TS1 Components Testing

Library development in Visual Components

25.10.24

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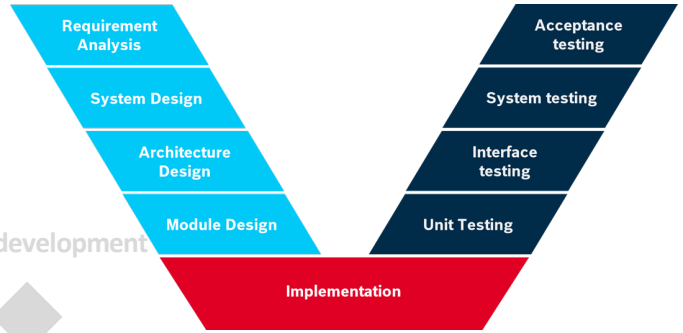
Library Development of TS1 Components

Overview

Evaluation of product information → Planning of development → Specifications of simulation components → **Testing** → Provide models to Visual components → Release → TS1 Evo development

Components Availability	**Completed**
Verification testing (Unit test) (Interface test)	**Completed**
Creating demonstration models	**Completed**
Validation Testing	**Completed**
Evaluation of PRM	**Completed**
Documentation	**Completed**



V-Model Framework for System development

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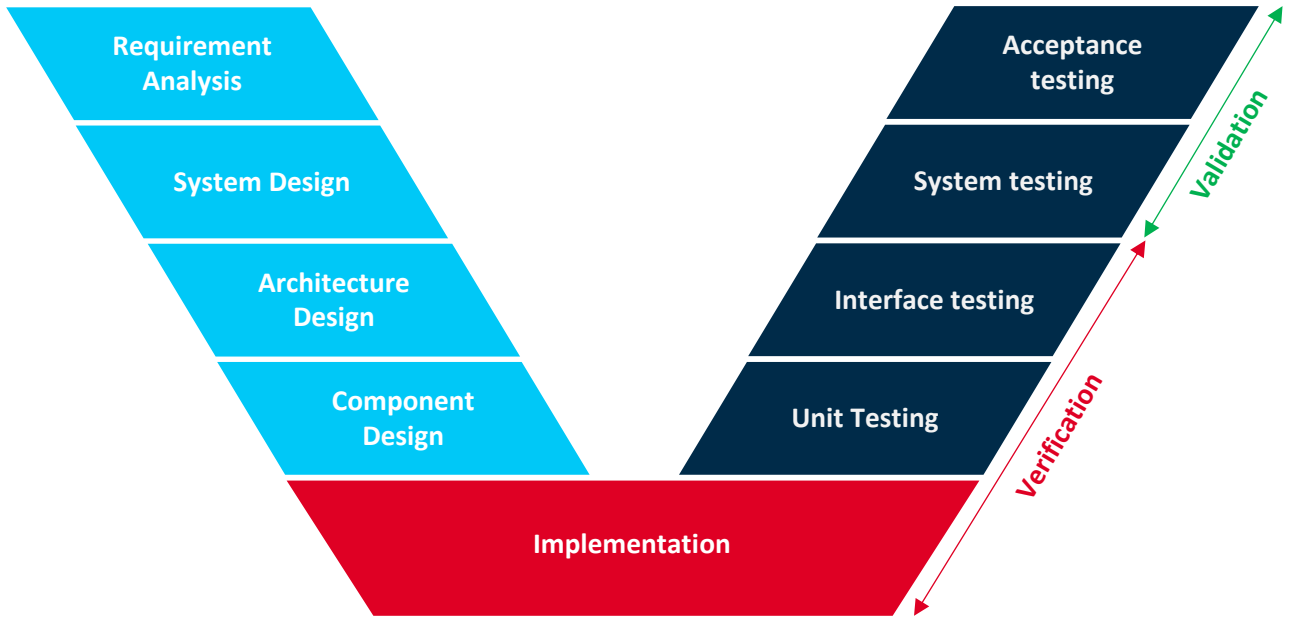
Testing of TS1 Components

V-model for Library development

The Verification & Validation (V-model) provides a formal framework for system development to ensure validity.



