Type		Motion Type				Mass	Unit
Accel / Decel	*	<ul> <li>Increme</li> </ul>	ntal			0	kg
Data Entry Permutation		O Absolute	e i			Force	Unit
Time Velocity	*	Time	Unit	Time	Unit	0	N
		1	s 🗸	58	s 🗸		
Jerk						Friction Coeffici	Unit
0	96	Velocity	Unit	Velocity	Unit	0	
		1	m/s	1	m/s		

# Index

# Provide the following parameters for Index:

Table: Index	
Parameter	Description
Index Type	<ul> <li>Triangle: 1/2 acceleration and 1/2 deceleration motion profile.</li> <li>Trapezoidal: This index type allows the User to use sliders to provide the velocity and time axes of the motion profile.</li> <li>Vertical Bar: Adjusts the height/velocity component of the motion profile. As the value of the slider is increased, more time is spent accelerating and decelerating the load and less time is spent dwelling at a constant velocity.</li> <li>Horizontal Bar: Adjusts the profile segment. A negative value on the slider indicates that more time is spent decelerating it. A positive value on the slider indicates that more time is spent accelerating the load than accelerating the load than decelerating it.</li> </ul>
Smoothness	Custom: 0% Jerk (Trapezoidal) Standard/Automatic: 40% Jerk (Partial S-curve) Maximum: 100% Jerk (Full S-curve)
Acceleration Jerk/Deceleration Jerk	The percent of time for Acceleration/Deceleration Jerk increases the peak acceleration (and therefore current) above that of a trapezoidal motion profile. The acceleration of a trapezoidal motion profile is taken to be 100%.
Motion Type	Select whether to input Incremental or Absolute parameter values. Incremental values represent the change in either the distance or time that occurs during the profile segment Absolute values represent the total distance or time elapsed throughout the entire motion profile.
Distance/Time	Select and enter either the Distance or Time parameter to define the profile segment.
Positive/Negative Velocity Limit	When the User provide the Positive or Negative Velocity Limit for the profile, Motion Analyzer adjusts the acceleration and deceleration times required to reach the desired velocity limits.

			Fi	gure: Index			
Edit ~	t Segment Index	t					
						Segment Load	ds
Segment Type Index	*	Motion Type <ul> <li>Increme</li> </ul>	ental			Mass 0	Unit kg 🗸
Index Type	10	O Absolute	e			Force	Unit
Trapezoid	*	Time 1	Unit S	Time 58	Unit S	0	N
Smoothness Custom	•	Distance	lloir	Distance	Unir	Friction Coeffici 0	Unit
Acceleration Jerk		1		54			
0	%						
2 101 10 1010		Positive	Velocity Limit	Negative Velo	city Limit		
Deceleration Jerk 0	%	0	Unit m/s	0	m/s		

Table: Segment Lo	ads
Parameter	Description
Load Inertia	Load inertia for the given segment.
Applied Torque	Torque applied at the given position.
Friction	Toque loss due to friction.

# Cruise/Dwell

# Provide the following parameters for Cruise/Dwell:

Table: Cruise/Dwell	Fable: Cruise/Dwell		
Parameter	Description		
Data Entry Permutation	Select an option to provide the profile segment parameters: • Time • Distance		
Motion Type	<ul> <li>Select whether to input Incremental or Absolute parameter values:</li> <li>Incremental values represent the change either in the distance or time that occurs during the profile segment.</li> <li>Absolute values represent the total distance or time elapsed throughout the entire motion profile.</li> </ul>		
Segment Loads	<ul> <li>Provide the parameter for any one of the following:</li> <li>Load Inertia</li> <li>Applied Torque</li> <li>Friction</li> </ul>		

# Figure: Cruise/Dwell

E	dit Seg	g <mark>men</mark> e / Dwe	t II								
									Segment Load	ds	
Segment Type			Motion Type						Mass	Unit	
Cruise / Dwell		*	Incremental						0	kg	
Data Entry Permuta	ation		O Absolute						Force	Unit	
Time		*	Time	Unit		Time	Unit		0	N	,
			0.5	s	•	57.5	s				
Velocity	Unit								Friction Coeffici	Unit	
0	m/s	•	Distance	Unit		Distance	Unit		0		
			0	m	•	53	m	•			

# Cam

### Provide the following parameters for Cam:

Table: Cam	
Parameter	Description
Beginning Slope	Provide the slope value for the beginning of the segment.
Ending Slope	Provide the slope value for the end of the segment.
Import from Logix Explorer	Import data from Logix.
Export to Logix Explorer	Export data to a clipboard.
Master/Slave Elements	<ul> <li>Use the [+] and [-] icon under the Modify column to add or remove Master and Slave elements or modify the segment type. The following segment types are available:</li> <li>Linear</li> <li>Cubic</li> </ul>
Show	View the desired number of elements.
Master Conversion 1 MU	Specify the conversion factor and unit to be used in Master Conversion.
Slave Conversion 1 SU	Specify the conversion factor and unit to be used in Slave Conversion.
Segment Loads	Provide the parameter for any one of the following:
	Load Inertia
	Applied Torque
	Friction

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#### **Define your profile**

	Edit Segment						
Segment Type Cam	Beginning Sk 9.54929658	5513 rpm _ 0	Unit rpm 🖕			Segment Load Load Inertia O	Unit kg • m
Import fi	rom Logix Designer/CSV	Export to Logix Designer/CSV	7	3 Results	Show 10 -	Applied Torque	Unit Nm
Element	Leader	Follower	Туре	Modify		0	Nm
	25	2	Segment Type	+			
0	2.5						
0	3.5	3	Cubic 👻	+			
0 1 2	2.5 3.5 4.5	3	Cubic • Cubic •	+ + ©			

To import data from Logix:

- 1. Click [Import from Logix Explorer]. The Import CAM Profile dialog displays.
  - Figure: Import CAM Profile

mport (	AM P	rofile		
0	0	0.007250917	Cubic	
0.0018	0	0.007927301	Linear	
0.0036	0	0.008664852	Cubic	
0.0054	0	0.009467818	Cubic	
0.0072	0	0.010339951	Linear	
0.009	0	0.011287862	Linear	
0.0108	0	0.012319381	Linear	
0.0126	0	0.013441855	Cubic	
0.0144	0	0.014661194	Cubic	
0.0162	0	0.015983801	Linear	
0.018	0	0.01741977	Linear	
0.0198	0	0.018980929	Cubic	
0.0216	0	0.020679428	Cubic	
0.0234	0	0.022526646	Cubic	
0.0252	0	0.024532619	Linear	
0.027	0	0.026708785	Cubic	
0.0288	0	0.029069219	Linear	
0.0306	0	0.031629862	Linear	
				Clear   Import

2. Copy the data from a clipboard. The User has the privilege to edit the data on this editor.

**NOTE:** Ensure that the data provided is valid and is in ascending order. The maximum number of elements allowed is 300 and the minimum is 2. Segment name must be either cubic or linear.

- 3. Click [Clear] to clear the input data in the editor.
- 4. Click [Import]. The data is displayed in the table and the relevant changes are reflected in the graph.

Edit Segment ∧ CAM Segment Loads Load Inertia Unit Segment Type Unit Beginning Slope Unit Ending Slope kg · m² 0 ▼ 9.549296585513 rpm Cam 0 rpm . . Applied Torque Unit Show 0 Nm Jump to Import from Logix Designer/CSV Export to Logix Designer/CSV 18 Results 10 . 2 Friction Unit Element Leader Follower Modify Туре 0 Nm 0 0 0 Segment Type + 0.0018 0.00793 Linear + 1 ٠ 2 0.0036 0.00866 Cubic + Θ . 0.0054 0.00947 Cubic +Θ 3 ٠ 4 0.0072 0.01034 Linear + Θ . 5 0.009 0.01129 +Θ Linear ٠ 6 0.0108 0.01232 Linear + Θ . +Θ 0.0126 0.01344 Cubic 7 ÷ 0.0144 +Θ 8 0.01466 Cubic ÷ 0.0162 0.01598 +Θ 9 Linear ٠ Unit 1 s Leader Conversion 1 MU = Unit 1 rad Follower Conversion 1 SU =

Figure: Import

Figure: Import Graph



5. If the data being imported through the editor is invalid, a validation message will display.

Figure: Invalid Data

	×
	_

6. If the data being imported contains more than 300 segments, a message stating that *"the pasted profile contains too any segments"* will display.

file contains too m .395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .151449268 .164236387	Linear Cubic Cubic Linear Cubic Cubic Cubic Linear Linear							
.395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .151449268 .164236387	Linear Cubic Cubic Linear Cubic Cubic Linear Linear							
.395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .151449268 .164236387	Cubic Cubic Linear Cubic Cubic Linear Linear							
.395903828 .395903828 .395903828 .395903828 .395903828 .395903828 .151449268 .164236387	Cubic Linear Cubic Linear Linear							
.395903828 .395903828 .395903828 .395903828 .151449268 .151449268	Linear Cubic Linear Linear							
.395903828 .395903828 .395903828 .151449268 .164236387	Cubic Cubic Linear Linear							
.395903828 .395903828 .151449268 .164236387	Cubic Linear Linear							
.395903828 .151449268 .164236387	Linear Linear							
.151449268 .164236387	Linear							
.164236387	- 1							
	Linear							
.178083973	Cubic							
.193072433	Cubic							
.209287303	Linear							
.226821346	Linear							
.245775187	Cubic							
.266257463	Cubic							
.288383805	Cubic							
.312275873	Linear							
.338064245	Cubic							
.365889937	Linear							
.395903828	Linear							
					Г	Clear	In	nport
	226821346 245775187 266257463 288383805 312275873 338064245 365889937 395903828	226821346 Linear 245775187 Cubic 266257463 Cubic 288383805 Cubic 312275873 Linear 338064245 Cubic 365889937 Linear 395903828 Linear	226821346 Linear 245775187 Cubic 266257463 Cubic 288383805 Cubic 312275873 Linear 38064245 Cubic 365889937 Linear 395903828 Linear	226821346 Linear 245775187 Cubic 266257463 Cubic 288383805 Cubic 312275873 Linear 338064245 Cubic 365889937 Linear 395903828 Linear	226821346 Linear 245775187 Cubic 266257463 Cubic 2883803805 Cubic 312275873 Linear 338064245 Cubic 365889937 Linear 395903828 Linear	226821346 Linear 245775187 Cubic 266257463 Cubic 288383805 Cubic 312275873 Linear 338064245 Cubic 365889937 Linear 395903828 Linear	226821346 Linear 245775187 Cubic 266257463 Cubic 288383805 Cubic 312275873 Linear 338064245 Cubic 365889937 Linear 395903828 Linear	226821346 Linear 245775187 Cubic 266257463 Cubic 28838085 Cubic 312275873 Linear 338064245 Cubic 365889937 Linear 395903828 Linear

7. If the data being imported contains less than 2 segments, a message stating that *"the pasted profile does not contain enough segments"* will display.

### Figure: Not Enough Segments

Impor	rt CAM P	rofile				×
The pass	sed profile d	oes not contain end	ough segments			
0	0	Cubic				
					Clear	Import

To export the data to a clipboard:

1. Click [Export to Logix Explorer]. The Cam Segment Export dialog displays.

Figure: Export



2. Click [Accept]. The data will be copied to a clipboard. The exported data matches the data in the table.

# **Index Advance**

Provide the following parameters for Index Advance:

#### **Table: Index Advance**

Parameter	Description
Data Entry Permutation	Select the Data Entry Permutation. • Simple Harmonic Motion • 2-3 Polynomial • 3-4-5 Polynomial • 4-5-6-7 Polynomial • Modified Sine
	Adjusted Sine     Modified Transzoid
Chapter 5 Define your profile

Parameter	Description
Number of Elements	Provide the desired number of elements.
Motion Type	<ul> <li>Select whether to input Incremental or Absolute parameter values.</li> <li>Incremental values represent the change either in the distance or time that occurs during the profile segment.</li> <li>Absolute values represent the total distance or time elapsed throughout the entire motion profile.</li> </ul>
Segment Loads	<ul> <li>Provide the parameter for any one of the following:</li> <li>Load Inertia</li> <li>Applied Torque</li> <li>Friction</li> </ul>

#### Figure: Index Advance



#### **Additional Loads**

Edit Segment provides the User with the option to select additional loads, which include Inertia, Torque, and Friction. To select a load, click the ADD or INSERT buttons and click the desired load. Once the load segment is added, the User may edit the load parameters in the Additional Loads input pane and view the changes on the Segment Graph.

### Inertia

Provide the following parameters for Inertia:

Table: Inertia						
Parameter	Description					
Permutation (Variable)	<ul> <li>The following parameters can be defined for Variable Permutation:</li> <li>Start Time: Define the start time and the desired unit of measurement.</li> <li>End Time: Define the end time and the desired unit of measurement.</li> <li>Start Inertia: Define the start inertia and the desired unit of measurement.</li> <li>End Inertia: Define the end inertia and the desired unit of measurement.</li> </ul>					
Permutation (Constant)	The following parameters can be defined for Constant Permutation: • Full Load: Define the full load value and the desired unit of measurement.					

Click Apply Changes when you are finished.









# Torque

Provide the following parameters for Torque:

Table: Torque						
Parameter	Description					
Permutation (Variable)	The following parameters can be defined for Variable Permutation:					
	• Start Time: Define the start time and the desired unit of measurement.					
	• End Time: Define the end time and the desired unit of measurement.					
	• Start Torque: Define the start torque and the desired unit of measurement.					
	• End Torque: Define the end torque and the desired unit of measurement.					
Permutation (Constant)	The following parameters can be defined for Constant Permutation:					
	• Full Load: Define the full load value and the desired unit of measurement.					

#### Click Apply Changes when you are finished.

Figure: 1	Torque -	Variable	Permutation
-----------	----------	----------	-------------







### **Friction**

Provide the following parameters for Friction:

Table: Friction	
Parameter	Description
Permutation (Variable)	<ul> <li>The following parameters can be defined for Variable Permutation:</li> <li>Start Time: Define the start time and the desired unit of measurement.</li> <li>End Time: Define the end time and the desired unit of measurement.</li> <li>Start Friction: Define the start friction and the desired unit of measurement.</li> <li>End Friction: Define the end friction and the desired unit of measurement.</li> </ul>
Permutation (Constant)	The following parameters can be defined for Constant Permutation: • Full Load: Define the full load value and the desired unit of measurement.

Click [Apply Changes].

Chapter 5

#### Define your profile









# **Import Motion Profile**

This section describes the Excel format in which imported Motion Profile shall be defined. It covers several mandatory points how such file should be implemented along with screenshot examples attached to the explanations.

The document is split into chapters describing separate Excel worksheets, responsible for defining the Motion Profile data, the motion itself and loads.

# **Prerequisites**

When importing Motion Profile using the excel template, one must remember that given profile can be imported only to the Axis with the same type, ex. Rotary profile can be imported only to the Rotary Axis. Profile imported to Axis with different type will result in error.

