



**Critical**  
manufacturing  
an ASM PT company

# New Product Introduction (NPI)

## 11.3

April 2026

### DOCUMENT ACCESS

Public

### DISCLAIMER

The contents of this document are under copyright of Critical Manufacturing S.A. it is released on condition that it shall not be copied in whole, in part or otherwise reproduced (whether by photographic, or any other method) and the contents therefore shall not be divulged to any person other than that of the addressee (save to other authorized offices of his organization having need to know such contents, for the purpose for which disclosure is made) without prior written consent of submitting company.

# New Product Introduction (NPI)

*Estimated time to read: 14 minutes*

New Product Introduction (NPI) is one of the fundamental concepts of manufacturing because it is the process of establishing a clear plan to take your product from its conceptualization to its final form. This process involves various stages, that may be different from project to project, but the end results are to reduce waste, avoid miscommunication, speed up production, and save time.

The Critical Manufacturing [MES](#) NPI module helps you achieve this by supporting the loading, association and visualization of an ECAD file of type ODB++ with a Product, and by supporting the loading of a Product [BOM](#) file with the component information.

**i Info**

NPI is a separately licensed module.

This document will guide you through the required configurations for the NPI functionalities.

## Overview

While manufacturing a product, it is a common practice to display technical drawings and schematics to assist the operator throughout the production process. Critical Manufacturing [MES](#) can help to associate the drawings to the products and to display these drawings when assembling the product. The concepts and functionalities of the Critical Manufacturing [MES](#) NPI module will be described in more detail over the next sections.

## Concepts

The table below describes the main concepts related to New Product Introduction.

Concept	Description
<b>ECAD</b>	ECAD (electronic computer-aided design) software is used to design and create electronic structures. Typically consists of multiple 2D layers. Some CAD files are very basic and only contain the drawings - in this case, separate additional files (centroid and <a href="#">BOM</a> File) are required. Some CAD files are more advanced and they contain the layout, the list of components as well as the component placement information, Pin, and Net information.
<b>MCAD</b>	MCAD (mechanical computer-aided design) is used to design and create mechanical systems. MCAD can be used for previewing various design iterations, including assessing form factors and the fitment of certain physical elements.
<b>Schematic</b>	A schematic is a representation of the elements of a system using abstract, graphic symbols rather than realistic pictures. A schematic usually omits all details that are not relevant to the key information the schematic is intended to convey and may include oversimplified elements in order to make this essential meaning easier to grasp.

Concept	Description
<b>Drawing</b>	A drawing (technical drawing) is used to convey information about an object. A common use is to specify the geometry necessary for the construction of a component and is called a detailed drawing.
<b>Layer</b>	There are multiple layers in an ECAD, some refer to the top side and others to the bottom side.
<b>Component</b>	A part used in an MCAD model, that is part of the <u>BOM</u> for a higher-level part.
<b>Reference Designator</b>	A Reference Designator identifies a component within an electrical schematic or on a printed circuit board. The Reference Designator usually consists of one or two letters followed by a number (accepts numbers, letters, underscores or dots, but not spaces).

Table: New Product Introduction main concepts

## Setting up New Product Introduction Related Entities

To enable the New Product Introduction functionalities, it is necessary to set up the Critical Manufacturing MES entities.

**Note**

Take the following example: you aim to set-up a new Product for manufacturing, Product A. To manufacture Product A, you have to create the required Products, BOMs and Checklists.

The CAD and BOM files should already be available.

In order to set up the NPI-related Entities it's necessary to follow the steps as described in the Table below.

Step Number	Step	Description
<b>1</b>	<b>Create the necessary Products</b>	Create the necessary Products and define their CAD, <u>BOM</u> , Schematic, and Drawing files.
<b>2</b>	<b>Create the necessary BOMs</b>	Create the necessary BOMs.
<b>3</b>	<b>Create the necessary Checklists</b>	Create the necessary Checklists for the manufacturing steps.