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Testing of TS1 Components

Testing Phases

1. **Components Availability:** Checking if all TS1 components are modelled as per MTPro.
2. **Verification testing:** Consists of ***Unit test*** *(Parameter Validation & Geometric evaluation)* and ***Interface test***.
3. **Creating demonstration models:** Utilizing the modelled components to verify the functionality of the components by creating basic models.
4. **Validation Testing:** Testing the entire system by recreating use case model using the TS1 components for validation.
5. **Evaluation of PRM:** The developed library components are provided to product management for evaluation.

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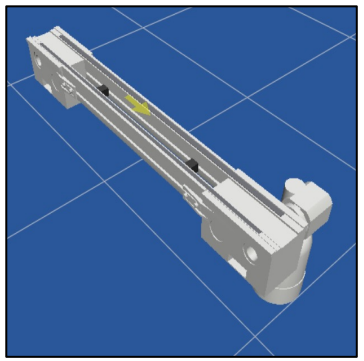
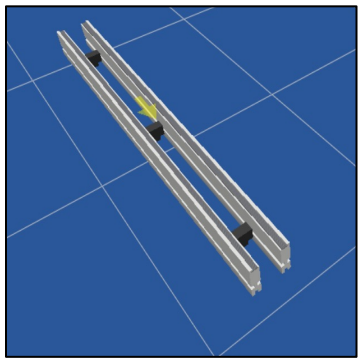
Testing of TS1 Components

Phase 1 : Checking Component Availability for Testing

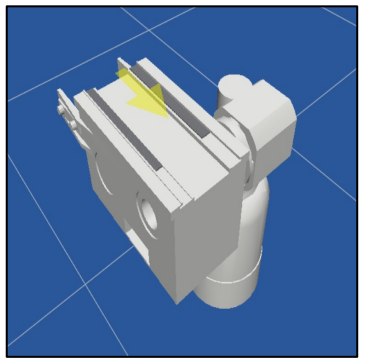
Component in MTPro



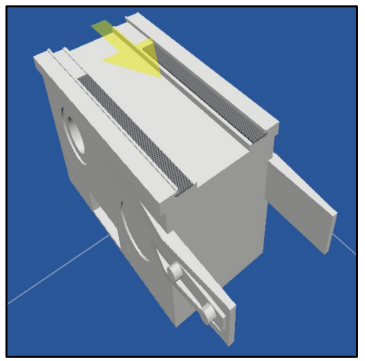
Conveyor Unit



Section (ST 1)

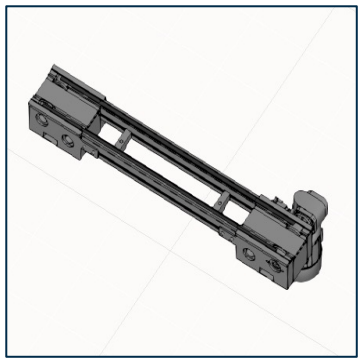


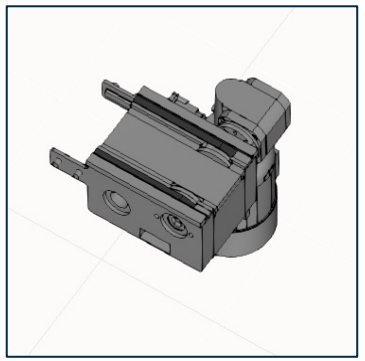
Drive (AS 1)

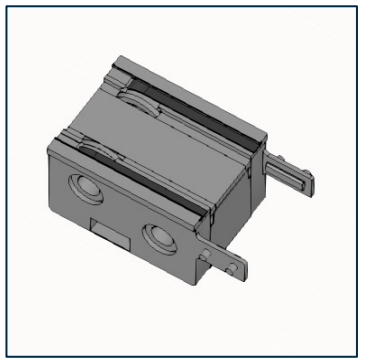


Return Unit (UM1)

Modelled Component in VC







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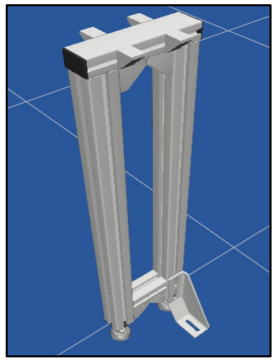
Testing of TS1 Components