# **General Data** Under this term rely on such things as Name, Profile Type, Profile Version and Motion Type.

This data must be defined in a separate worksheet named as **"Motion Profile Data**".

Each of these values must be defined as separate column, as shown on the example below.

		В	С	D	E		G	Н	J	•
1	Name	Profile Type	Profile Version	Motion Type						
2	Motion Profile	MA	1	Rotary						
З										
4										
5										
б										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
- 1-		Mastine Desti	In Data							*
		wotion Proti	Notion		: •					
Rea	ndy 🏷 Accessibility:	Good to go			🛛 🙀 Display Setting	IS 🖽		]	-+ 100%	

Figure: Example of Motion Profile Data Worksheet

### **Columns Explanation**

- Name should contain single row with value representing the name of the Motion Profile,
- Profile Type should have single row with MA value
- Profile Version should have single row with 1 value, which represents the Motion Profile format version
- Motion Type describes the type of the Motion Profile; this accepts values such as Rotary or Linear
- Inclination column should be added if the Motion Profile is Linear type; the value must be provided in degrees

#### Figure: Linear Motion Profile Data Worksheet Example

					E				м	
1	Name	Profile Type	Profile Version	Motion Type	Inclination					
2	Linear Motion Profile	MA	1	Rotary	90					
З										
4										
5										
б										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
		Mation Destile De	l An Adaption I					_	_	
	✓ F Guide	Motion Profile Da	ta wotion	Ð						

### Loads

The Motion Profile can have loads defined. These should be defined as separate worksheets, named as following:

For Rotary Motion Profiles:

- Inertia: The name of worksheet is {Inertia} in [kg · m2]
- Torque: The name of worksheet is {External Force or Torque} in [Nm]
- Friction: The name of worksheet is {Friction} in [Nm]

For Linear Motion Profiles:

- Weight (mass): The name of worksheet is {Weight} in [kg]
- Force: The name of worksheet is {Force} in [N]
- Friction Coefficient: The name of worksheet is {Friction Coefficient}

Each of the worksheets representing the loads must be defined in specific format.

The first cell within the worksheet represents the Name of the Load.

Next in the second row there are Column Headers defined, where the first column represents the **Time (s)** and second column the **Load name**. The headers for second columns must be named correctly, according to given load.

										м		0	۹Þ
1 Load exter	nal_force_torque 1												
2 Time (s)	External Force or Torque												
з (	-14.63490123												
4 0.0018	-14.61974058												
5 0.0036	-14.66887535												
6 0.0054	4 -14.65726228												
7 0.0072	-14.61549142												
8 0.009	-14.66177951												
9 0.0108	3 -14.82543418												
0.0126	-14.99560003												
0.0144	4 -15.18495334												
0.0162	-15.28945228												
0.018	-15.37524481												
4 0.0198	-15.4541144												
5 0.0216	-15.48004963												
6 0.0234	4 -15.45161045												
0.0252	-15.48513488												
8 0.027	7 -15.53310114												
9 0.0288	-15.54176557												
0.0306	-15.5274996												
1 0.0324	4 -15.49358801												
• • • <u>- •</u>	Motion Profile Data	External Fo	orce or Torc	que} - Lo	Motion	•	 	: (	1				
				-						 	a ma		 

External Force or Torque Worksheet Example

Keep in mind that for given Motion Profile type, only selected Loads are available, otherwise the import will fail.

### **Motion**

The Motion Profile depends on the Motion data itself. The Basic Motion Segments include **Accel/Decel, Index and Cruise Dwell**.

The individual segments data is defined based on **Time**, **Position**, **Velocity**, **Acceleration**, **Jerk** and **Smoothness**.

All these variables are defined in worksheet named **Motion** within separate columns, named accordingly to the Profile Type. The difference in headers between Linear and Rotary Profile Types comes down to the hardcoded units.

The column headers for Linear Profile are as following:

- Time (s) the time
- Position (m) position at given time
- Velocity (m/s) velocity at given time
- Acceleration (m/s<sup>2</sup>) acceleration at given time
- Smoothness (%) jerk percentage value, accepts values from range 0 to 1

For Rotary Profile the columns are as following:

- Time (s) the time
- Position (rad) position at given time
- Velocity (rad/s) velocity at given time
- Acceleration (rad /s^2) acceleration at given time
- Smoothness (%) jerk percentage value, accepts values from range 0 to 1

4	А	В	с	D	E	F F
1	Time (s)	Position (m)	Velocity (m/s)	Acceleration (m/s^2)	Jerk (m/s^3)	Smoothness (%)
2	0	0	0.007250917	0	0	
3	0.0018	0	0.007927301	0	0	
4	0.0036	0	0.008664852	0	0	
5	0.0054	0	0.009467818	0	0	
б	0.0072	0	0.010339951	0	0	
7	0.009	0	0.011287862	0	0	
8	0.0108	0	0.012319381	0	0	
9	0.0126	0	0.013441855	0	0	
10	0.0144	0	0.014661194	0	0	
11	0.0162	0	0.015983801	0	0	
12	0.018	0	0.01741977	0	0	
13	0.0198	0	0.018980929	0	0	
14	0.0216	0	0.020679428	0	0	
15	0.0234	0	0.022526646	0	0	
16	0.0252	0	0.024532619	0	0	
17	0.027	0	0.026708785	0	0	
18	0.0288	0	0.029069219	0	0	
19	0.0306	0	0.031629862	0	0	
20	0.0324	0	0.03440667	0	0	
21	0.0342	0	0.03741598	0	0	<b>T</b>
	• <b>→</b>   G	uide   Motion Prof	le Data Motion	÷ : •		Þ

#### Example of Motion Data Defined for Linear Profile

**Index segments** 

The **Index** segments are defined in a unique way compared to others, meaning additional columns and data must be included so that the segments are correctly recreated.

The additional data is included in following columns:

- Segment\_type type of Index segment, accepts values Trapezoidal or Triangle
- Segment\_jerkAccelerationPercent this impacts the smoothness of acceleration in percentage (accepts values 0 – 100)
- Segment\_jerkDecelerationPercent this impacts the smoothness of deceleration in percentage (accepts values 0 – 100)
- Segment\_positiveVelocityLimit positive velocity limit (maximum) in [m/s] or [rad/s]
- Segment\_negativeVelocityLimit negative velocity limit (minimum) in [m/s] or [rad/s]
- Segment\_specifyVelocityLimit accepts values TRUE or FALSE, IT MUST BE SET!

												i i	м	N		P E
1 Time (s	)	Position (m)	Velocity (m/s)	Acceleration (m/	s' Jerk (m/s^3)	Smoothness (%)	Segment_type	Segment_JerkAcceler	Segment_JerkDeceler	Segment_absoluteVelo	Segment_positiveVel	cSegment_negative∨	Segment_speci	f Segment_camInitia	Segment_transformed	dDuration
2	0	0		0 4.	5	0	0 Trapezoidal	10	10	0	1.:	0.2	TRUE	0	0	
3	1	1		9 4.	5	0	0 Trapezoidal	10	10	0	1.3	2 0.2	TRUE	0	D	
4	2	2		D 4.	5	0	0 Triangle	100	100	0	1	i 2	TRUE	0	0	
5																
6																
7																
8																
9																
10																
11																
12				S												
		uide Moti	on Profile Data	Motion (	Ð					18	1					

### Requirements

**CAM Segments** 

When defining segments, following conditions must be met:

- 1. Time must be positive.
- 2. The Positive velocity limit for Index segments must be larger than segment velocity.

CAM Segments belong to Advanced Segments and require additional configuration. Because of that, they are defined in separate worksheet called **CAM Profiles**.

The CAM table values are defined in following columns:

- **Key** this refers to the row number of Segment defined in Motion worksheet, which will be replaced by the **CAM** segment itself
- MasterMU time when the subsegment ends in [s]
- SlaveSU the final position achieved when subsegment ends in [rad]
- SlopeSUMU the ending slope provided in [rad/s]
- Type type of CAM segment, accepts values Cubic and Linear

Figure: Example of CAM Segments Define

	A	В	с	D	E		G	
-	Time (s)	Position (rad)	Velocity (rad/s)	Acceleration (rad/s^2)	Jerk (rad/s^3)	Smoothness (%)	Segment_type	S
2	2 0	0	0	4.5	0	0	Trapezoidal	
3	3 1	1	0	4.5	0	0	Trapezoidal	
2	2	2	0	0	0	0		
5	5 3	2.5	1	1	0	0		
ť	5 3.5	3	1	0	0	0		
7	4.5	3.5	0	-1	0	0		
8	6.5	4.5	1	0	0	0		
9	9							
	• →   G	uide   Motion Prof	ile Data Motion C	AM Profiles   🛨 🗄	•		[	Þ

	A	в	с	D	E		G	н		к	м	
1	Кеу	MasterM∪	SlaveSU	SlopeSUMU	Туре							
2	4	1	1	0	Cubic							
3	4	2	2	0	Cubic							
4	8	3.5	2.5	1	Cubic							
5	8	4.5	3.5	1	Cubic							
6	8	5.5	3.5	1	Cubic							
8												
9												-
	<b>→</b>	Guide N	Aotion Profile	Data 🛛 Motio	n CAM	Profiles	÷	: •				

The CAM segments do not act as a standalone segment but rather replace provided one in **Motion**, based on **Key** property.

In the above example you can see two **CAM** segments defined, one defined in between different segments and the other one at the end of the Profile.

As you can see in **Motion**, the **Cruise Dwell** segment that starts at 2s is in the end being replaced by the **CAM** segment from **CAM Profiles** worksheet.

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# **Components**

The Components section allows user to select different types of Mechanisms, transmissions, drives and motors for an axis.

- 1. On the profile editor page, select a Linear axis type and click [Next].
- 2. Under components, the Linear Mechanism Component displays.

Figure: Linear Mechanism Types



- 3. Choose the following Linear Mechanism types:
  - Integrated Actuators
  - Linear servo Motors
  - Custom Mechanisms

# **Change Motion Type**

If the user defines a motion in Rotary motion type and configures motor, transmission and drive and wanted to change the motion type to linear:

- 1. Go to the Set-up Axis page, click [Linear] under motion type and click [Next].
- 2. The Confirm changes dialog displays.
- 3. Click [Confirm] to change the motion type.

# Mechanism

NOTE: Ensure that the defined motor, transmission, and drive may get effected, if the motion type is changed in the defined profile and the warning signs display across the defined motion tree in the left panel.

NOTE: Click the [<sup>(i)</sup>] icon on any given component and the Component's description is displayed.



Component Description

### **Integrated Actuators**

Integrated actuators are complete direct-drive, ballscrew, or rollerscrew linear motion solutions from Rockwell Automation's Allen-Bradley product line. All components such as a transmission, gearbox, bearing, magnet, etc. are fully integrated into the product. Includes MPAR/MPAI Electric Cylinders, MPAS Linear Stages, and LDAT Linear Thrusters.

Perform the following steps to add a component from Integrated Actuator:

1. Under the Linear Mechanism, select the Integrated Actuator and the list of available Actuators display.



Figure: Integrated Actuator

User can select the Actuator from Family View or Table View:

- The Family View tab displays a list of Actuator families which can be selected.
- The Table View tab displays a list of available Actuator. User can scroll down or use the Search option for a desired Actuator.

	Linear Mechani	sm Type					
Inte	grated Actuator	O Linear Servo Motor	O Custom Mechanism				
0		0	0				
9. Searc	ch				1059 Result	s 50 - ▼ ≪ 1 2 3	4 5 22 🕨 Jump to
Select	Catalog Number	Peak Stall Force [N]	Continuous Stall Force [N]	Stroke Length [m]	Max Acceleration [m/s <sup>4</sup> ]	Max Speed [m/s]	Carriage Mass [kg]
	LDAT-5031010-Dxx	168	81.3	0.1	59	24	2.824
	LDAT-5031010-Dxx LDAT-5031020-Dxx	168	81.3	0.1	59 59	2.4	2.824 3.43
	LDAT-5031010-Dxx LDAT-5031020-Dxx LDAT-5031030-Dxx	168 168 168	813 813 813	01 02 03	59 59 59	24 3.1 3.5	2.824 3.43 4.036
	LDAT-S031010-Dxx LDAT-S031020-Dxx LDAT-S031030-Dxx LDAT-S031030-Dxx	168 168 168 168	81.3 81.3 81.3 81.3 81.3	0.1 0.2 0.3 0.4	59 59 59 59	2.4 3.1 3.5 3.8	2.824 3.43 4.036 4.642
	LDAT-5031010-Dxx LDAT-5031020-Dxx LDAT-5031030-Dxx LDAT-5031040-Dxx LDAT-5031040-Dxx	168 168 168 168 336	813 813 813 813 813 126	0.1 0.2 0.3 0.4 0.1	59 59 59 59 59 59	24 31 35 38 31	2.824 3.43 4.006 4.642 3.43
	LDAT-5031010-Dxx LDAT-5031020-Dxx LDAT-5031030-Dxx LDAT-5031040-Dxx LDAT-5032010-Dxx LDAT-5032010-Dxx	168 168 168 168 336 336	813 813 013 013 126 126	01 02 03 04 01 03	59 59 59 59 59 59 59 59	24 31 35 38 31 31 31	2.824 3.43 4.006 4.642 3.43 3.43
	LDAT-5031010-Dxx LDAT-5031020-Dxx LDAT-5031030-Dxx LDAT-5031040-Dxx LDAT-5032010-Dxx LDAT-5032010-Dxx LDAT-5032010-Exx LDAT-5032010-Exx	166 168 168 168 336 336 336 336	813 813 013 013 126 126 126 126	01 02 03 04 01 01 01 02	59 59 59 59 59 59 59 59 59	24 31 35 38 31 31 31 41	2.824 3.43 4.036 4.642 3.43 3.43 3.43 4.036
	LDAT-5031010-Dxx LDAT-5031020-Dxx LDAT-5031030-Dxx LDAT-5031040-Dxx LDAT-5032010-Dxx LDAT-5032010-Exx LDAT-5032010-Exx LDAT-5032020-Dxx	166 168 168 168 336 336 336 336 336 336	613 613 613 613 126 126 126 126	0.1 0.2 0.3 0.4 0.1 0.1 0.1 0.2 0.2	59 59 59 59 59 59 59 59 59 59	24 31 35 38 31 31 31 41 41	2.824 3.43 4.036 4.642 3.43 3.43 4.036 4.036
	LDAT-5031010-Dox LDAT-5031010-Dox LDAT-5031000-Dox LDAT-5031040-Dox LDAT-5032010-Dox LDAT-5032010-Dox LDAT-5032010-Dox LDAT-5032020-Dox LDAT-5032010-Dox	168 168 168 336 336 336 336 336 336 336	813 813 813 813 813 126 126 126 126 126	0.1 0.2 0.3 0.4 0.1 0.1 0.2 0.2 0.2 0.3	59 59 59 59 59 59 59 59 59 59 59 59 59 5	24 23 35 36 31 31 31 41 41 43 47	2.824 3.43 4.096 4.642 3.43 3.43 3.43 4.096 4.096 4.692

Figure: Table View

2. Select the required component and the respective Actuator displays under the Components section as shown in the following image:



Figure: Components

3. Click [Next Step].

### **Linear servo Motors**

High speed linear servo motors are direct-drive coil and magnet packages that allow you to fully customize your own linear solution. LDC iron core servo motors have high force density while LDL ironless servo motors provide smooth, zero-cog motion.