Table: Steps to setup the NPI-related Entities

The MES object model is displayed in the figure below.

```
graph LR
  L1[Checklist Item] --- A1[Checklist]
  A1 --- A2[BOM]
  A2 --- A3[Product]
  A2 --- A4[BOM Product]
  A3 --- N1[Product Component]
  N1 --- N2[Product Component Location]
  A3 --- N2
```

```

classDef mermaid_title color:#000, fill:#fafafa, stroke:#fafafa, stroke-width:0x, font-size:100%,
font-weight:200;
classDef mermaid_start color:#000, fill:#fafafa, stroke:#fafafa, color:#fafafa, stroke-width:0x,
font-size:100%, visibility: hidden;
classDef mermaid_businessdata color:#000, fill:#65CDE8, stroke:#65CDE8, stroke-width:0px, font-
size:100%;
classDef mermaid_nonbusinessdata color:#000, fill:#B7DEE8, stroke:#B7DEE8, stroke-width:0px, font-
size:100%;
classDef mermaid_entity color:#000, fill:#FB9F53, stroke:#FB9F53, stroke-width:0px, font-size:100%;
classDef mermaid_entitylinked color:#000, fill:#FCD5B5, stroke:#FCD5B5, stroke-width:0px, font-
size:100%;
classDef mermaid_context color:#000, fill:#B9CDE5, stroke:#B9CDE5, stroke-width:0px, font-
size:100%;
classDef mermaid_optional color:#000, fill:#B7DEE8, stroke:#65CDE8, stroke-width:1px, font-
size:100%, stroke-dasharray: 5 5;
class Main mermaid_entity
class A1,A2,A3,A4,A5,A6,A7,A8,A9,A10,A11,A12,A13,A14 mermaid_businessdata
class L1,L2,L3,L4,L5,L6,L7 mermaid_entitylinked
class C1,C2,C3,C4,C5,C6 mermaid_context
class N1,N2,N3,N4,N5,N6 mermaid_nonbusinessdata

```

The next sub-sections will cover the required configuration steps in more detail.

## 1 - Product

When preparing a Product for production, you can define a Default BOM and it will be used to display the complete Product BOM tree structure by linking the different Product Default BOMs.

 **Note**

For the above-mentioned example, you should create Product A and the Parts required for assembling it.

### CAD File Support

Drawings and Schematics are key for the manufacturing of a product in many assembly and electronics industries. To achieve this, you can upload **ODB ++** ECAD files in MES. Currently, the system only supports this file type, however, in the future, further file types will be supported.

The CADFileInformation Generic Table will be used to maintain general information of imported CAD files. The structure of this table is described in the Table below.

Property	Description	Data Type
<b>File Type</b>	The name of the File Type	String, Mandatory
<b>File Extensions</b>	A semi-colon separate list of possible file extensions for the given File Type	String, Mandatory
<b>Content Type</b>	Content of the FileType	Enumeration, Mandatory: - MCAD - ECAD
<b>Includes <u>BOM</u> Information</b>	Specifies whether the File Type contains <u>BOM</u> Information embedded within it	Boolean, Mandatory

Property	Description	Data Type
<b>Includes Reference Designator Information</b>	Specifies whether the File Type contains Reference Designator information embedded in it <b>Note:</b> this applies to ECAD files only	Boolean, Mandatory
<b>Includes Component Location</b>	Specifies whether the File Type contains Component Location information embedded in it <b>Note:</b> this applies to ECAD files only	Boolean, Mandatory

Table: Generic Table CAD File Information properties

### Import Product Information

You can link to the Product ECAD, BOM, Drawings, and Schematics files. Thus, on the creation of a Product, you can access the Import Product Information wizard, displayed in the Figure below, and define the properties listed in the Table below.

Property	Description
<b>CAD Type</b>	The Product CAD file type. Currently, only the ODB ++ format is supported.
<b>CAD File</b>	To store the Product CAD file.
<b>Panel Type</b>	The Panel Type can be set for ECAD only and it defines whether the Product is single-sided or double-sided. This information is only for reference.
<b>Import <u>BOM</u> Information</b>	Whether the <u>BOM</u> information will be imported from the CAD file.
<b>Import Component Location Information</b>	Whether the Component Location information will be imported from the CAD file.
<b><u>BOM</u> File</b>	To store the Product <u>BOM</u> file, in case it's not included in the CAD file. The <u>BOM</u> File is parsed according to the File Import Template Generic Table definition.
<b>List Separator</b>	The Separator used within the <u>BOM</u> file (Comma or Semicolon).
<b>Schematic</b>	A Schematic is a representation of the elements of a system.
<b>Drawing</b>	A Drawing is a type of technical drawing that is used to convey information about a Product.