Phase 1 : Checking Component Availability for Testing

Component in MTPro



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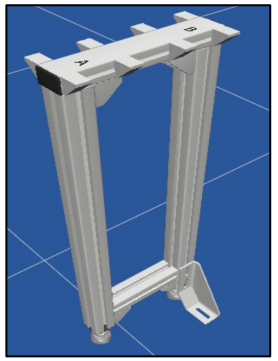
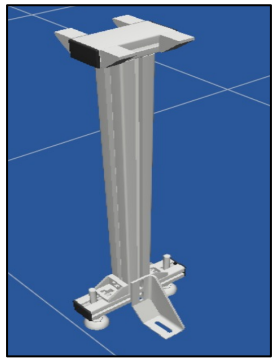
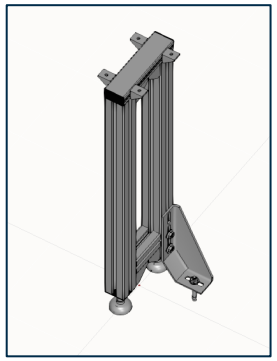


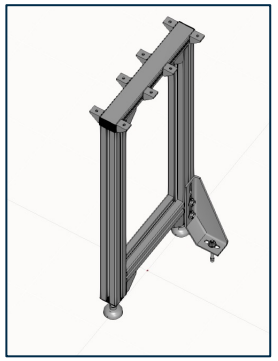
Legset (two tracks)

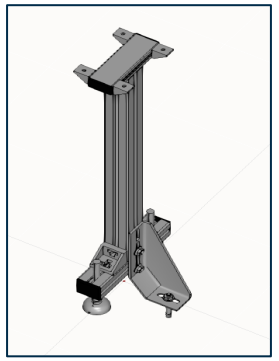


Legset (SZ 1/L)

Modelled Component in VC







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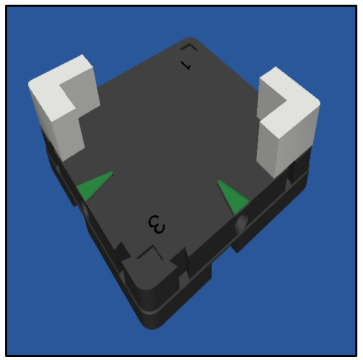
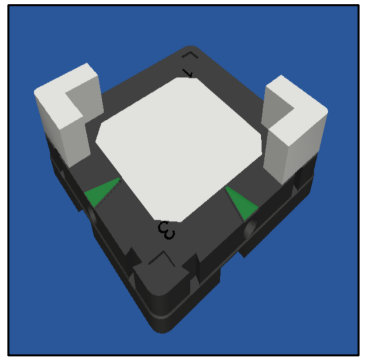
Testing of TS1 Components

Phase 1 : Checking Component Availability for Testing

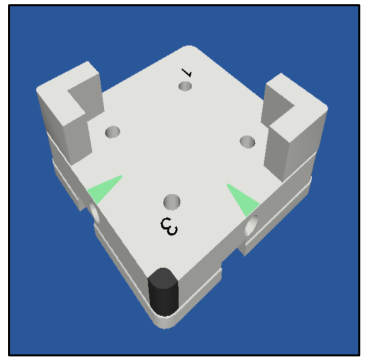
Component in MTPro



Workpiece Pallet
(WT 1/K)

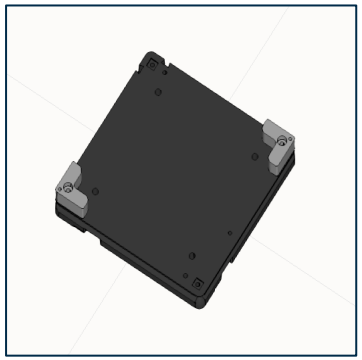


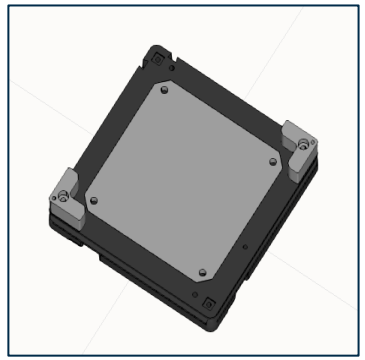
Workpiece Pallet
(WT 1/S)