Perform the following steps to add a Linear Servo Motor:

1. Under the Linear Mechanism, select the Linear Servo Motor and the list of available motors display.



Figure: Linear Servo Motors

User can select the Motors from Family View or Table View:

- The Family View tab displays a list of Linear Servo Motor families which can be selected.
- The Table View tab displays a list of available Linear Servo Motors. User can scroll down or use the Search option for a desired Linear Servo Motor.
- 2. Select the required motor and the respective motor displays under the Components section as shown in the following image:

Chapter 7 Components

### Figure: Components - Family

	Componen	ts				
	Linear Servo Motor		Ô	Drive 📋		
LOAD SIDE	FAMILIES LDL-Series Linear Servo Motors	PRODUCTS	elected	+ Add Drive		
	Linear Mechanism Type					
	O Integrated Actuator	O Linear Servo Motor	O Custom Mec	hanism		
			Contraction of the second	00		
	<b>()</b>	0	(i)			
	Family View Table View	V				





#### 3. Click [Next Step].

NOTE: If user switches between the Linear Mechanism types, a warning dialog displays. To proceed, click [Continue] and add the desired component.

Figure: Change Linear Mechanism types



## **Custom Mechanisms**

Select the Custom Mechanism and the following Linear Mechanism types display:

- Lead Screw
- Belt Drive
- Chain & Sprocket
- Rack & Pinion

Chapter 7 Components

Figure: Custom Mechanism



## **Lead Screw**

A lead screw is coupled to a rotary motor and causes relative linear motion between a rotating screw and its non-rotating nut.

1. Select [Lead Screw] and provide the following parameters:

Field	Description
Name	Name for the Lead Screw type.
Lead	The distance that the slide moves per one full rotation of the screw shaft.
Inertia	The inertia of the lead screw if the lead screw rotates, and the nut is stationary. Provide the inertia of the nut when the Lead screw is stationary, and the nut rotates. Or If the user has the measurements and other details of the Lead screw, click the [ ] icon to calculate the inertia of the Lead screw. Refer to Inertia Calculator section.
Pre-Load	The friction torque produced by pre-loading the two nuts of a ball screw against each other. This is done to reduce backlash and increase stiffness in the system. Seal friction should be included in this value. This value can be obtained from the manufacturer's data and is normally quoted in datasheets.
Efficiency	The efficiency of the lead screw. The efficiency value depends on unit of measure, which can be % or none. If there is no unit selected, it is written as a decimal (between 0 and 1). If the % is selected, this value is multiplied by 100
Slide Mass	The mass of the slide travels along the lead screw. This mass is affected by gravity if the inclination in the Load Type Tab is non-zero.

NOTE: Ensure that these values are defined and should be greater than or equal to "0".

2. Click [Add Mechanism] and the customized Lead Screw linear mechanism is added to the components.

#### Figure: Add Mechanism

	Compon	ents			
LOAD SIDE	Custom Mechanism FAMILIES There are no families sele	PRODUCTS Custom Lead Screw	<	Transmissions	OR Add Gearbox
	Linear Mech	nanism Type			
	O Integrated Actuator	O Linear Servo Motor	O Custom Mech	nanism	
			and the second s	00	
	0	<b>(</b> )	Ō		
	Choose A M	echanism Type			
		O Belt Drive	O Chain & Spro	cket O	Rack & Pinion
	ALL HARD	6 0 0		2	
	0	(j)	0	0	

The same Lead Screw linear mechanism is added to the Architectural Overview and Axis Overview.

#### Figure: Architectural Overview

💌 🗌 New Axis 3				/:
Axis Type:	Linear with Mechanism	Transmission:	None	
Custom Mechanism:	CUSTOM LEAD SCREW			
Motor:	None			
Drive:	None			

		~ '
LINIKO		
<b>F</b> (())()( <b>b</b> )	<b><i><i>L</i> V I</i> <b>C</b></b>	
I IQUIC.	<b>A A I A</b>	

		LOAD SIDE	
Custom Me	chanism		/
		PRODUCTS	
FAMILIES	There are no families selected	Custom Lead Screw	

3. Users can edit the parameters and click [Update Mechanism] to save the changes.

# **Rack & Pinion**

A Rack and Pinion is a rotary motor coupled to a toothed pinion wheel that engages a toothed rack to create relative motion between the two elements.

Field	Description
Name	Provide a name for the Lead Screw type.
Pinion PCD	Pinion Pitch Circle Diameter. The pitch circle diameter value can be obtained from standard catalogue data. The value can also be calculated by multiplying the tooth pitch by the number of teeth on the sprocket and dividing by pi.
Pinion Inertia	The inertia of the Pinion. Or If the user has the measurements and other details of the pinion, click the [ icon to calculate the inertia of the pinion. Refer to Inertia Calculator section.
Friction Torque	The torque loss due to friction at the pinion shaft. This value can be obtained from the supplier or Engineering tables.
Table Mass	The mass of the linear load table.

1 Select [Chain & Sprocket] and provide the following parameters:

NOTE: Ensure that these values are defined and should be greater than or equal to "0".

- 2. Click [Add Mechanism] and the customized Rack & Pinion linear mechanism is added to the components and the same linear mechanism is added to the Architectural Overview and Axis Overview.
- 3. Users can edit the parameters and click [Update Mechanism] to save the changes.

NOTE: If the user switches between the Linear mechanism after adding it to the Components, a warning dialog displays as shown in the following image:

#### Figure: Warning Message

■ = × 0 0   0   0					
Project 🕂	Motion Definition: Profile E	Components: Linear Mecha	Test Project	Axis Overview - New Axis 3	
O Preferences	Choose	A Mechanism Type			
- Architecture Overview	O Lead Screw	elt Drive	Chain & Sprocket	O Rack & Pinion	
<ul> <li>T Power Bus</li> </ul>				8	
New Axis 2		Sec.	and Control Price		
<ul> <li>New Axis 3</li> </ul>	MARKED MARK	00	Chargements		
<ul> <li>Dverview</li> </ul>			N.C.		
<ul> <li>Motion Definition</li> </ul>					
<ul> <li>Set up Axis</li> </ul>	0	0	0		
Profile Editor	No.	A Your defined Custom Mach	anism will be replaced		
	Custom Belt Drive	Are now size when the custom mech	anishi wili be replaced	weight of Load + Table Applied For	
Custom Mechanism		Are you sure you want to continuer			
O Transmission	Table Mass		Continue		
@ Motor				Friction Surface Load Diameter of Roll	
⊘ Drive	Belt Mass	Unit		The second secon	
O Solution Search	0	kg 🗸			
⊘ Anølysis					
Power Analysis	Diameter	Inertia Friction To	rque Number of	Idler of ort	
Bill of Materials	<u> </u>	kg·m* Nm	<ul> <li>Rollers</li> </ul>	Driver Belt	
Project Report	Driver 1	0 🗄 0	1		
	Idler 1 1	0 🗄 0	1		
	Idler 2	1		Gearbox	
	Idler 3	0		Motor + Transmission	
			Add Mechanism		

4. Click [Continue] to change the Linear Mechanism type and the previous customized Linear mechanism will be replaced with the new one.

### **Belt Drive**

A Belt drive is a rotary motor coupled to a sprocket wheel that drives a belt, with its coupled load, back and forth between the idler sprocket guides.

1. Select [Belt Drive] and provide the following parameters:

Field	Description		
Name	Provide a name for the Belt Drive type.		
Table Mass	The mass of the linear load table.		
Belt Mass The mass of the Belt. This mass is not affected by gravity.			
Diameter	The diameter of the Driver and the Idler(s)		
Inertia	The inertia of the Driver and the Idler(s). Or the user can calculate the inertia using the [III] icon. Refer to Inertia Calculator section.		
Friction Torque	The torque loss due to friction at the driver or idler shaft. This value can be obtained from the supplier or Engineering tables.		
Number of Rollers	The numbers of rollers for each Idler group. Provide the number in Integers.		

NOTE: Ensure that these values are defined and should be greater than or equal to "0".

- 2. Click [Add Mechanism] and the customized Belt Drive linear mechanism is added to the components and the same linear mechanism is added to the Architectural Overview and Axis Overview.
- 3. Users can edit the parameters and click [Update Mechanism] to save the changes.

Chain & Sprocket	A Chain and Sprocket is a rotary motor coupled to a spro drives a linked chain, with its coupled load, back and fort sprocket guides. 1. Select [Chain & Sprocket] and provide the followir				
	Field	Description			
	Name	Provide a name for the Chain & Sprocket type.			
	Table Mass	The mass of the linear load table.			
	Chain Mass	The mass of the Chain. This mass is not affected by gravity.			
	Diameter	The diameter of the Driver and the Idler(s)			
	Inertia	The inertia of the Driver and the Idler(s). Or the user can calculate the inertia using the [I] icon. Refer to Inertia Calculator section.			
	Friction Torque	The torque loss due to friction at the driver or idler shaft. This value can be obtained from the supplier or Engineering tables.			
	Number of Sprockets	The numbers of sprockets for each Idler group. Provide the number in Integers.			
	NOTE: Ensure greater than or	that these values are defined and should be equal to "0".			
	<ol> <li>Click [Add Med linear mechanis mechanism is a Overview.</li> </ol>	chanism] and the customized Chain & Sprocket sm is added to the components and the same linear added to the Architectural Overview and Axis			

3. Users can edit the parameters and click [Update Mechanism] to save the changes.

# **Choose Your Motor**

User can either select the motors from the catalog or user can define the custom motor parameters.

#### Figure: Components: Motor tab



# **Custom Motor**

1. Select the Custom Motor and provide the following detail	ils:
---	------

**Table: Inertia Table** Field

Description

Motor Name Plate Infor	mation				
Name	Name of the custom motor				
Rated Power	The motor power output under full load conditions of rated current, speed, and voltage				
Rated Frequency	The motor rated frequency at synchronous speed.				
Voltage	The phase-to-phase voltage applied to the motor required to reach rated speed at full load				
Speed	The Motor rotary rated speed, rated speed (rpm) or Linear Motor Rated Speed (m/s)				
Rated Current	The current applied to the motor under full-load conditions at rated speed and voltage				
Motor Poles	Number of Motor poles				
haft Diameter The diameter of the shaft					
Additional Information (O	ptional)				
Shaft Inertia	The Inertia of the shaft				
Description	To add any additional information of the shaft.				
Equivalent Circuit Data (p	er Phase)				
Stator Resistance	The winding resistance of the stator in the motor				
Rotor Resistance	The winding resistance of the rotor in the motor				
Core Loss Resistance	The resistance of the energy loss				
Rotor Leakage Inductance	The leakage inductance of the rotor winding in the motor				
Stator Leakage Inductance	The leakage reactance of the stator winding in the motor				

 Magnetizing Inductance
 The self-inductance of an induction motor with magnetic core

2. Click [Calculate] to manually calculate the equivalent circuit data. NOTE: Ensure to provide a valid parameters to calculate.

Chapter 7 Components

### Figure: Custom Motor

Motors			
O Custom		🔿 Catalog	
(i)		<b>(i)</b>	
Motor Name Pla	te Informatio	n A	dd Motor
Name New Custom Motor		Rated Power 3.7	Unit kW
Rated Frequency 60	Unit Hz	Voltage 460	Unit Volts
Speed 1750	Unit rpm 🚽	Rated Current 6.2	Unit A(rms) 🚽
Motor Poles 4		Shaft Diameter 0.014	Unit 🗸
Additional Infor	mation (optional)		
Shaft Inertia 0	Unit kg·m² ₊	Description	
Equivalent Circu	it Data (Per Ph	aase) (optional)	Calculate
Stator Resistance <b>0</b>	Unit Ohms	Rotor Resistance O	Unit Ohms
Core Loss Resistance	Unit Ohms	Rotor Leakage Inductan 0	Unit Henrys
0			

3. Click [Add Motor] and the Custom motor is added to the profile.

**Components** 

<b>-</b> :	N/	0	
Flaure:	New	Custom	wotor

Motio	on Definition: Profile E	Components: Motor - N	ew Test Project Axis Overvie	w - New Axis 3
			Previ	ious Step Go to Axis Overview Next Step
	Transmissions	Û	Motor	â Drive â
<	OR + Add Transmission	* Add Gearbox	FAMILIES PRODUCTS New Custom Motor There are no families selected	<
	Motors		Catalog	
	0			

- 4. User can update the custom motor and click [Update Motor] to update the changes.
- 5. If user change from catalog to custom or from Custom motor to a Catalog motor, the following warning dialog displays.

Figure: Change Motor

🔥 Your selected motors will be remove	ed.	
Are you sure you want to continue?		
	Continue	Cancel

6. If user chose to continue, the custom motor will be deleted, and user can select the Catalog Motors.

### **Catalog Motors**

User can select the motor from Family View or Table View:

- The Family View tab in the Motors section displays a list of available Motor families which can be selected.
- Click [Table View] to open the Table View tab.

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#### Figure: Catalog Motors Motion Definition: Profile E... Components: Motor - New ... Test Project Axis Overview - New Axis 3 Motors Catalog O Custom ۲ ۲ Family View Table View **Filter** Show 22 Results 50 👻 MPL Low Inertia Serv... MPM Medium Inertia S... MPF Food Grade Servo... MPS Stainless Steel .. TL-Series Servo Moto.. 1 1 1 1 VPL Low Inertia Serv... VPS Stainless Steel ... VPF Food Grade Servo... CM222 - AC Spindle M... EZS Hollow-Bore Moto ...

The Table View tab in the Motors section displays a list of available Motor products. When user selects a motor, Motion Analyzer validates the power requirements of axis.

#### Chapter 7

Components

otion Defini	tion: Profile E	Components: Mot	or - New	Test Project	Axi	is Overview - New Axi	s 3		
Fam	ily View Table View	ew							
Searce	h	<b>T</b> Filter			2199 Results	<u>•</u> ∢ 1 2 3	4 5 44	Jump t	0
Select	Catalog Number	Inertia [kg · m²]	Cont. Stall Torque [Nm]	Peak Stall Torque [Nm]	Max Velocity [RPM]	Rated Power [W]	Brake Rating [Nm]	Frame Size	ŝ
	CM222-BC01512AXZCA	0.10525	90.83994	241.33596	1765	11190		0	c
	CM222-BC02012AXZCA	0.1263	122.023800000000.	. 291.5013	1755	14920		0	c
	CM222-BC02512AXZCA	0.2020799999	151.85184	379.6296	1760	18650		0	c
	CM222-BC02518AXZCA	0.10525	100.873008000000.	264.3849	2650	18650		0	c
	CM222-BC03012AXZCA	0.2189199999	183.0357	433.8624	1755	22380		0	¢
	CM222-BC03018AXZCA	0.1263	121.074726	325.3968	2650	22380		0	c
	CM222-BC04012AXZCA	0.55572	241.33596	610.119	1778	29840		0	c
	CM222-BC04018AXZCA	0.20207999999	161.34258	433.8624	2642	29840		0	c
	CM222-BC05012AXZCA	0.65255	300.992040000000.	711.8055	1775	37300		0	c
	CM222-BC05018AXZCA	0.23155	202.01718	711.8055	3525	37300		0	C
	CM222-BC06012AXZCA	1.19985	362.00394	1152.44700000000	1770	44760		0	c
	CM222-BC06018AXZCA	0.6315	239.98014	711.8055	2665	44760		0	C
	CM222-BC07512AXZCA	1.32615	450.13224	969.4113	1775	55950		0	¢
	CM222-BC07518AXZCA	0.6736	299.63622	874.5039	2670	55950		0	c
	CM222-BC10012AXZCA	2.6944	597.91662	1694.775	1780	74600		0	c

Use the Search option to find a specific Motor product or to filter Motor products with partial text. Click [Family View] to open Family View back.