Table: Import Product Information properties


**Import Product Information**

CAD BOM ATTACHMENTS

AP-Product-004 [A.1] / AP-Product-004

**Import CAD**

\* CAD Type: ODB++

CAD:  as1-oc-214.4.stp  
07/24/2024 05:19 PM | 423 KB

Panel Type:  Single Sided  Double Sided

\* Bottom View Mirror Mode: Y Axis

Import Component Location Information:

Comments:

100% Upload Completed (1 file uploaded)

Cancel < Back Next >

If you select a BOM file, the Product Components can be previewed by selecting the Preview button, as displayed in the Figure below. For the required structure of the BOM File please check the BOM File Support sub-section below.

**Import Product Information**


CAD BOM ATTACHMENTS

AP-Product-004 [A.1] / AP-Product-004

**Import BOM**

Import BOM Information from:  CAD

Apply Component Mapping:

BOM:  BOMFileProductA.csv  
07/24/2024 05:53 PM | 695 B

Culture: en-US

Product Components (6)

ITEM	COMPONENT DESCRIPTION	INTERNAL PART NUMBER	MANUFACTURER	MANUFACTURER PART NUMBER	FOOTPRINT	QUANTITY	DESIGNATOR
1	Cap Ceramic 0201 COG +/-0...			C0603COG1E100D030BA	footprint 1	6	C28 C30 C36 C44 C53 C82
2	Cap Ceramic 0201 COG 5% 5...	123		GRM0335C1H470JA...		3	C32 C33 C34
3	Cap Ceramic 0201 X5R 10% ...	CS-2408			footprint 2	1	C1
4	Cap Ceramic 0201 X5R 10% ...	CS-2484		UMK0638J222K...		4	C38 D2.T5 R2
5		CS-2484		UMK0638J222K...	footprint 2	5	C38 D2.T5 R2 T156
6	Cap Ceramic 0201 X5R 10% ...	CS-2408		UMK0638J222K...	footprint 2	1	C100

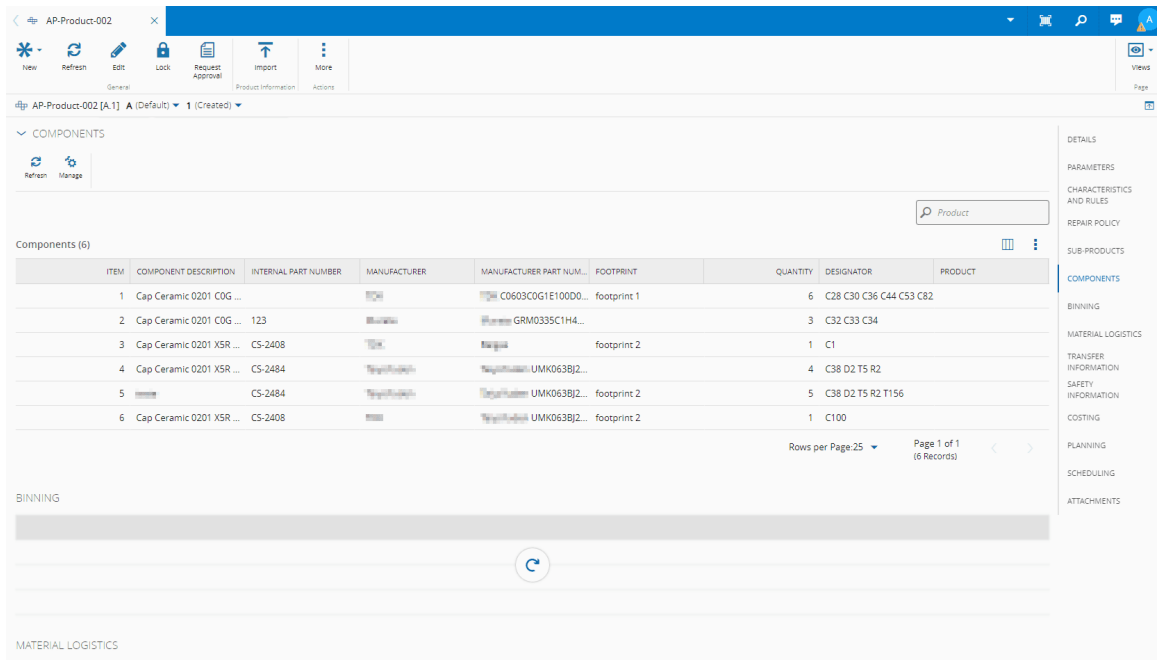
Rows per Page: 25 Page 1 of 1 (6 Records)

Comments:

100% Upload Completed (2 files uploaded)

Cancel < Back Next >

The Product Components are listed under the Components section available in the Product Details view, as displayed in the Figure below.