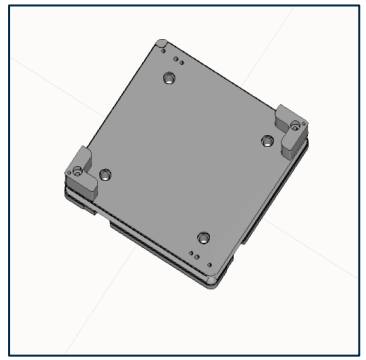


Workpiece Pallet
(WT 1/P)

Modelled Component in VC







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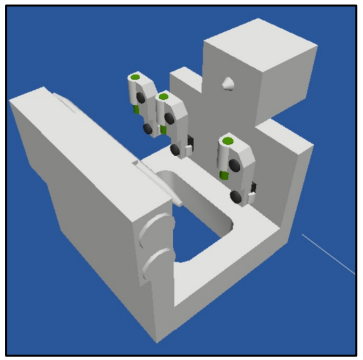
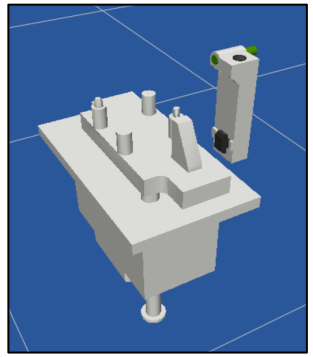
Testing of TS1 Components

Phase 1 : Checking Component Availability for Testing

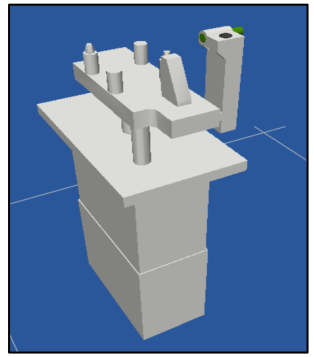
Component in MTPro



Position Unit (PE 1)

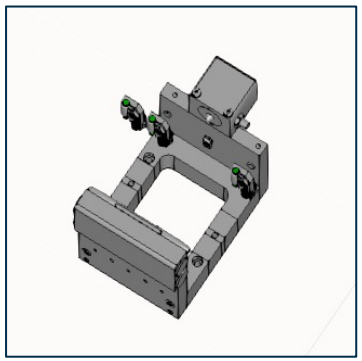


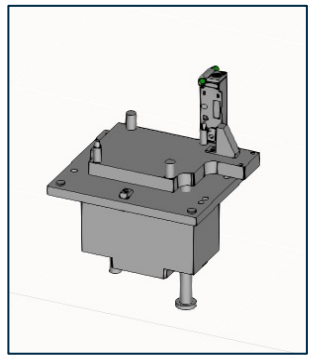
Lift Position Unit (HP 1/P h=15)

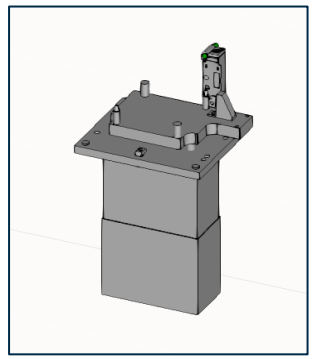


Lift Position Unit (HP 1/P h=0…50)

Modelled Component in VC







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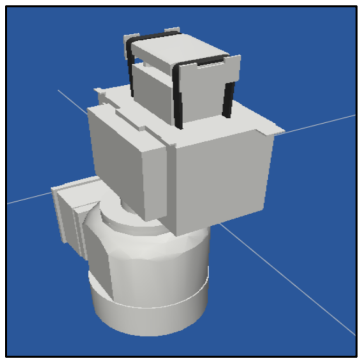
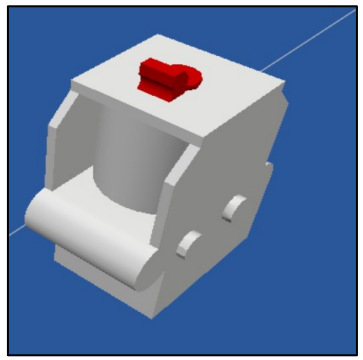
Testing of TS1 Components

Phase 1 : Checking Component Availability for Testing

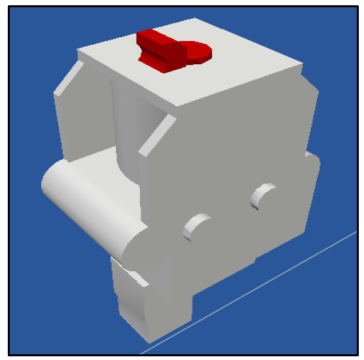
Component in MTPro



Lift Transfer Unit
(HQ 1/U)