All selected Motor families and products will be displayed in the Motor tile in the Components section.



Figure: Components section

When the user tries to calculate Solution Search without selecting Drive family or product, warning icons will be displayed on the page as well a proper message will show up.

Figure: Missing Drive



Figure: Warning icons for Motor

Factory/lalk# Motion Analyzer - Test Project							- 0
File View Tools Help		× ×				× 1	
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O Preferences				A To perform Solution Search you mu	st provide at least 🗙 wildows Scen	Go to Avis	Overview Next Step
- Architecture Overview				one Drive Product or Family			inche Step
N Power Bus			_				
New Axis 2		Transmissions		Motor		tî.	A Drive
<ul> <li>New Axis 3</li> </ul>		transmissions		FAMILIES	PRODUCTS	0	A
<ul> <li>Dverview</li> </ul>			100	MPL Low Inertia Servo Motor	CM222-8C01512AX2CA	0	
<ul> <li>Motion Definition</li> </ul>	<					<	
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# **DSM Motor**

ArmorKinetix<sup>®</sup> Distributed Servo Motors (DSM) integrate the proven technologies of Kinetix<sup>®</sup> 5700 Servo Drives and VP Low Inertia Servo Motors into an On Machine<sup>™</sup> decentralized motion solution supporting Integrated Motion on EtherNet/IP. This Kinetix<sup>®</sup> 5700/VPL combo is designed to be mounted out on the application rather than in an electrical enclosure. This decentralized approach simplifies design architectures by minimizing cabling requirements, reducing electrical enclosure requirements, decreasing enclosure climate control requirements, and enabling a modular/expandable solution. The simplified approach helps reduce overall installation and commissioning time while simplifying the architecture and potentially reducing overall machine size.

# Add DSM Motors

Perform the following steps to add DSM Motors:

1. Under the Family view, select the DSM Motor family.

Figure: DSM Motor



2. The DSM motors is added to the axis workflow. By default, the DSM motors contain a drive inside and the drive is automatically added as shown in the following image:

Figure: Internal Drive

Compo	nents	This selected Meter Family of the appropriate Drive Family automatically.	ontains an internal Drive so x	Previous Step	Go to Axis Overview Go to Solution S
Transmissions Add Tansmission	B - Add Gearbox	Motor MARGUES DSM AnmonKinesix Distributed Servo	DOUCTS There are no products selected	Drive      Moluse     DSM Antorkinesk Distributed Servo Drive	Products There are no products selected
Motors O custo	m A	Catalog	Þ		
٩		0			

3. User can select the specific DSM Motors under the Product view. The respective drive is automatically added and the user cannot delete the drive, hence the delete icon is disabled.

Chapter 7 Components

### Figure: Drive Delete Icon

xled 167420710591	Components: Moto	or - New						
	omponents	This Ma automa	tor contains an internal drive tically added to the Drive sec	and it is x ion.		Previous Step	Go to Axis Overview	Go to Solution Se
Transmissions - Add Transmission	on Add Cearbox	Motor Nacius DSM AntorKinedx Distribu	ted Servo	14-485x-80751M	C Drive Norques DSM Armo	antonecis Distributed Servo I	SHODUCTS 2198-05M016	
1	fotors O Custom	Catalog						
	D	0						
Family View	Table View							
0. Search	T Filter				22	tt Aesuita 50 + ⊲	1 2 3 4 5	45 🕨 Jump
select Catalog	Number Inertia (kg · m²)	Cont. Stall Torque [Nm]	Peak Stall Torque [Nm]	Max Velocity [RPM]	Rated Power [W]	Brake Rating (Nm)	Frame Size	Shaft Diameter [m]
TRACTOR DESCRIPTION	616-EKSa-807_ 0.0000136	1.01	227	8000	540	1	75	6.011
2196-09								
2116-00	1016-ERSx-807 0.000025	1.61	4.39	8000	810	3	75	0.011

• If multiple DSM motors are added, then the respective drive(s) are automatically added as shown in the following images:

Figure: Multiple Motors

led 16742071051	11	Components Motor	New						
	Componer	its	This auto	Motor contains an internal drive matically added to the Drive sec	and it is X		Previous Step	Go to Axis Overview	Go to Solution Se
Transmission + Add Transmission	or or	0 *Add Gention	Motor Avecutes DSM ArmorKinedix Distri	buned Servo 0 2198-0540 2198-0540 2198-0540 2198-0540	16-085+00751M 116-085+00752M 116-085+00752M 24-085+01003F		re nonKinesix Distributed Servo	2198-054016 2198-054016 2198-054024	<
	Motors								
	O Custom								
	0		0						
Family View	Table Vie	w							
i, Search		<b>T</b> Filter				1	211 Results 50 + 4	1 2 3 4 5	45 🕨 Jump
Select Catal	og Number	Inertia (kg · m²)	Cont. Stall Torque [Nm]	Peak Stall Torque [Nm]	Max Velocity [RPM]	Rated Power [W]	Brake Rating [Nm]	Frame Size	Shaft Diameter [m]
<ul> <li>✓ 2198-0</li> </ul>	SM016-ERSx 807	0.0000136	1.01	2.27	8000	540	3	8	6011
2 2116-0	SM016-ER5x-807	0.000025	141	4.19	8000	810	1	75	0,011

Hence a user cannot add any other DSM drives to these DSM motors manually. If required, user can add drives other than the DSM.

Uncitled 16	74207105911	6 Component	: Drive - New A							
								Previous Step	Go to Axis Overview	So to Solution Search
	Compo	onents								
Tran 1015 Ovo1	+ Add Transmission	B - Add Gearton	Motor Neisues DSM ArmorKinetix	Distributed Servo	PRODUCTS 2198-05M016-ERS-8075 2198-05M016-ERS-8075 2198-05M016-ERS-8100 2198-05M024-ERS-8100		<	Avdues DSM AnnorKinesix Distributed Servo Drive	94004075 2198-0544016 2198-0544024	0
34 c/ DS	Drive S larsity View Tal	Selector ←	-							0 Results
Voltage Voltage	r Requiredents 94 a repured	Phase     Phase     Phase	wed vo	tege Tolerance 0 % 0 • 1	<u>0</u> %					
Selec	ct Catalog Numbe	¢	Ivtr. Cont. Current (A (0-P)	cij Ivtr. P	Peak Current [A (0-Pk)]	Rated Powe	er (KW)	Volkage Range [V]	Frame Size	
					No rows	data 🔶		_		

Figure: Drive Selector

**Choose Your Drive** 

Use the Components: Drive tab to select a preferable Drive family or product.

Chapter 7

#### Components

Figure:	Component	ts: L	)rive	tab
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Motion Definition: Profile E	Test Project	Components: Drive - New A		,
			Previous Step	Go to Axis Overview Next Step
Compon	ients			
LOAD SIDE Transmissions + Motor +	Prive C			
Drive Se	lector View			
Filter Power Requirements				Show 14 Results 50 👻
Voltage	• Phase	Voltage Tolerance - 10 96 0 <u>+ 10</u> 96		
Kinetix 5500 Servo D	Kinetix 6000 Servo D	Kinetix 6200 Servo D	C Kinetix 6500 Servo D	Kinetix 7000 Servo D

The Family View tab in the Drive Selector section displays the list of available Drive families which can be selected.



Drive Sele	ector			
Family View Table V	iew			
<b>T</b> Filter				Show 14 Results 50 <del>-</del>
Power Requirements				
Voltage	Phase	Voltage Tolerance	7	
400		- 10 96 400 + 10 96		
<ul> <li>Kinetix 5500 Servo D</li> </ul>	Kinetix 6000 Servo D	Kinetix 6200 Servo D	Kinetix 6500 Servo D	Kinetix 7000 Servo D
			• • • • • •	
$^{h}$ $\overline{h}$				T In the second se
0	0	0	0	0
			<u> </u>	<u> </u>

Enter the following parameters to further narrow the drive family options and help the user to decide which drive is best for the application.

Parameter	Description					
Power	Voltage	Select Voltage from the drop-down menu				
Requirements	Phase	Select Phase from the drop-down menu, available phases depend on the chosen voltage				
	Voltage Tolerance	Insert the high and low tolerance for the voltage using input fields				

#### Table : Additional parameters for Drives

Click [Table View] to open the Table View tab. The Table View tab in the Drive Selector section displays a list of available Drive products which can be selected.

#### Figure: Table View in Drive Selector section

	Drive Selec	ctor							
Fam	nily View Table View	w							
् Searc	h	<b>T</b> Filter		1094 Results	″ ▼ < 1	234	5	22	Jump to
Power Re	equirements								
		Phase	Voltage Tolerance						
400		3	<ul> <li>- 10 96 400</li> </ul>	+ 10 96					
400	•	3		+ 10 96					
400 Select	• Catalog Number	3 Ivtr. Cont. Current [A (0-Pk)]	<ul> <li>- 10 % 400</li> <li>Ivtr. Peak Current</li> <li>[A (0-Pk)]</li> </ul>	+ 10 %	V] Volta	ge Range [V	1	Frame	Size
400 Select	Catalog Number	3 Ivtr. Cont. Current [A (0-Pk)]	<ul> <li>- 10 % 400</li> <li>Ivtr. Peak Current [A (0-Pk)]</li> <li>10</li> </ul>	+ 10 % Rated Power [kW	V] Volta 324 - 5	ge Range [V	1	Frame S	Size
Select	Catalog Number 2094-8C01-M01-M 2094-8C01-M01-M	3 Ivtr. Cont. Current [A (0-Pk)] 4 9	<ul> <li>- 10 % 400</li> <li>Ivtr. Peak Current [A (0-Pk)]</li> <li>10</li> <li>21.5</li> </ul>	+ 10 % Rated Power [kW 1.8 3.9	V] Volta 324 - 5 324 - 5	ge Range [V, 128	]	Frame S	Size
Select	Catalog Number 2094-8C01-M01-M 2094-8C01-M01-M 2094-8C01-M01-S	3 Ivtr. Cont. Current [A (0-Pk)] 4 9 8.62	<ul> <li>- 10 96 400</li> <li>Ivtr. Peak Current [A (0-Pk)]</li> <li>10</li> <li>21.5</li> <li>21.5</li> </ul>	+ 10 % Rated Power [kW 1.8 3.9 3.9	/] Voltay 324 - 5 324 - 5 324 - 5	ge Range [V 28 28 28	1	Frame 5	Size
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Selecc	Catalog Number 2094-BC01-M01-M 2094-BC01-M01-M 2094-BC01-M01-S 2094-BC01-MP5-M 2094-BC01-MP5-M 2094-BC01-MP5-S 2094-BC01-MP5-S 2094-BC02-M02-M	3 Ivtr. Cont. Current [A (0-Pk)] 4 9 8.62 4 9 4.02 15	<ul> <li>- 10 % 400</li> <li>Ivtr. Peak Current [A (0-Pk)]</li> <li>21.5</li> <li>21.5</li> <li>10</li> <li>21.5</li> <li>10</li> <li>21.5</li> <li>10</li> <li>36.5</li> </ul>	+ 10 % Rated Power [kW 1.8 3.9 1.8 3.9 1.8 3.9 1.8 6.6	V] Voltag 324 - 5 324 - 5	ge Range [V 28 28 28 28 28 28 28 28 28 28 28 28	]	Frame 5	Size

Use the Search option to find specific Drive products or to filter Drive products with partial text. Click [Family View] to open Family View back.

All selected Drive families and products will be displayed in the Drive tile in the Components section.

Chapter 7

**Components** 

Figure: Components section

on Definition:	Profile E		Test Project	 Components: Drive - New A					
					Previou	s Step	io to Axis O	verview	Next Step
	Com	poner	nts						
+	+		Drive		đ				
ŝ			FAMILIES Kinetix 5500 Servo Drive	PRODUCTS  2094-BC01-M01-M					
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in a	Ň	<b>^</b>							
Trai									
Trai									
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Trai	Driv	e Sele	ctor						
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Family Vi	Driv	e Sele Table Vie	ctor w ¥ Filter	1094 Result	Show s 50 ❤ ∢ 1	2 3 4	15	22 •	Jump to
Family Vi	Driv	e Sele Table Vie	ctor w ¥ Filter	1094 Result	s Show d 1	2 3 4	4 5	22 •	Jump to
E Family Vi Search Power Requi	Driv w	e Sele Table Vie	ctor w Filter	1094 Result	s 50 ¥ 4 1	2 3 4	4 5	22 •	Jump to
Family Vi  A Search  Power Requi  Voltage	Driv	e Sele Table Vie	ctor w T Filter	1094 Result Voltage Tolerance	s Show ⊲ 1	2 3 4	15	22 •	Jump to

When the user tries to calculate Solution Search without selecting Drive family or product, warning icons will be displayed on the page as well a proper message will show up.