**Note**

For the given example, you should upload for Product A and for the Products of the Parts required for assembling it: the CAD file, the BOM file, and any relevant Drawings and Schematics.

To perform automatic column mapping of specific file headers and standard system properties, the system uses the [FileImportInformation](#), [FileImportPropertyInformation](#), and [FileImportColumnInformation](#) Generic Tables as described in the Tables below.

Property	Description	Data Type
<b>Entity Type</b>	Describes for which Entity this information applies to	Reference to an Entity Type - mandatory
<b>Type</b>	Describes the information type to import	Enumeration, Mandatory: - <u>BOM</u> - Centroid - CAD
<b>Is Enabled</b>	Defines whether the import is enabled for this information type	Boolean, Mandatory

Table: Generic Table File Import Information properties

Property	Description	Data Type
<b>Entity Type</b>	Describes to which Entity Type this information applies	Entity Type, Mandatory

Property	Description	Data Type
<b>Type</b>	Describes the information to be imported	Enumeration, Mandatory: - BOM - Centroid This must be a list of known types
<b>Property</b>	The name of the system property	String, Mandatory
<b>Data Type</b>	The property data type	Enumeration, Mandatory
<b>Enumeration Name</b>	The enumeration name	Boolean, Optional
<b>Is List</b>	Whether the property is a list or not	Boolean, Mandatory
<b>Is Mandatory</b>	Whether the property is mandatory or not	Boolean, Mandatory

Table: Generic Table File Import Property Information properties

Property	Description	Data Type
<b>Entity Type</b>	Describes for which Entity this information applies to	Reference to an Entity Type - mandatory
<b>Type</b>	Describes the information type to import	Enumeration, Mandatory: - BOM - Centroid This must be a list of known types, same as File Import System Properties
<b>Header</b>	Name of the file column header	String, Mandatory
<b>System Property</b>	Name of the system property	String, Mandatory

Table: Generic Table File Import Column Information properties

### **BOM File Support**

Currently, Critical Manufacturing MES provides support for BOMs in CSV format.

The CSV file has to meet some structure requirements, as described in the Table below. Those are defined for the BOM entity, under the [FileImportPropertyInformation](#) Generic Table.


**Info**

In the CSV file, the headers must be set and defined in the first row. You can set any order for the columns and there is no culture when importing the CSV file.

--	--

Property	Description	Data Type
Item Number	The <u>BOM</u> item number	Number, Mandatory
Reference Designator	A list of reference designators, mandatory for ECAD files. Separate by "spaces" or "," and use "-" for ranges.	String, Optional
Description	The description of the component	String, Optional
Quantity	The <u>BOM</u> item quantity	Long, Mandatory
Internal Part Number	The internal part number of the component	String, Optional
Manufacturer	The manufacturer	String, Optional
Manufacturer Part Number	The manufacturer part number	String, Optional
Footprint	The geometry of pads for soldering certain electronic components <b>SMT Specific</b>	String, Optional

Table: BOM CSV file properties

 **Note**

For the given example, the BOM file for Product A would have the following information:

Item Number	Internal Part Number	Description	ReferenceDesignator	Quantity	Manufacture
1	CS-2412	Part A top	C28 C30 C36 C44 C53 C82	6	Manufacturer ,
2	CS-2482	Part B bottom	C32,C33,C34	3	Manufacturer
3	CS-2408	Part C side	C1-6 Z1 R102	8	Manufacturer ,

Table: BOM file example


## 2 - BOM

When creating a BOM with Scope Materials or Weigh & Dispense it is possible to define the properties listed in the Table below.

Property	Description
<b>Product</b>	The selected Product will allow to link the <u>BOM</u> to that specific Product and to re-use the Product CAD, Drawing, and Schematic files.
<b>Drawing File</b>	You can add a Drawing file.

Table: BOM properties

For each BOM Item of a BOM with Scope Materials it is possible to define a **Reference Designator**. This only applies to BOMs that reference a Product that contains an ECAD file.