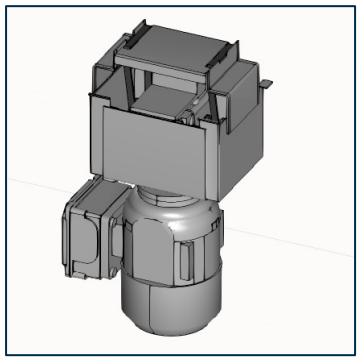


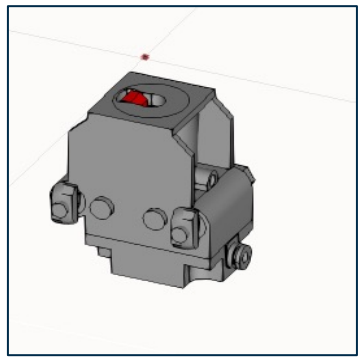
Stop Gate (VE 1)

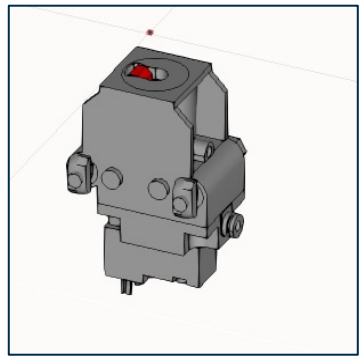


Stop Gate (VE
1/V)

Modelled Component in VC







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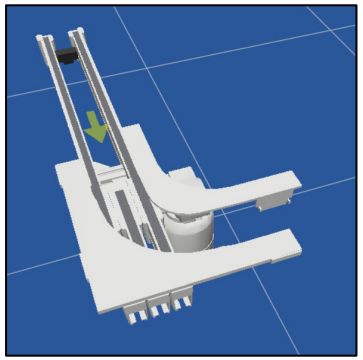
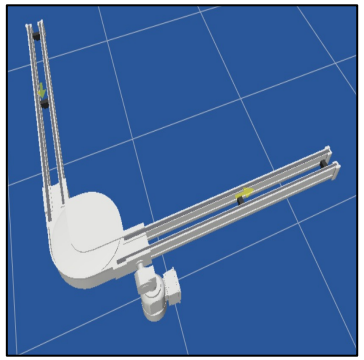
Testing of TS1 Components

Phase 1 : Checking Component Availability for Testing

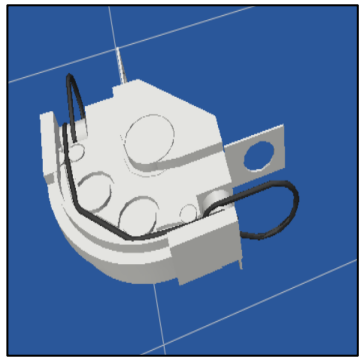
Component in MTPro



Curve CU 1/90

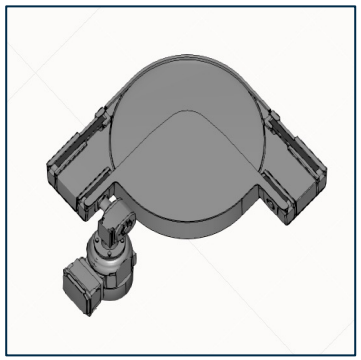


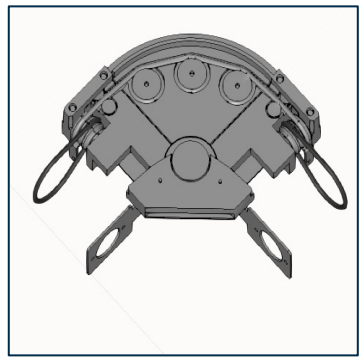
Curve KU 1/90



Curve KU 1/90
(KE 1/O-90)