Figure: Warning icons for Drive

Procytlask Motion Adaryer - Test Project     Ver     Motion Definicion: Profile E     Attributecture Overview									
Her ter tods Help Project Profile Cas Project Profile Cas Profile C	FactoryTalk* Motion Analyzer - Test Project								- 0
	File View Tools Help		× 1				× .		
Project <ul> <li>Motion Definition: Profile E</li> <li>Components: Motor - New</li> <li>Test Project</li> <li>As Diverview - New Axis 3</li> <li>Solution Search - New Axis 4</li> <li>Solution Search</li></ul>	■ ★ ℃ 応   ●   □								
<ul> <li>Preferences</li> <li>Architecture Overview</li> <li>Architecture Overview</li> <li>New Axis 3</li> <li>New Axis 3</li> <li>Overview</li> <li>O Motion Definition         <ul> <li>Set up Axis</li> <li>Profile Editor</li> <li>Custom Mechanism</li> <li>Transmission</li> <li>O transmission</li> <li>Motors</li> </ul> </li> <li>Motors</li> </ul>	Project -	≡ Mo	tion Definition: Profile E	Components: Motor - N	vew Test Project	Axis Overview - New Axis	s 3 🔺 🔺 Sol	ution Search - New A	locis 3 🗉
<ul> <li>Architecture Overview</li> <li>S. Power Bus</li> <li>New Axis 2</li> <li>New Axis 3</li> <li>Deriview</li> <li>Set up Axis</li> <li>Profile Editor</li> <li>A Components</li> <li>Custom Mechanism</li> <li>Transmission</li> <li>Motor</li> <li>Outrout</li> <li>Motors</li> <li>Motors</li> <li>Solution Search</li> <li>Asolution Search</li> <li>Asolution Search</li> <li>Asolution Search</li> <li>Bill of Materials</li> <li>Project Report</li> </ul>	O Preferences				A To perform Solution Search you mu	st nerovide at least v residence Steam	Go to Avit (	Duerulew Nevr	Step
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<ul> <li>New Axis 2</li> <li>New Axis 3</li> <li>New Axis 3</li> <li>Overview         <ul> <li></li></ul></li></ul>	<ul> <li>A Power Bus</li> </ul>			_					
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Notion Definition     Set up Axis     Profile Editor     Components     Custom Mechanism     Ortrasmission     Motor     Custom Mechanism     Ortrasmission     Motor     Solution Search     OAnalysis     Project Report     Project Report	<ul> <li>New Axis 3</li> </ul>		Transmissions	8	family 5	80001/75	8	A	
<ul> <li>Motion Definition</li> <li>Set up Axis</li> <li>Profile Editor</li> <li>Components</li> <li>Custom Mechanism</li> <li>Transmission</li> <li>Motors</li> <li>Motors</li> <li>Motors</li> <li>Solution Search</li> <li>Analysis</li> <li>Bill of Materials</li> <li>Project Report</li> </ul>	- Dverview			-	MPL Low Inertia Servo Motor	CM222-8C01512AX2CA	8		
<ul> <li>Set up Axis</li> <li>Profile Editor</li> <li>Components</li> <li>Custom Mechanism</li> <li>Transmission</li> <li>Motor</li> <li>Drive</li> <li>Solution Search</li> <li>Analysis</li> <li>Prover Analysis</li> <li>Bill of Meterials</li> <li>Project Report</li> </ul>	<ul> <li>Motion Definition</li> </ul>	<					<		<
<ul> <li>Profile Editor</li> <li>Add transmission Gearbox</li> <li>Custom Mechanism</li> <li>Transmission</li> <li>Motors</li> <li>Motors</li> <li>Solution Search</li> <li>Analysis</li> <li>Prover Analysis</li> <li>Bill of Materials</li> <li>Project Report</li> </ul>	<ul> <li>Set up Axis</li> </ul>	`	UK UK				· · · ·	100	ì
<ul> <li>Components</li> <li>Cuscom Mechanism</li> <li>Transmission</li> <li>Motor</li> <li>Drive</li> <li>Solution Search</li> <li>Analysis</li> <li>Prover Analysis</li> <li>Bill of Materials</li> <li>Project Report</li> </ul>	<ul> <li>Profile Editor</li> </ul>		+ Add Transmission	+ Add Gearbox				Add     Drive	
<ul> <li>Custom Mechanism</li> <li>Transmission</li> <li>Motor</li> <li>Drive</li> <li>Solution Search</li> <li>Analysis</li> <li>Power Analysis</li> <li>Bill of Materials</li> <li>Project Report</li> </ul>	★ Components     4								
<ul> <li>Transmission</li> <li>Motors</li> <li>Drive</li> <li>Solution Search</li> <li>⊘ Analysis</li> <li>Bill of Materials</li> <li>Project Report</li> <li>O Custom</li> <li>O Custo</li></ul>	<ul> <li>Custom Mechanism</li> </ul>								_
Motor     Drive     A Solution Search     Analysis     Drover Analysis     Bill of Materials     Project Report	<ul> <li>Transmission</li> </ul>		Motors						
Drive     A Drive     A Solution Search     Analysis     Drower Analysis     Bill of Materials     Project Report     ①	<ul> <li>Motor</li> </ul>		0.000		A structure				
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<ul> <li>Power Analysis</li> <li>Bill of Materials</li> <li>Project Report</li> </ul> <ul> <li>Image: Content of the second second</li></ul>	🔺 Solution Search 🛛 🚽	-	<u>60</u>		<u></u>				
Power Analysis     Bill of Materials     Project Report	⊘ Analysis			1	A CONTRACTOR				
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Project Report	Bill of Materials				12 CO				
	Project Report		0	0	0				
			0	4	V				

If the power requirements of the bus are not valid, a warning icon displays on the respective component(s) as shown in the following image: Components

#### Figure: Warning Icons - Components

	Drive Select	or					
Fam	ily View Table View	_					
् Searc	h	<b>T</b> Filter				3 Results	
Voltage 415 The selecto	equirements ed voltage is not sufficient	Phase 1 The selected phase is not su	Voltage Tolerance - 10 % 415 +	- 10 96			
Select Catalog Number		Ivtr. Cont. Current [A (0-Pk)]	Ivtr. Peak Current [A (0-Pk)]	Rated Power [kW]	Voltage Range [V]	Frame Size	
	2198-H003-ERSx	1.4142	3.5355	0.6	190 - 528	1	
	2198-H008-ERSx	3.5355	8.83875	1.6	190 - 528	1	
	2198-H015-ERSx	7.1	17.75	3.2	190 - 528	2	

Important: The Power requirement validation depends on selected voltage, phase and the selected drive and motor.

If the power requirements are not valid, an error message displays as shown in the following image:

Figure: Error Message – Power Requirements

М	Motion Definition: Profile E Test			est Project		A Components: Drive - New A								1	=		
					-	To perform one Drive F	Solution Se Product or Fa	arch you mu imily	st provide at le	tast X	revious Ste	o Go t	o Axis Overvi	ew	Next Ste	:p	Ī
		Con	nponent	ts													L
	+	+	4	🛕 Drive	Û.												I
10AD SIDE	Transmissions <	Motor	>	+ Add Drive	<												
		Driv	e Selec	tor													
	Family	View	Table View	r													
	୍ Search			<b>Y</b> Filter									3	Results	50 -		
Power Requirements																	
	Voltage 415 The selected v	voltage is not	sufficient	Phase 1 The selected p	hase is not	suitable	Voltage To - 10 9	415 +	10 %								

If the user tries to move to next step (Solution search), an error dialog displays to define the correct power requirements.
Chapter 7 Components

🔺 Not valid Power Requiremen	ts	×
Please define correct power requireme	ents on drive to proceed.	
	Go to Components	Cancel

Ensure to provide valid power requirements to proceed further.

### **Pre-filter Drives**

By default, during a workflow, if a motor(s) is selected either from the families or from the products, then the Motion Analyzer application automatically filters and displays the drives that are compatible with that motor(s).

Under the drive selector, user can use the [Filter] option to filter the drives as shown in the following image:

Transi	+ Add	и <b>лs</b> ов бо +лоз	a <	Mot IAM VPC	or B.BS Continuous Duty Serv	PMODU/DS 9 Micror 👔 MPT-01510Account	n <	Drive <	
a, Searc	niy vev h Xequi	Drive Selector	2300 2300	Unit kov	Votige To	6/11/0		1003 Returts 50 - 4 1 2	3 4 5 21 ▶ <u>jumpto</u>
Select	G	Strverser Peak Current	10700	Unit Altmsl	ent (A (0-1%))	brir. Peak Current (A (8-Pkg)	Rated Power (kW)	Voltage Range [M	Frame Size
		Converter Continuous Cu 0	4800	Unit A0ms0					
0	201		and an and a second			10	18	324 - 528	1
U	201	Converter Peak Current	7205	Unit Alumit		115	19	214 - 520	
U	205			-through		213	19	744 - 528	
U	201					10	14	324 - 328	1
0	205					21.5	3.9	334 - 528	1
	201	-				10	1.8	334 - 528	1
	201	A	cia Cia	at All		365	6.6	324 - 528	1
	205					365	6.6	334 - 528	1

Figure: Drive Selection

Based on the requirements, user can give the minimum and the maximum power values, and the application display the compatible drives.

NOTE: In a workflow, if a user tries to select a drive first, even then the application displays all the available motors. In this case, if the user selects a motor that is not compatible with the selected drive, then the "Current Motor and Drive components are incompatible" error message is displayed:

#### Chapter 7 Components

Figure: Available Drives

d16760235321	K2 🛆	Components Motor -N	iewA_						
			A Current	Actor and Drive component	s are incompatible 🗙		PreviousStep	Go to Axis Overvi	ew Go to Solution Search
	Componen	ts							
ransmission	15		Motor			8 🛕 Drive			
• Add P atomicsion	or [	Kas Arbox	TANGLIS There are no families	Hedbucht Millu Enst o	4.000.4	• • • • • • • • • • • • • • • • • • •	re areno families selected	H00xC11 20011300K4.co/M	××× 1
	Motors					1			
	O Custom		Catalog						
	•								
Family View	Table View								
Search MPL-0	×	<b>Y</b> Filter							17 Results SO v
Search MP5-8	× og Number	♥ Filter Inertia [kg - m]	Cont. Stall Torque (ping)	Peak Scall Torque [Nm]	Max Velocity [RPM]	Rated Power [W]	Brake Rating [Nin]	Frame Size	27 Aesults 50 + Shaft Diameter [m]
Search MPL-0 clear Casalo	× og Nureber	▼ filter       Inentia [kg·m³]       0.0000014	Cons. Scall Torque [Nm] 036	Peak Scall Torque [Nim] 0.77	Max Velocity (RPM)	Rased Power [W]	Erake Rating [Nin] 03	Frame Size	37 Results 50
Search MPL-8 dect Castals 2 MPL-8	× Ing Number 1518V-mone	▼ Filter Intertia (kg - m³) 0.000013	Cons. Scall Torque [Nm] 0.16 0.49	PeakStall Torque (Pirs) 077 158	Max Velocity (RPM) 8000 7000	Rased Power (W) 160 270	Brake Rating [Ving] 0.9	Frame Size	27 Reputs 50 - Shaft Diameser (m)  0009

It also displays warning icons on the project tree. If the user proceeds to Solution Search, a warning dialog displays to return back to the Component section to fix the component configuration as shown in the following image:



Figure: Incompatible Components

# **Transmission**

A transmission helps to provide a speed-torque conversion, such as a gear reduction or speed reduction, from a higher speed to a slower, more forceful output.



Figure: Components - Transmission Tab

The user may add up to four transmission components, click the [+] icon for the appropriate component.

Table: Tranonnoolon type
--------------------------

Transmission type	Description
Belt Drive	A belt drive consists of a loop of flexible material that is used to mechanically link two or more rotating shafts with pulleys.
Chain & Sprocket	A sprocket is a profiled wheel with teeth that mesh with a chain.
Spur Gear	A spur gear consists of a rod or disk with the teeth extruding radially. These gears can mesh together correctly only if they are fitted to parallel shafts.
Coupling	A coupling is a device used to connect two shafts together at their ends to transmit power. The inertia, stiffness, and backlash of couplings can be found in Manufacturers Data Sheets.

The user may also add gearbox families or products. Click [Add Gearbox] or Gearbox tile to open the Family View tab.

Figure: Family View tab for Gearboxes



The Family View tab displays a list of available Gearbox families which can be selected.

Figure: Family View for Gearboxes



Click [Table View] to open the Table View tab which displays a list of available Drive products which can be selected.

Chapter 8

#### Transmission

Figure: Table View for Gearboxes									
Family View Table View									
Search     Y Filter     S1274 Results     Show     1     2     3     4     5      1,026     Jump to									
Select	Catalog Number	Ratio (In\Out)	Max Input Speed [RPM]	Output Max Torque [Nm]	Weight [kg]	Axial Load [N]	Radial Load [N]	Stage Number	
~	AB042-003-52-P2	3	10000	36	0.5	390	780	1	
	AB042-004-52-P2	4	10000	34.2	0.5	390	780	1	
	AB042-005-52-P2	5	10000	39.6	0.5	390	780	1	
	A8042-006-52-P2	6	10000	36	0.5	390	780	1	
	AB042-007-52-P2	7	10000	34.2	0.5	390	780	1	
	AB042-008-52-P2	8	10000	30.6	0.5	390	780	1	
	AB042-009-52-P2	9	10000	25.2	0.5	390	780	1	
	AB042-010-S2-P2	10	10000	25.2	0.5	390	780	1	
	AB042-015-S2-P2	15	10000	36	0.8	390	780	2	
	AB042-020-52-P2	20	10000	34.2	0.8	390	780	2	
	AB042-025-52-P2	25	10000	39.6	0.8	390	780	2	
	A8042-030-52-P2	30	10000	36	0.8	390	780	2	
	AB042-035-S2-P2	35	10000	34.2	0.8	390	780	2	
	A8042-040-52-P2	40	10000	30.6	0.8	390	780	2	
	AB042-045-52-P2	45	10000	25.2	0.8	390	780	2	

Use the Search option to find specific Gearbox products or to filter Gearbox products with partial text. Click [Family View] to open Family View back.

All added Transmissions and Gearbox families and products will be displayed in the Transmission tile in the Components section.



Figure: Components Section

The user may modify the parameters of every added transmission on its respective tile.

Table: Transmissi	on Parameters
Parameter	Description
Ratio	Transmission component ratio. If a straight-through coupling is being modeled, set Ratio = 1
Inertia	Inertia on the motor side (the rotor inertia and if a gearbox is present, the inertia of the pinion attached to the rotor).

### MOTION-UM004E-EN-P

Efficiency	Efficiency is widely misused. It refers to the ratio of output power to input power for a single operating condition, but a servo system typically operates over a wide range of operating conditions. A gearbox supplier normally specifies the efficiency at an optimum point such as full load and full speed. For example, a gearbox that has an output rating of 100 Nm (885 lb. in.) and an efficiency of 98%. This means that the losses at full load are 2 Nm (18 lb. in). But because most of the losses in a gearbox are due to shaft seal friction and churning of the lubricant, this would not reduce significantly at a lower load torque. In using this gearbox, a well-matched servo motor only has a continuous rating of around one-third of the peak torque, and it is quite likely that the average torque over the motion cycle would be even lower, for example about 20 Nm (177 lb in) at the gearbox output. The losses of 2 Nm (18 lb in) amount to 10% of the load on the motor, which can have a significant effect on the temperature rise of the motor. Motion Analyzer software overcomes this problem by dynamically computing the real losses throughout the motion cycle, and thereby avoids underestimating the effect of losses on the motor.
Friction	This is the torque caused by friction on the motor side between the rotor and the transmission component. This value can be obtained from the supplier or Engineering tables

The user can use the Inertia Calculator to calculate the Inertia for a transmission. Each Transmission has its own Inertia Calculator, and it can store the definitions for each transmission.

Click the [1] icon and define the parameters. Refer to Inertia Calculator section.