 **Note**


For the given example, you should create the BOMs required for assembling Product A and for assembling the Parts of Product A.

### 3 - Checklist

When processing a Material at a certain Step, you might require some visual aid in order to guide him/her throughout the operation's steps. This can be attained by having an instruction displayed when performing a Checklist. The properties to be configured are detailed in the Table below.

Property	Description
<b>Scope</b>	The Scope must be defined as Material Tracking.
<b>Execution Mode</b>	The Execution Mode must be defined as Long Running.
<b><u>BOM</u></b>	The BOMs available for selection have the Type defined as Materials or Weigh & Dispense.

Table: Checklist properties

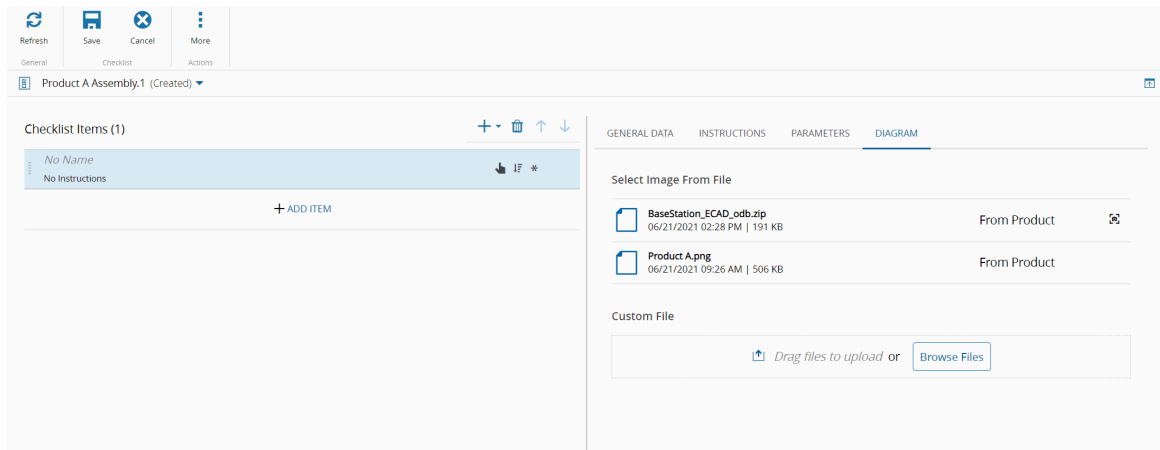
 **Note**

For the given example, you should create the Checklists to guide yourself when assembling Product A and when assembling the Parts of Product A.