Modelled Component in VC





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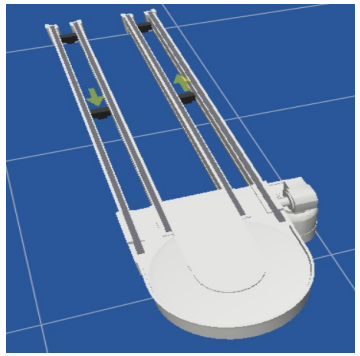
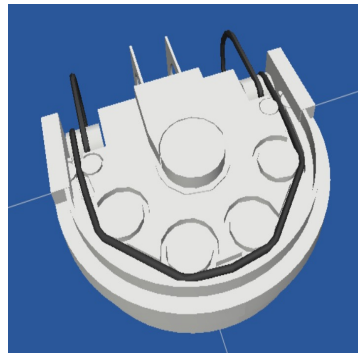
Testing of TS1 Components

Phase 1 : Checking Component Availability for Testing

Component in MTPro

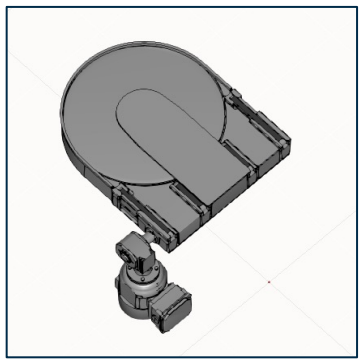


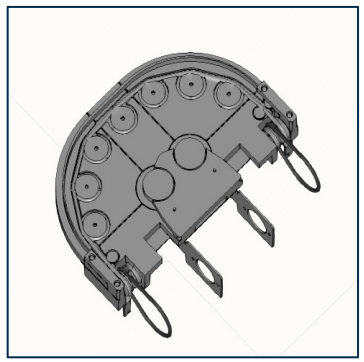
Curve KU 1/180



Curve KU 1/180
(KE 1/O-180)

Modelled Component in VC





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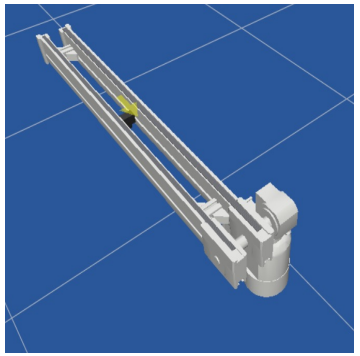
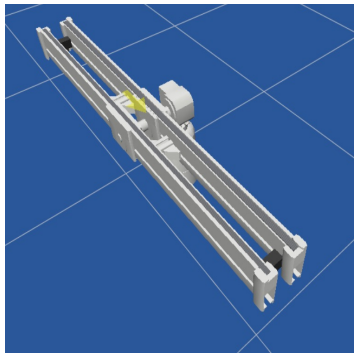
Testing of TS1 Components