# Solution

	To organize the solutions, click on the table header. The column data is now sorted in descending order. Click on the table header again and column data is sorted in the ascending order. Click column heading for a third time restores the default sorting.
	By default, 50 results are displayed on each page. To navigate to each page use the pagination control available above the table. Click the page number link or directly typing the page number in the "Jump to" input box. Usercan also use chevrons navigating to previous or next page. The number of displayed results can be changed to one of (10, 20, 50) by using the drop-down menu.
Solution Search Results	The results can be adjusted by using the checkbox filter. A checkbox filter is a filter trigger that enables users to add and remove filters by checking and unchecking boxes next to following filter criteria.
	<ol> <li>Full Matches</li> <li>Partial Matches</li> <li>Not Recommended</li> </ol>

The Refresh Search button allows to re-calculate solution search results. The Cancel Search allows to terminate ongoing calculation.

### Figure: Solution Search Tab

tion	Search - New Axis 1							
						Prev	ious Step Go to A	xis Overview Next Step
	Solutio	n Search					Cancel Sea	Refresh Search
٦	Filter 🔽 Full Match	es 🗌 Partial	Matches 🗌 No	ot Recommended	I			6 Results 50 -
	Match	Drive	Motor	Gearbox	Average Current [A(RMS)]	Inertia Ratio	Torque Utilization	Speed Utilization
0	72%	2198-H040-ERSx	MPL-8880D-xxxxxx	None	11.04	892.86	70.1%	0.5%
0	68%	2198-H070-ERSx	MPL-8580J-xxxxxx	None	17.06	6666.67	61.1%	0.3%
0	66%	2198-H070-ERSx	MPL-B640F-xxxxxxx	None	15.86	4566.21	56.8%	0.3%
0	64%	2198-H070-ERSx	MPL-8560F-xxxxxx	None	14.1	8810.57	77.2%	0.3%
$\circ$	63%	2198-H070-ERSx	MPL-8580F-x0000x	None	13.82	6666.67	60.9%	0.3%
$\sim$					11.04	003.05	20.00	

Table: Solution Search Tab PropertiesPropertyAction

Previous Step	Click to open the Components selection tab
Go to Axis Overview	Click to open the Axis Overview tab
Next Step	Click to open the View Solution tab

#### The Axis Analysis tab contains information and tools that you can use to **Axis Analysis**

evaluate system performance and efficiency.

orque/Speed	Power/Speed Thermal	Summary	Motor Dri
	Flip Axes	Drive:	2198-H070-ERSx
ORQUE (Nm)			Drive Capacity:
70			Average Current
60			Bus Utilization:
50			Motor Compatil
50			
40		Motor:	MPL-B580J-xxxx
30			Thermal Capaci
20 •			Peak Speed:
10			Peak Torque:
			RMS Torque:
0 5	00 1,000 1,500 2,000 2,500 3,000 3,500		Brake Rating:
	SPEED (rpm)		Inertia Ratio:
	Dark Tarras Area		

Figure: Axis Analysis Tab

NOTE: If the selected motor and the drive are incompatible, then the warning icon will be displayed in front of the Analysis menu and also under the Torque/Speed Summary page.

### Figure: Incompatible Products



NOTE: In case of any incomplete configuration of Motion Profile, if the user proceeds to Axis Analysis, then the application displays a warning icon(s) in front of the respective menu and also an empty Axis Analysis page along with an instruction to complete the previous steps with compatible components to proceed further.

Figure: Incomplete Profile

File Vale Tools marp					
Project # s	Unimed 1676025352481	Motion Definition: Profile E	Components: Drive - New A.,	Axis Ahalysis - New Axis 1	• D
Progect  Pr	United 1676025353481	Axis Analysis	Components Drive - New A.,		E Constantine Constantine Constantinent
			The v pre with	previous steps are incomplete to enthe analysis. Complete the vious steps and save the project selected compatible components.	

View the following parameters for your solution. The Summary portion of the Axis Analysis view provides an overall summary of the performance characteristics for the various components of the system.

When a solution includes a gearbox, the inertia ratio is not simply the Reported Application Inertia divided by the Reported Motor Inertia (rotor inertia), as with systems that do not include a gearbox.

When a system includes a gearbox, the Input Pinion of the gearbox is rigidly attached to the rotor, while the rest of the gears in the gearbox remain connected to the application. Most of the backlash in the system occurs between the input pinion and the rest of the system.

To correctly calculate the inertia ratio, the Input Pinion Inertia must be removed from the Reported Application Inertia and added to the Reported Motor Inertia.

Reported Application Inertia - Input Pinion Inertia \_\_\_\_\_ = Inertia Ratio

Reported Motor Inertia + Input Pinion Inertia

For example, the system in the following image with an VPL-B1001M motor and a VRT-200C-28-F3-28 gearbox has a 1.19:1 inertia ratio.

Summary	Motor Drive			
Drive:	2198-S086-ERSx			
	Drive Capacity:		12.9	96
	Average Current:		12.9	96
	Peak Current:		14.3	%
	Bus Utilization:		31.3	96
	Motor Compatibility:		1.056	
Motor:	VPC-B2156D-xxxxFS			
	Thermal Capacity:		12.4	%
	Peak Speed:		15.3	%
	Peak Torque:		21.1	96
	RMS Torque:		17.1	%
	Brake Rating:	No Data		
	Inertia Ratio:	15.27 : 1		

Figure: Summary Tab

Click the Motor tab to view the Reported Application Inertia and the Reported Motor Inertia.

#### Figure: Motor Tab

Summary	Motor Drive				
Motor:	VPC-B2156D-xxxxFS				
		Application		Motor	
	RMS Torque:	11.86	Nm	70.10	Nm
	Peak Torque:	26.20	Nm	185.50	Nm
	RMS Speed:	483.16	rpm	No Data	
	Peak Speed:	763.94	rpm	5000.00	rpm
	Min Reflected Inertia:	5.00	kg · cm²	205.00	kg · cm²
	Max Reflected Inertia:	0.31	kg · m²	205.00	kg · cm²
	Average Current:	7.83	A(0-pk)	57.57	A(0-pk)
	Peak Current:	17.29	A(0-pk)	171.61	A(0-pk)
	Winding Temperature:	6.73	°C	155.00	°C
	Brake Rating:	No Data		No Data	
	Min Inertia Ratio:	0.02		No Data	
	Max Inertia Ratio:	15.27		No Data	
	Peak Motoring Power:	2096.00	W	No Data	
	Average Motoring Power:	465.28	W	No Data	
	Peak Regenerative Power:	-38.40	W	No Data	
	Average Regen. Power:	3.84	W	No Data	

The Motion Analyzer database contains the Input Pinion Inertia for every available gearbox. To obtain a correct inertia ratio, Motion Analyzer software adds the Input Pinion Inertia to the Reported Motor Inertia, which decreases the application inertia and increases the motor inertia.

(Reported Application Inertia - Input Pinion Inertia)/(Reported Motor Inertia + Input Pinion Inertia)=Inertia Ratio

In this example, division produces the correct inertia ratio of 1:19:1.

The individual component tabs (for example, Motor, Drive, Gearbox and Transmission) provide detailed performance information.

```
Chapter 9
```

Solution

#### Figure: Motor Tab

Summary	Motor Drive				
Motor:	VPC-B2156D-xxxxFS				
		Application		Motor	
	RMS Torque:	11.86	Nm	70.10	Nm
	Peak Torque:	26.20	Nm	185.50	Nm
	RMS Speed:	483.16	rpm	No Data	
	Peak Speed:	763.94	rpm	5000.00	rpm
	Min Reflected Inertia:	5.00	kg · cm²	205.00	kg · cm²
	Max Reflected Inertia:	0.31	kg · m²	205.00	kg · cm²
	Average Current:	7.83	A(0-pk)	57.57	A(0-pk)
	Peak Current:	17.29	A(0-pk)	171.61	A(0-pk)
	Winding Temperature:	6.73	°C	155.00	°C
	Brake Rating:	No Data		No Data	
	Min Inertia Ratio:	0.02		No Data	
	Max Inertia Ratio:	15.27		No Data	
	Peak Motoring Power:	2096.00	W	No Data	
	Average Motoring Power:	465.28	W	No Data	
	Peak Regenerative Power:	-38.40	W	No Data	
	Average Regen. Power:	3.84	W	No Data	

In the Motor tab, the brake rating compares the maximum static torque that can be applied to the brake with the quoted holding torque of the brake. This normally occurs when the drive is disabled with the motor/load stationary. This static torque arises from any applied load torques or forces, including gravitational effects. It does not consider friction. If a high proportion of the brake torque (or force) is used for static loads, then little may be left in case the brake is required to stop motion suddenly. Brakes reduce performance if operated during motion. The motor brake is intended as a holding brake applied when motion is stopped and cannot be relied upon to stop a moving load when the drive fails or loses power. An independent method of stopping is recommended for all emergency situations where there is a gravitational load or applied force/torque. A resistive brake module provides some braking but will never stop a mechanism with a gravitational load or applied force/torque.

The Axis Analysis tab provides graphical representations of the performance characteristics for the system.

The Torque-Speed tab contains the torque/speed graph for the selected motor/drive combination. This graph is created dynamically, which

means that if the supply voltage changes in the Motor or Drive tab, the graph will change accordingly.





The Power-Speed tab contains the power/speed graph for the selected motor and drive combination. This graph is typically used for Variable Frequency Drive (VFD) applications where power is more appropriate than torque as a measure of performance.





The Thermal tab displays the output of drive and motor thermal models that reside in the drive firmware.

Chapter 9 Solution

Figure:Thermal Graph



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# **Power Analysis**

Motion Analyzer allows the user to calculate the detailed power analysis for a power bus based on the axes, bus configuration (selected Motion Profile and other components) and selection of power accessories (selected manually or automatically by the program).

User can calculate the Power Analysis for any Power bus that contains valid axes with a drive, motor, valid phase information, valid voltage, valid Motion Profile, and the solution search selected; else an error message displays while calculating the Power Analysis.

FactoryTalk® Motion Analyzer - A	emorKinetix Distributed Servo Drives	- 0 ×
File View Tools Help		
×06110	a.	
Project 🕂 🗏	ArmorKinetix Distributed S	= 1
Preferences     Architecture Overview		Add Axis Add Bus 🟵
• h Power Bus	Select all	
New Axis 2     Power Analysis     Bill of Materials	C Line Voltage     Phase     Voltage Tolerance	O Power Summary Clusters: 0 Pims: 0 Axes: 2 : %
Project Report	480 <u>• 10 % 480 • 10 %</u>	
	Dual Axis Drive Drive: 2196-0020-ERSX	+l+ E
	General_Motion_Axis_1     Axis Type: Rotary     Motor: MPL-84560F-XXXXX     Drive: 2198-D020-ER5X	× 1
	↓       General_Motion_Axis_2         Axis Type:       Rotary         Transmission:       Chain & Sprocket         Motor:       VPC-B2153A-X000AS         Drive:       2198-D020-ERSX	× 1
	□ ► New Axis 2	21

Figure: Power Bus

Perform the following steps to setup Power Analysis:

- 1. On the left panel, click the Power Analysis menu. The list of available Power buses display.
- 2. Choose your Power Bus and click [Setup]. The Power Analysis Setup page displays.

Figure:	Power	Anal	vsis
riguio.	1 01101	/ (i / Gi	, 0,0

FactoryTalk® Motion Analyzer - Power Analysis San	nple Project				-	σ	×
File View Tools Help							
🗎 🗑 🛪 🗈 🖧 🛛 🕮 🗍							
Project ⊕ ≡	Power Analysis Sam	Axis Overview - X2 A	Components: Trans	Axis Analysis - X2 Axis	Power Analysis		8
O Preferences							6
Architecture Overview							
<ul> <li>A Power Bus</li> </ul>	Powe	r Analysis					
Power Analysis							0
Bill of Materials							t
Project Report	Power Bus	Clusters: 0	Axes: 2		O Summary Setup		-
							2

NOTE: This may a take few seconds to fetch the Power aggregation data.

### **Power Analysis Setup**

This section allows the user to update the Power-Time graph by performing the sequencing and choose a Power Supply, multiple Capacitors, and multiple Shunts for the selected power bus (or the default selections using the Auto mode) and perform the calculation for power analysis. This connects the power analysis accessories with calculations and displays the power analysis results.

NOTE: In the Auto mode, after the calculation, the application selects the power accessories such as power supply, Capacitors, and shunts.

FactoryTalk® Motion Analyzer					- 0 ×
File View Tools Help					
■ 🕯 🗙 🗅 🖧   り 🖓 📳					
Project ₽ =	Power Analysis Sample Proj	Power Analysis	Power Analysis Setup - Pow		=
Preferences					(
▼ ▲ Architecture Overview					
► ► Power Bus	Setup				
<ul> <li>Power Analysis</li> </ul>					5
<ul> <li>Power Bus</li> </ul>	Profile Sequencing Power Si	ummary			
🐚 Bill of Materials					
Project Report	Aggregate Power Sequence Type Worst Case Timed Manual Entry Selected Index Profile X Axis Power Calculation All Axes Complete	50000 40000 30000 10000 -10000 0 1	2 3	-power -power 4 5 6 Time (s)	7

Power Analysis Setup

The setup section contains two tabs:

- Profile Sequencing
- Power Summary

Profile Sequencing	Allows the user to update the graph by performing the sequencing. Under the Profile Sequencing tab, the Power-Time graph displays along with the axes available in the power bus.					
	1. Under the Aggregate Power section, provide the following details:					
	a. Sequence Time: Time in Milliseconds or Seconds or Minutes.					
	b. Sequence Type: Type of the Sequence					
	<ul> <li>Timed Manual Entry: By default, this option is selected. This option allows user to defined time offset for power consumption of each axis separately.</li> <li>Worst Case: Used if the User predicts that the power reaches its peak stage.</li> </ul>					
	c. Selected Index Profile: Displays the Index profile selected.					
	<ul> <li>Scroll down the Aggregate Power section and select the desired axis as the Index Profile. By default, the offsets will be zero, if all the axis profiles have the same length and start at their correct respective positions. User can define new offset to align the profiles correctly.</li> </ul>					
	<ul> <li>d. Power Calculation: Displays the status of the Power calculation for the axes that are available in the power bus.</li> </ul>					
	<ol><li>Click [Update Graph] to update the graph based on the sequencing.</li></ol>					
Project Summary	Allows the user to calculate the Power Analysis results based on the selected components and Motion Profile. If the Auto mode is selected, the Power accessories such as power supply, capacitors and shunts are selected after the calculation.					
	The Power summary tab contains two sections:					
	<ul><li>Calculate</li><li>Power Analysis Result</li></ul>					
Calculate	Allows the user to define the following parameters and calculate the power analysis for a power bus:					
	<ul> <li>Power Supply</li> <li>Power Supply Options</li> <li>Shunts</li> <li>Capacitors</li> </ul> NOTE: User can select one Power Supply and multiple Shunts and Capacitors for calculation. NOTE: Not all the Power buses have these options to select. The availability of these power components (accessories) depends upon the axis configurations and available bus features.					
	Perform the following steps to calculate the Power Analysis:					
	<ol> <li>Click the [I] icon to expand the Power Supply and the list of available Power supplies display. User can switch between the power supplies to calculate as required.</li> </ol>					
	<ul> <li>By default, the Power Supply setup is set to Manual mode. User can choose the Auto mode to define the Power Supply automatically.</li> </ul>					

# NOTE: Some of drives has power supply built-in, so re-selection of power supply can affect to selection of drive component.