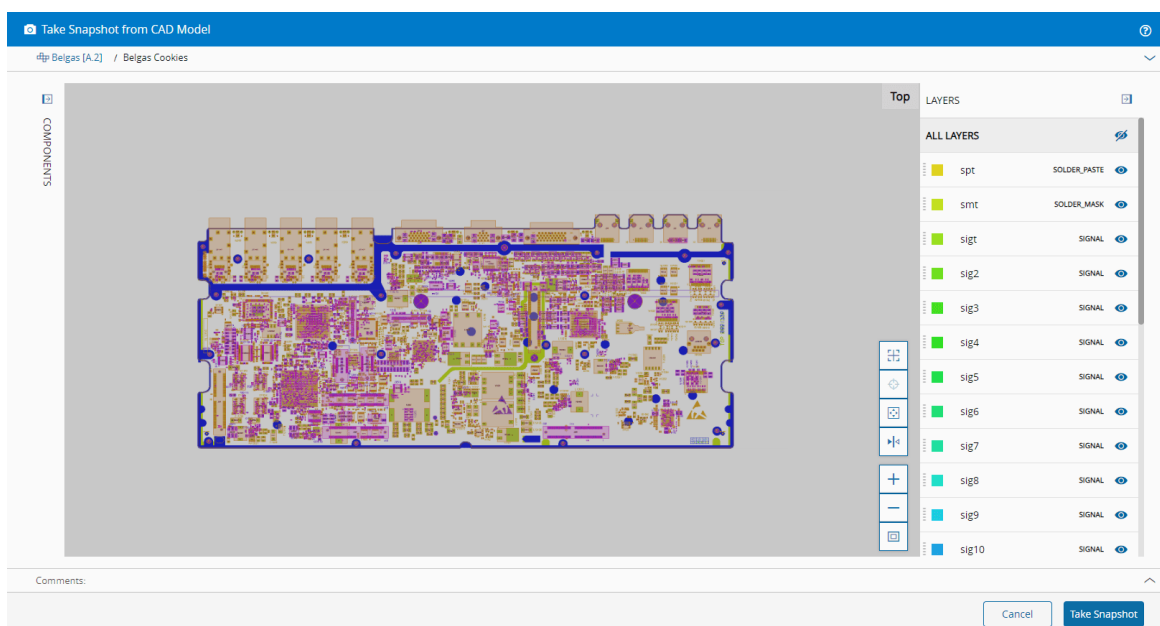
#### Diagram

It is possible to define a Diagram for a Checklist Item, example, a file that provides instruction with some sort of visual aid for you when performing the Checklist.

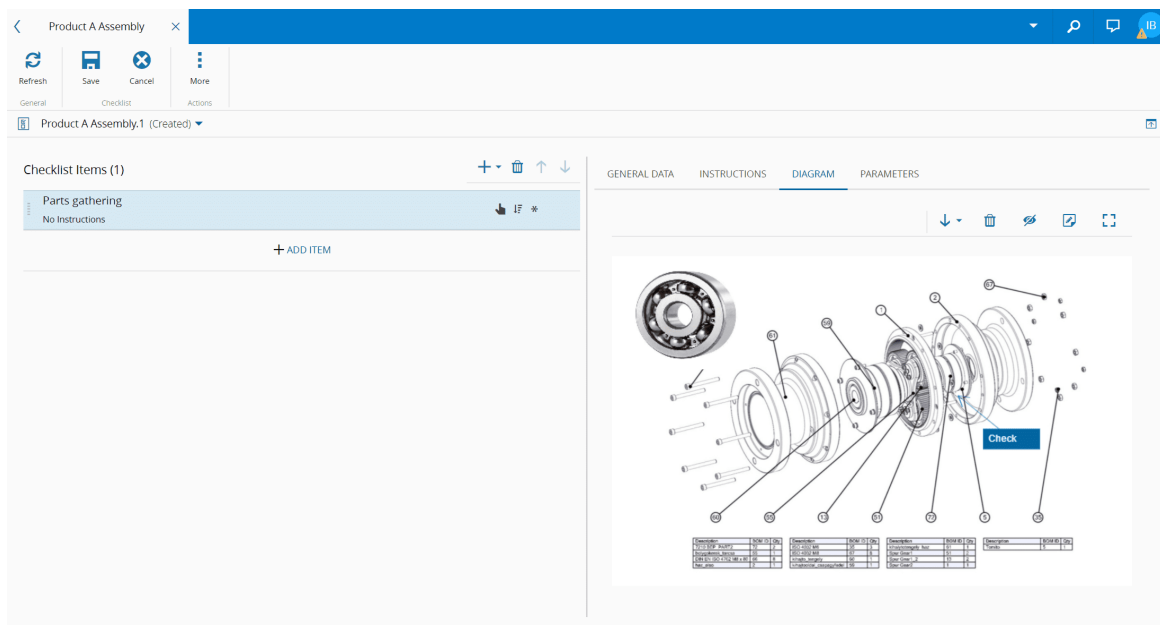
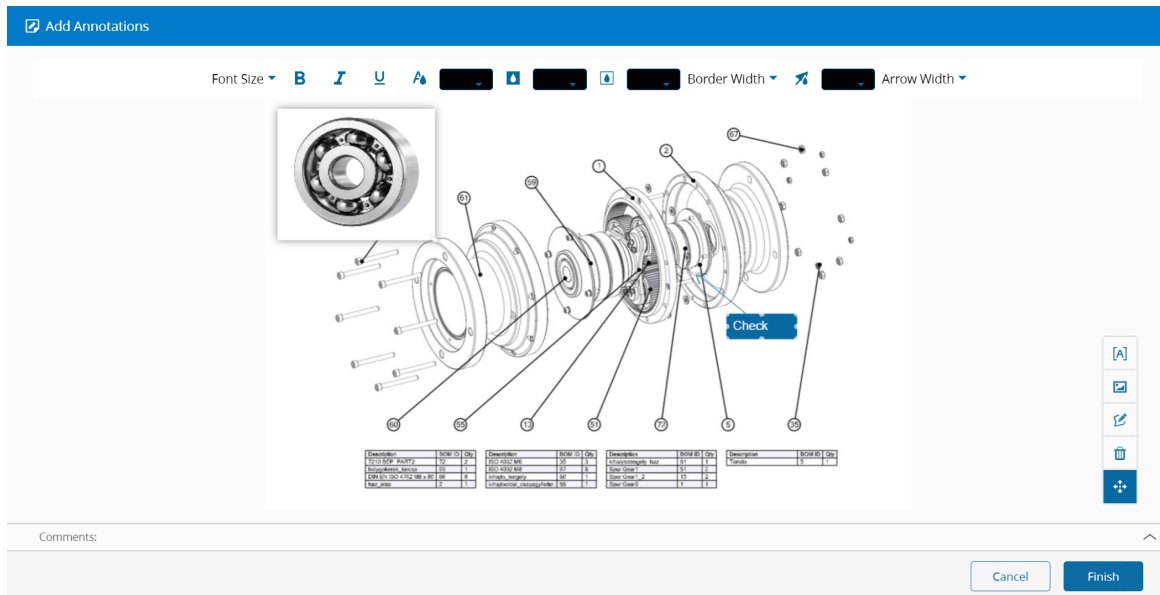
The BOM property Drawing File and the Product properties CAD File, Schematic, and Drawing are available for selection if a BOM is defined for the Checklist and this BOM as a Product defined, as displayed in the Figure below.