Phase 1 : Checking Component Availability for Testing

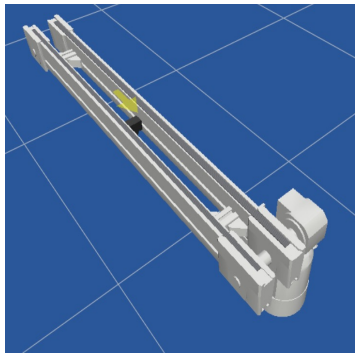
Component in MTPro



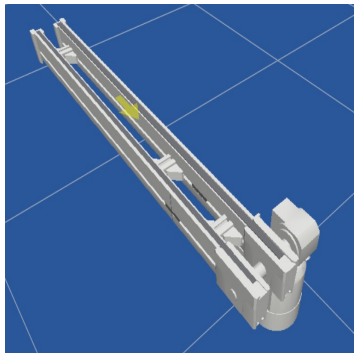
BS 1



BS 1/M

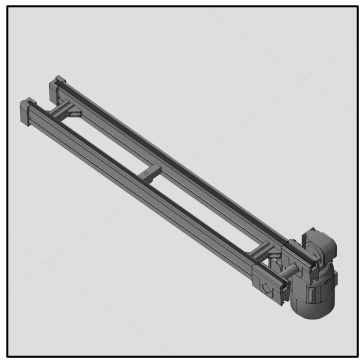


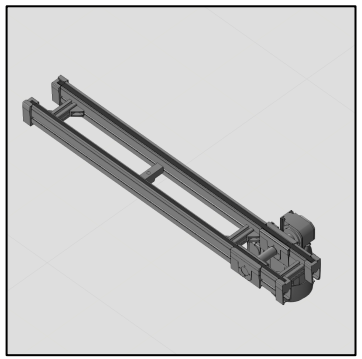
BS 1/T

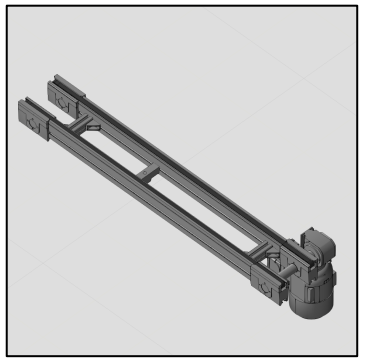


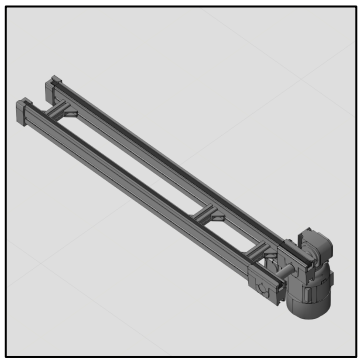
BS 1/S

Modelled Component in VC









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Testing of TS1 Components

Phase 2 : Verification Testing

1. **Unit test (Parameter Validation & Geometric Evaluation):**

- Verifying if all the associated parameters/attributes are properly defined and are within the required constrained limits for any individual component.
- The attributes along with their data types are listed for specific variant of the component as available in MTPro and Visual Components.
- The component properties, data types, default values and their limitations are counter checked for variation against the properties given in MTPro.
- Additionally, evaluation of geometric changes upon manipulation of these attributes are also checked for variation.

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Testing of TS1 Components

Phase 2 : Verification Testing

1. Unit test (Parameter Validation & Geometric Evaluation):

- A comparison excel sheet for the data available in MTPro and Visual Components is prepared as shown below.

		MTPro				Visual Components			
Component	Variant	Property	Data type	Limitation	Default	Component	Variant	Property	Default
Belt Section	BS 1	ConveyorLength	Integer	250 -5000mm	1000 mm	Belt Section	BS 1	ConveyorLength	1000 mm
		ConveyorWidth	Integer	80,120,160 mm	120 mm			ConveyorWidth	120 mm
		ConveyorHeight	Integer		850 mm			ConveyorHeight	850 mm
		ConveyorSpeed	Integer	6,9,12,15,18	12 m/min			ConveyorSpeed	12 m/min
		StandardSizes	String	Standard Size/Individual Size	Standard Size			StandardSizes	*preserve*
		DirectionOfTransport	String	Forward, Backward,Alternating	Forward			DirectionOfTransport	Forward
		BeltSectionType	String	BS 1, BS 1/M, BS 1/T, BS 1/S	BS 1			BeltSectionType	BS 1
		WTWeight	Real	0.5 - 3 kg	1 kg			WTWeight	1 kg
		Motor/Gear	String	without Motor/Gear, with Motor without Gear, with Motor/Gear	with Motor/Gear			Motor/Gear	with Motor/Gear
		Motor arrangement	String	Left, Right	Left			Motor arrangement	Left
		Frequency	Integer	50,60 Hz	50 Hz			Frequency	50 Hz
		Voltage	Integer	400 (+10/-12%), 200(±10%)	400 (+10/-12%)			Voltage	400 (+10/-12%)
		ConnectionType	String	TerminalBox, CablePlug	TerminalBox			ConnectionType	TerminalBox
		MotorMounting	Integer	0,90,180,270 deg	0 deg			MotorMounting	0 deg
		Position	Array(Real)[3]					Coordinates (World)[x,y,z]	
		Rotation	Array(Int)[3]					Coordinates (World)[Rx,Ry,Rz]	
		preserve						ConveyorCapacity	9999
		preserve						Accumulate	True
		preserve						SpaceUtilization	True
		preserve						RetainOffset	True

TS1_Library_Testing.xlsx

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Testing of TS1 Components

Phase 2 : Verification Testing

2. Interface test:

- Interface testing focuses on whether individual components interact with other components as intended.
- Individual components are connected to each other and tested to verify if its functioning with the expected behavior.
- To check different functionalities of the component, a structured question-based approach can be used such that each question is associated with a test to verify this functionality.
- Each component will have several functionality questions and tests to verify it. The results of which are noted down in TS1_Library_Interface, Functionality test.xlsx

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Testing of TS1 Components

Phase 3 : Creating basic demonstration models

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