### Figure: Power Supply Setup

P	Power Supply			Catalog#: 2198-P20	Catalog#: 2198-P208			
Se	Part No.	Туре	Peak Current	Power	Frame Size	Capacitance	Max Supported Capacitance	
	2198-P031	DFE	31.6 A	7 kW	2	585 μF	8000 μF	
	2198-P070	DFE	70.3 A	17 kW	2	780 μF	8000 µF	
	2198-P141	DFE	140.8 A	31 kW	4	1640 μF	13000 μF	
$\checkmark$	2198-P208	DFE	207.6 A	46 kW	4	2050 μF	13000 μF	
	2198-P208 (Qty 2)	DFE	415.2 A	92 kW	4	4100 μF	26000 μF	
	2198-P208 (Qty 3)	DFE	622.8 A	138 kW	4	6150 μF	39000 μF	
	2198-RP088	RPS	88 A	24 kW	7	940 μF	9000 μF	
	2198-RP200	RPS	200 A	67 kW	9	2460 μF	15000 μF	
	2198-RP263	RPS	263 A	119 kW	12	4510 μF	25000 μF	
	2198-RP312	RPS	312 A	140 kW	12	5740 μF	25000 μF	

- 2. Under the Power Supply Options section, user can select the converter Type and select the [Power Supply In Standalone Cluster] option.
  - Converter Type: Select the type of Converter used. This option is only available, if the Power Supply is set to Auto mode. By default, the DFE type is selected. If the RPS converter type is selected, user can define VDC Set point and enable the regulation.
  - Power Supply In Standalone Cluster: Check this box 'Yes' if you plan to run cables from the power supply to your drive clusters. This means that no driver modules are connected directly to the power supply. This standalone cluster will also require an additional capacitor module.

### Figure: Power Supply Options

Power Supply Options	Converter Type <ul> <li>DFE</li> <li>RPS</li> </ul>	Power Supply In Standalone Cluster(j)

- 3. Under the Shunt section, user can select the required shunts to be calculated. for which power analysis will be calculated or select Auto option to select shunts automatically.
  - The left pane displays the selected shunts. Click the [\_C] icon to delete the shunts.
  - The Right pane displays the list of available shunts. Click the [ \_\_\_\_\_] icon to add the shunts.

Figure: Shunt Setup ▼ Shunt Selected: 2 🔿 Auto 💿 Manual Selected ○ Search 43 Results Jump to 10 -Catalog Catalog Contin... Dissip... Shunt Shunt Contin... Dissip... D... Resist... Resist... Α.. Number Туре Power Energy Number Туре Power Energy Θ 2198-R031 3100 W N/A Joules +PWB035 SafetyShunt Shunt 33 Ohms 1000000 Ohms 0 W 0 Joules Θ PKB010 SafetvShunt 52.7 Ohms 2063 W 80000 Joules +PWB110 SafetyShunt 1000000 Ohms 0 W 0 Joules +2198-R004 Shunt 33 Ohms 400 W N/A Joules +PF9F2R1K20 SafetyShunt 9.2 Ohms 1200 W 102200 Joules +1200 W 123800 Joules PF7R1K20 SafetyShunt 7 Ohms +2198-R014 9.4 Ohms 1400 W N/A Joules Shunt +PKB005 SafetyShunt 108 Ohms 1500 W 49000 Joules +9.2 Ohms PF9F2R1K60 SafetyShunt 1600 W 75500 Joules +PF5F1R1K60 5 Ohms SafetvShunt 1600 W 141200 Joules +PF7R1K79 SafetyShunt 7 Ohms 1792 W 77800 Joules

By default, the Shunt selection is set to Manual mode. User can choose the Auto mode to select the Shunts automatically.

4. Under the Capacitor section, user can select the required capacitors for which power analysis will be calculated or select Auto option to select Capacitors automatically.

Figure: Capacitor

▼ Capaci	tor		Sele	cted: 1		Setup O Auto 💿 Manual
Selected				Q Search		1 Results 10 -
Delete	Catalog Number	Capacitance		Add	Catalog Number	Capacitance
Θ	2198-CAPMOD-2240	2240 μF		+	2198-CAPMOD-2240	2240 µF
						Calculate

By default, the Capacitor selection is set to Manual mode. User can choose the Auto mode to select the Capacitor automatically.

- 5. Click the [1] icon on the Quick Access Toolbar to save the project.
- 6. Click [Calculate] the results display under the Power Analysis Result section.

NOTE: If user does not save the project and proceeds to calculate, then the 'Save Project before Calculation' dialog displays. Click [Save] and the calculation begins.

#### Figure: Save Project



### **Power Analysis Result**

The calculated Power Analysis Result displays in values along with the Voltage-Current graph.

Figure: Voltage Current Graph



These results are displayed based on the selected accessories and the type of parameters are displayed based on the response dynamically. Hover the mouse on the labels for more details.

Figure: Power Analysis Result

Power Analysis Result	
	Bus
Average Power 2.87 kW	DC Bus Voltage 800.00/832.00 Volts
Average Matoring Power 2.21 WV	DC Bus Continuous Current 22/76/203100 Ampp
Average Regen Power 1.25 kW	DC Peak Current

After the calculation, if the user changes any of the above parameters, a warning pop-up displays to re-calculate.

### **Power Sharing**

This feature is available only for families that support AC and DC power sharing (Kinetix 5500 drives). If the drivers are selected from the Kinetix 5500 family, then the user must define a valid power sharing configuration during the Power Analysis.

- **DC Sharing**: To support common DC bus configuration supplied by one or more shared AC inputs. Use the DC Sharing configuration to group axes to share a common DC bus and input AC supply (optional).
- AC Sharing Only: To support one or more shared AC inputs. 3-phase AC input power can be shared among drives with the same power rating. No DC bus connections are allowed in this configuration. Use the AC Sharing Only configuration to group axes to share input AC supply only, with no DC bus sharing.
- Clear All: To clear the power-sharing selection.
- **Power Sharing Table**: This table displays the list of Axes from a given bus along with their drive Catalog Numbers, Frame Size, Power in Kilowatts, and power-sharing from DC or AC line. User can manually enable or disable the sharing options.

NOTE: If neither DC Sharing nor AC Sharing Only is selected, then [Shares DC] and [Shares AC] checkboxes will be disabled.

### Limitations

The following restrictions are imposed on the number of drives allowed in common bus or shared AC/DC configurations:

- 1. Common AC/DC Sharing:
- a. The most powerful driver acts as a leader and should share the power with other drives in the DC line.

NOTE: Ensure that the powerful drive is created at the top of the list.

 Calculate **Power Sharing** Clear All O DC Sharing O AC Sharing Only 111 Axis Name Frame Size Power [kW] Shares DC Shares AC Catalog Number [Copy] New Axis 2 2198-H003-ERSx 1 0.6 kW ~ ~ 2198-H003-ERSx 0.6 kW  $\checkmark$ [Copy] New Axis 3 1

Figure: Power Sharing

b. AC sharing is only allowed between axes with the same drive catalog number. If user tries to enable the [AC Sharing Only] option with different drivers, then a warning message displays as shown in the following image:

```
Figure: AC Sharing
```

Calculate					
	L				
	AC Sharing     AC sharing is only allowed by Select same drive catalog nu	etween axes with same drive ca imber or select different sharin	talog number. g option.		Clear Al
Axis Name	Catalog Number	Frame Size	Power [kW]	Shares DC	Shares AC
New Axis 1	2198-H008-ER5x	1	1.6 kW		
[Copy] New Axis 2	2198-H003-ERSx	1	0.6 kW		
In the second second	3100 0003 505-	1			

NOTE: Ensure to select same drive catalog number in the given bus or select a different sharing option.

Figure: AC Sharing Only

Calculate					
					Clear A
	C	) DC Sharing	AC Sharing Only		
	-				
	Q		D		
Axis Name	Catalog Number	Frame Size	Power [kW]	Shares DC	Shares AC
[Copy] New Axis 2	2198-H003-ERSx	1	0.6 kW		
					873

c. If the [Shares DC] checkbox is disabled manually for any axis from the same bus, then a warning message displays as shown in the following image:

Figure: DC Sharing	re: DC Sharing	
--------------------	----------------	--

Calculate					
<ul> <li>Power Sharing</li> </ul>					
	DC Sharing     All Axes in the drive group m	ust share DC bus.	OK		Clear All
			φ φ φ φ D		
uxis Name	Catalog Number	Frame Size	Power [kW]	Shares DC	Shares AC
Copy] New Axis 2	2198-H003-ERSx	1	0.6 kW		

Note: Ensure that all Axes in the drive group must share the DC line.

- 2. **None K5500 family**: If the drive selection is not from the Kinetic 5500 family, then the Power Sharing section is not available in the Power Analysis.
- 3. **Single Axis Bus**: The Power sharing is only available for multiple axes sharing single bus.
- 4. **None Sorted Axis**: The Power Sharing is sorted from the most powerful driver to the least powerful driver irrespective of the axis created.

Figure: None Sorting Axis

					Clear Al
		O DC Sharing	O AC Sharing Only ↓↓↓ ↓↓ ↓↓ ↓↓ ↓ ↓ ↓		
		•	D		
xis Name	Catalog Number	Frame Size	D Power (KW)	Shares DC	Shares AC
us Name	Catalog Number 2198-H070-EKS#	© (	Power (KW) 14.5 kW	Shares DC	Shares AC
is Name 15 3 16 3	Catalog Number 2198-H070-EKSa 2198-H040-EKSa	Frame Size	D Power (kW) 14.6 kW 8.3 kW	Shares DC	Shares AC
ds Name n 5 n 3	Catalog Number 2168-4070-855 2168-4040-855 2168-4025-855	Frame Size	Power (kill) 14.6 kill 8.3 kill 5.1 kill	Shares DC	Shares AC
ds Name n 5 n 3 n 1 n 2	Catalog Number 2158-H070-855 2158-H040-855 2158-H025-855 2158-H025-855 2158-H025-855	Frame Size	D Power (ktW) 14.6 ktW 8.3 ktW 5.1 ktW 3.2 ktW	Shares DC	Shares AC
nis Name no 3 no 1 no 2 no 4	Catalog Number 2108-H070-EKIs 2108-H040-EKIs 2108-H025-EKIs 2108-H015-EKIs 2108-H015-EKIs	Frame Size	D Power (ktV) 14.6 ktV 6.3 ktV 5.1 ktV 3.2 ktV 1.6 ktV 1.6 ktV	Shares DC	Shares AC

5. **AC Sharing Limitations**: The maximum number of axes that can share AC Inputs is based on the driver configurations. If the driver is shared across multiple axes beyond its configuration limits then a warning message displays as shown in the following image:

### Figure: AC Sharing Limitations

Profile Sequencing Power S	ammary				
Power Sharing					
	The maximum n configuration h	umber of axes that can share AC input in " is been exceeded. 2198-H015-ERSx drive ca	AC Only Sharing*		
	maximum u a a	Art, Select a cameren dus consiguration.			
Axes Name	Catalog Number	Rep. Select a camerenz dus consiguration.	OK C	Shares DC	Shares AC
Axes Name Acc.1	Catalog Number	Rep. Select a camerene bus consiguration.	OK Power (kW) 32 kW	Shares DC	Shares AC
Axis Name Acis 1 Acis 2	Catalog Number 296-405-555 298-405-555	Frame Size	CK Power (KW) 12 kW 12 kW	Shares DC	Shares AC
Axes Name Axes 1 Axes 2 Axes 3	Caralog Number 2016-0015-056 2016-0015-056 2016-0015-056	Frame Size	OK Power (XW) 12 XW 12 XW 12 XW 12 XW	Shares DC	Shares AC
Axis Name Axis 1 Axis 2 Axis 3 Axis 4	Catalog Number 2158-6015-85x 2198-6015-85x 2198-6015-85x 2198-6015-85x 2198-6015-85x	Frame Size	CK Power (KW) 12 kW 12 kW 12 kW 12 kW 12 kW	Shares DC	9am AC
Axis Name Axis 1 Axis 2 Axis 3 Axis 3 Axis 3	Catalog Number 2158-6015-85x 2158-6015-85x 208-6015-85x 208-6015-85x 208-6015-85x 208-8015-85x	Frame Size	CK Power (KW) 12 kW 12 kW	Shares DC	9am AC

6. **DC Follower Limits**: In a given group of axes with a powerful axis acting as the leader with other axes acting as followers and they share different DC bus or it exceeds DC power sharing, a warning message displays as shown in the following image:



		OC Sharing	O AC Sharing Only		Ciear All
	• DC Sharing con CC Sharing con can share DC bu or select a differ	9 figuration could not be completed as not a is. Move axes out of this group to reduce D rent bus configuration.	K sharing count		
Aus Name	Catalog Number	Frame size	Power (km)	States DC	Situres M.
Ani 2	2196-H040-ER5a	2	4.3 kW		
Aris 1	2198-H008-ER5e	1	1.6 kW		
Are 1	2198-+008-ER5e	1	16 KW		
Arit 4	2186-H000-ER54	1	1.6 KW		
Ave 5	2186-H006-ER54	3	1.6 KW		0
Are 6	2196-H006-ER54	3	1.6 VW		
Aut 7	2198-H008-EK5x	3	1.6 KW		
Anti	2198-H008-ERS4	1	1.6 kW		

7. **DC Limits**: If a group contains 2 powerful drivers and more than 6 follower drivers, then the 1st driver acts as a leader for the second drive and the second driver will act as the leader for the other follower drivers.

Chapter 10 Power Analysis

Figure: DC Limits

<ul> <li>Power Sharing</li> </ul>					
					Cle
		OC Sharing	AC Sharing Only		
		III-Htt-th-th	III <del>I III III III</del> II		
		×ģ	\$ \$ \$ \$		
		U C	D.		
us Name	Catalog Number	Frame Size	Power (KW)	shares DC	shares AC
s1	2198-H040-ER5x	1	63 KW	<b>2</b>	2
				-	
• 2	2198-H040-ER5x		6.3 kW	24	
12	2198-H040-ER5x 2198-H015-ER5x	1	83 KW 3.2 KW		
12 13 14	2198-HOAD-RESk 2198-HO15-ERSk 2198-HO15-ERSk	2	83 kW 32 kW 32 kW	2	
12 13 14 15	2199-HORD-EKSx 2199-HOTS-EKSx 2199-HOTS-EKSx 2199-HOTS-EKSx	2 2 2	6.3 kW 3.2 kW 3.2 kW 3.2 kW		
s 2 s 3 s 4 s 5 s 6 To Celete	2184-HORE (254 2196-HOT5-(256 2196-HOT5-(256 2196-HOT5-(256 2196-HOT5-(256	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	8.3 kW 3.2 kW 3.2 kW 3.2 kW 3.2 kW 3.2 kW	5	
15 2 15 3 15 4 15 5 16 7 5 Delete 15 7	2198-4040-0554 2198-4015-054 2198-4015-054 2198-4015-0554 2198-4015-0554 2198-4015-0554	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	83 eW 32 kW 32 kW 32 kW 32 kW 32 kW		

8. AC Limit in DC Sharing Manual (Hybrid sharing): If a group of axes contains shares same Driver, then both DC and AC sharing can be enabled beyond its configuration limits as shown in the following image:

Figure: Hybric	d sharing
----------------	-----------

		DC Sharing	O AC Sharing Only		Clear All
Axis Name	Catalog Number	0 Frame Size	Power (kW)	Shares DC	Shares AC
Axis 1 Leader	2198-H025-685x	2	\$.1 WV		5
Axis 2 Leader	2198-R025-ER5k	2	5.1 kW		
Axis 3 Leader	2190-H025-DR5x	2	5.1 kW		
Axis 4 Leader	2198-H025-ER5e	2	5.1 kW	2	
Axis 5 Leader	2198-H025-ER5x	2	5.1 KW	<b>2</b>	0
Asis 1	2198-H003-ER5+	1	0.5 kW	<b>2</b>	
		1000	0.6.000		
Axis 2	2198-H000-ER5x	1	2.0 6.04		U
Anis 2 Anis 3	2198-H003-ER5x 2198-H003-ER5x	t	D6 KW		0

9. If the Power sharing is configured and the user deletes the drive from the components list, then a warning message displays, and the power-sharing is reset to none and the user must configure the Power sharing.

Figure: Power Sharing Warning

and the second s	Power Acarpso Secu	o AC/Components	: Drive - Axis 1	_			
Comp	onents	Powe     This acts     default a	er Sharing on will reset the Power Sharing configurat end Power Supply solution (if any) will be in	X Ion to Ion.	Previous See	p Go to Axis Overview	Go to Solution Sea
Transmissions Add Transmission	Add Gearbox	Motor Nacats MPL Low Inertia Servo Moto	MPL-BIBOD-xxxxxx	0	Drive Auruzti Kinesis 5500 Servis Drive	80001291 2788-H015-(852	0
Drive	Selector		Þ				Des
Drive	Selector Ible View		Þ				Show 1 Results 50
Drive	Selector Ible View X Filter Dister 3 Ible Detr	Vetage for - 10 %	Fance 400 <u>+ 10</u> %	Bated Power (KM)	Voltane Banne D	1 Frame Size	Snee 1 Results 50

- 10. If the axis is deleted from the power bus, then a warning message displays, and the power-sharing is reset to none and the user must configure the Power sharing.
  - Figure: Power Sharing

owerSharing	Power Analysis Setup	AC/		
Select all		Power Sharing × This action will reset the Power Sharing configuration to default and Power Supply solutions (if any) will be lost.		Add Axis Add B
AC/DC Sharing				O Power Summary Clusters 0 Aves
AC Line Voltage	• 3	voltage Tolerance • <u>10</u> % 400 • <u>10</u> %		
► □ Axis 2			I	/ 1
Axis 3				/
Axis 4				/
Net #3500				O PowerSummary Oussers 0 Ave
AC Line Voltage 400	• 3	Voltage Tolerance • 10 % 400 • 10 %		
Axis 1				/
Axis 2				1
Axis 3				/
Axis 4				1

## **PIM Summary**

The section provides information about the list of PIM Modules and their summary. Each PIM summary contains the PIM details along with the number of axes with brakes, and the details about the power consumption. This tab is only available for the bus containing PIM modules. Users can expand/collapse the section view.

The PIM Summary consists of 3 sections:

- PIM Name: Displays the information about the details of the PIM Module. List of PIM used along with the Catalog Number, Power Rating, and Continues Current and Peak Current details.
- Aggregation Graph: Displays the Aggregation Graph of the axes inside the PIM module. Users can hover the mouse on the graph line to view the Power values against the time.
- Summary: Display the total number of axes inside the PIM, the number of brakes used, and the Power consumption.



#### PIMs Summary

**Operation Range Error** 

If the Power Analysis parameters exceed their normal operating range, it will be marked as red progress-bar as shown in the following image (for Continuous Current and Peak Current):

#### Figure: Invalid Results Bus Power Supply Shunt DC Bus Voltage Continuous Current Continuous Power Average Power (i) (i) 1168.21/1400.00 W... 800.00/832.00 Volts 19.73/10.50 Amps 2.87 kW Average Motoring Power DC Bus Continuous ... Peak Current Safety Shunt (i) (i) 2.21 kW 42.81/208.00 Amps 81.59/31.60 Amps 0.52/80.00 kJ Average Regen Power DC Peak Current (i) E. 1.25 kW 12.70/805.50 Amps

To view these invalid or excess results, perform the following steps:

1. Open your Power Analysis Sample Project, select the power supply manually to first option.

For example: In this case 2198-p031 (or second 2198-p070)

2. Change the Setup option of Shunts and Capacitor to 'Auto' mode and click [Calculate] to calculate the Power Analysis.

# **Bill of Materials**

The Bill of Materials menu displays the total list of Axes, and components that configured in the Project. User can view them in two tabs:

- View by Axis
- View by Type

Displays the list of components that are divided by:

- Axes configured in the project.
- Platforms (if some bus is in a project, or drive needs some special components assigned to platform).
- Power Components and accessories which displays power components (based on selection in Power Analysis of buses)

### Figure: View by Axis

Project	우 =	Labeling Machine	Bill of Materials		
Preferences     Architecture Overview     Power Analysis		Bill of M	aterials		
Bill of Materials		View by Avis - View by T	lune		
Project Report		Sponge wheel			Export
		Quantity	Catalo	g Number	Description
		1	VPL-806	532T-monoor	VPL Low Inertia Servo Motor
		1	2198-H0	008-ERSx	Kinetix 5500 Servo Drive
		Labeling Axis			
		Quantity	Catalo	g Number	Description
		1	MPL-82	10V-x00000x	MPL Low Inertia Servo Motor
		1	2198-H0	108-ERSx	Kinetix 5500 Servo Drive
		Platform Accessories			

**View by Type** 

Displays the list of components in the project grouped by each type such as Drives, Motors, Gearboxes, Linear mechanisms, Actuators, Platform Accessories and Power Buses.

## **View by Axis**

Figure: View by Type					
Labe	ling Machine	Bill of Materials			1
		Bill of Materials			
	View by Axis	View by Type			
	Drives			Export	
	Quantity		Catalog Number	Description	
	2		2198-H008-ERSx	Kinetix 5500 Servo Drive	
	2		25C-D010N1x4	PowerFlex 527	
	Motors				
	Quantity		Catalog Number	Description	
	1		VPL-80632T-xxxxxx	VPL Low Inertia Servo Motor	
	1		MPL-B210V-xxxxxxx	MPL Low Inertia Servo Motor	
	2		CM222-NV00518AXZCA	CM222 - AC Spindle Motor	

Table: View by Type	Table: View by Type		
Column	Description		
Quantity	Number of components.		
Catalog Number	The component's catalog number		

The Family name of the component.

Description

# **Export Bill of Materials**

User can export the Bill of Materials in both tabs: View by Axis and View by Type.

 Click [Export] and the provide the path to save the exported file. The file format is .csv. After exporting, a success message displays.

Chapter 11 Bill of Materials

beling Machine	Bill of Materials				
View by Axis	/iew by Type				
Drives			Export		
Quantity		Catalog Number	Description		
2		2198-H008-ER5x	Kinetix 5500 Servo Drive		
2		25C-D010N1x4	PowerFlex 527		
Motors					
Quantity		Catalog Number	Description		
1		VPL-80632T-xxxxxx	VPL Low Inertia Servo Motor		
1		MPL-8210V-xxxxxxx	MPL Low Inertia Servo Motor		
2		CM222-NV00518AXZCA	CM222 - AC Spindle Motor		
Platform Accesso	ries				
Quantity	$\rightarrow$	Started exporting	× Description		
1		Successfully exported: Project8OM[10102]-2022-08-	Kinetix 5500 Frame 1 and 2 connectors for the first drive in a mult		
1		17.csv	T-connectors and bus-bars for the DC bus and control power on		

If the user edits any components in the project and proceeds to Bill of Materials without saving, a warning dialog displays. Click [Save] to save the project and the updated Bill of Materials display.

Figure: Save Project



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# **Project Report**

The Project report allows the user to generate the information related to the project in one place including all axes, motion profiles, components, solution search results, BOM, power analysis results, and other information. This report is updated based on the changes that the user makes in the development process. This feature also allows user to save the report in PDF.

### **Generate Project Report**

Perform the following steps to generate the Project Report:

1. On the left pane, double-click the Project Report menu.

FactoryTalk® Motion Analyzer - Arr	morKinetix Distributed Servo Drives				
File View Tools Help					
* 6 6 🗎 🗊 🛞 🗐 🖩	R.				
Project ₽ ≡	ArmorKinetix Distribu	Power Analysis	Axis Overview - Gener	Components: Drive	Solution Search - Gen
• Preferences					
Architecture Overview     A Power Bus	Select all				
<ul> <li>General_Motion_Axis_1</li> <li>Overview</li> <li>Motion Definitio</li> <li>Components</li> <li>Solution Search</li> </ul>	Power Bus AC Line Voltage 480	Phase - 3	Voltage Toleran - 10 % 480	te + 10 %	
Analysis	Dual Axis Drive			Drive:	2198-H003-ERSX
General_Motion_Axis_2 New Axis 2 Dower Analysis Bill of Materials Project Report	Genera Axis Typ Motor: Drive:	L_Motion_Axis_1 e: Rotary MPL-B880D-XXXXXX 2198-H003-ERSX		Transmission: Belt Drive	
	Genera Axis Typ Motor: Drive:	I_Motion_Axis_2 e: Rotary VPC-B2153A-XXXXAS 2198-D020-ERSX		Transmission: Chain & Sp	rocket

### Figure: Project Report Menu

2. A new window displays the Project details. This may take a while to load the necessary data.

### Figure: Generating Project Report

norKinetix Distributed Serve	o Drives - Project Report			- 0	1
			Refresh	Save as PD	F
Report Date:	June 25, 2023				
Customer Inform	ation	Prepared By			
Address Line 1:	None	Address Line 1:	None		
Address Line 2:	None	Address Line 2:	None		
City:	None	City:	None		
Company:	None	Company:	None		
Country:	None	Country:	None		
Name:	ArmorKinetix Distributed	Name:	Analyzer Motion		
	Servo Drives	Phone:	None		
Phone:	None	Postal Code:	None		
Postal Code:	None	5. te:	None		
State:	None				
Power Bus	Give us a moment, we	e are loading all necessary	data		
, one, bus					
General_Motion_	Axis_1				
Axis Type:	Rotary				
Transmission	Rotary Motion Prome				
Coarbow	Nono				
Motor:					
Drive:	2198-H003-EPSY				
Drive.	2150 11005 21054				
General_Motion_	Axis_2				
Axis Type:	Rotary				
Motion Profile:	Rotary Motion Profile				
Transmission:	Chain & Sprocket				

### The Project Report displays the following project details: Table: Project Report

Label	Description		
Report Date	The Date when this report is generated.		
Customer Information	The customer information as mentioned in the Preferences menu.		
Prepared By	The information about the report publisher.		
Architectural Overview	The information about the list of available power bus, List of Axes / Dual-axis along with their components (Motor, Driver, Transmissions) and the Cluster details, if available.		
Details   <axis name=""></axis>	The information about the Axis/Dual-Axis/Bus such as Axis Type, Motion Profile, and the detailed information about the components along with the graphs.		
**Chapter 12** 

**Project Report** 

morKinetix Distributed Serve	o Drives - Project Report			- 0
			Refresh	Save as PD
Report Date:	June 25, 2023			
Customer Inform	ation	Prepared By		
Address Line 1: Address Line 2: City: Company: Country: Name: Phone: Postal Code: State:	None None None None ArmorKinetix Distributed Servo Drives None None None	Address Line 1: Address Line 2: City: Company: Country: Name: Phone: Postal Code: State:	None None None None Analyzer Motion None None None	
Architecture Overview				
Conoral Mation	Avis 1			
Axis Type: Motion Profile: Transmission: Gearbox:	Rotary Rotary Motion Profile Belt Drive None MPL-B880D-XXXXXX			

\_

Save the report

If user does any changes to the project and the Project Report window is open in another tab, click [Refresh] for the changes to take effect.

To save the Project Report as PDF output:

- 1. Click [Save as PDF] the Save As dialog displays.
- 2. Select the desired location and provide the file name.
- 3. Click [Save]. A success message displays as shown below.

#### Figure: Save as PDF

ArmorKinetix Distributed Servo Drives - Project Report			- 0
		Refresh	Save as PDF
Report Date: June 25, 2023		_	1
Customer Information	Prepared By		
Address Line 1:NoneAddress Line 2:NoneCity:NoneCompany:NoneCountry:NoneName:ArmorKinetix Distributed Servo DrivesPhone:None	Address Line 1: Address Line 2: City: Company: Country: Name: Phone: Postal Code:	None None None None Analyzer Motion None None	
State: None	State:	None	
Architecture Overview			
Power Bus			
General_Motion_Axis_1 Axis Type: Rotary Motion Profile: Rotary Motion Profile Transmission: Belt Drive			
Gearbox: None			

Drive:	2198-H003-ERSX	
General_Motion_/	Axis_2	
Axis Type:	Rotary	
Motion Profile:	Rotary Motion Profile	
Transmission:	Cha Project Report was successfully generated ×	

Open the published PDF and the Project Report displays along with the Publisher name in the page footer as shown in the following image:

Figure: PDF

5/25/23, 5	::11 PM	м	lotion A	nalyzer   Project Report		
	Report Date:	June 25, 2023				
	Customer Information			Prepared By		
	Address Line 1: Address Line 2: City: Company: Country: Name: Phone: Postal Code: State:	None None None None ArmorKinetix Distributed Servo Drives None None None		Address Line 1: Address Line 2: City: Company: Country: Name: Phone: Postal Code: State:	None None None None Analyzer Motion None None None	
	Architecture Overview					
	Power Bus					
	General_Motion_A Axis Type: Motion Profile: Transmission: Gearbox: Motor: Drive:	xis_1 Rotary Rotary Motion Profile Belt Drive None MPL-B880D-XXXXXX 2198-H003-ERSX				
	General_Motion_A Axis Type: Motion Profile: Transmission: Gearbox: Motor: Drive:	xis_2 Rotary Rotary Motion Profile Chain & Sprocket None VPC-B2153A-XXXXAS 2198-D020-ERSX				
	New Axis 2 Axis Type: Motion Profile: Transmission: Gearbox: Motor:	LinearWithMechanism Linear Motion Profile None AB042-003-S2-P2 None				

# **Rockwell Automation support**

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Knowledgebase	Access Knowledgebase articles.	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Get help determining how products interact, check features and capabilities, and find associated firmware.	rok.auto/pcdc

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# Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental information on its website at rok.auto/pec.

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