For dynamic files (example: CAD), you need to take a snapshot from the CAD viewer to use as a static image and to be able to add annotations, as displayed in the Figure below.



It is also possible to configure annotations and add `../images` for files or snapshots through the Add Annotations wizard available in the Diagram tab of the Checklist Item, as displayed in the Figures below.



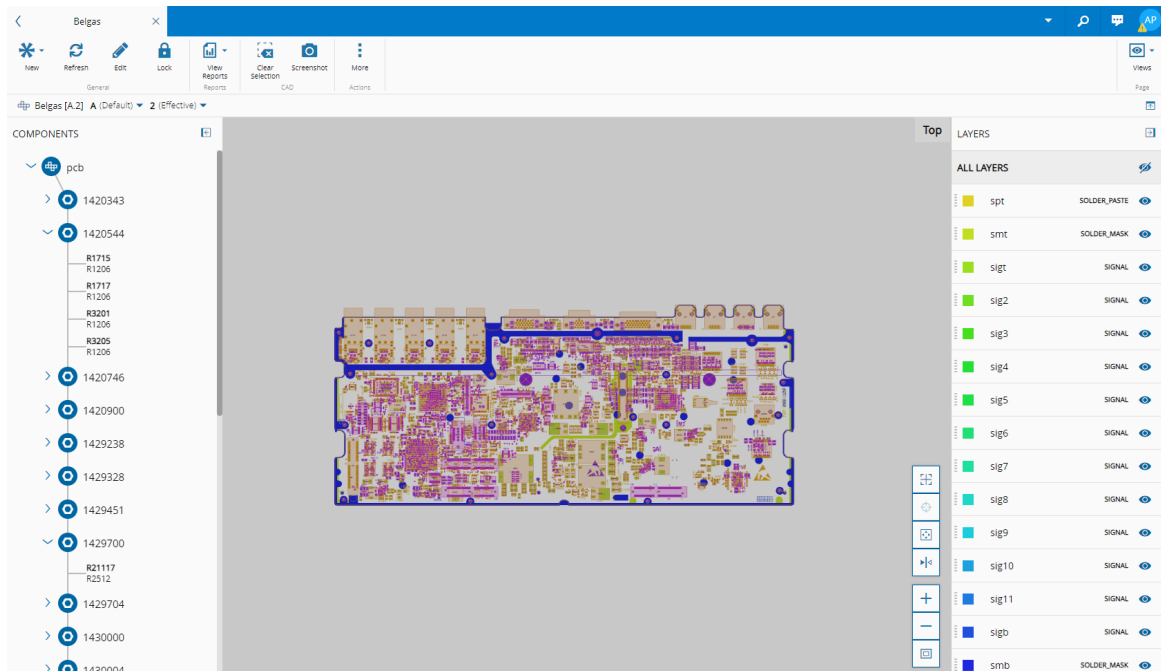
## Using New Product Introduction

After setting up the required configurations mentioned in the previous sections, the NPI functionalities can be used, as described in the next sections.

## CAD Visualization

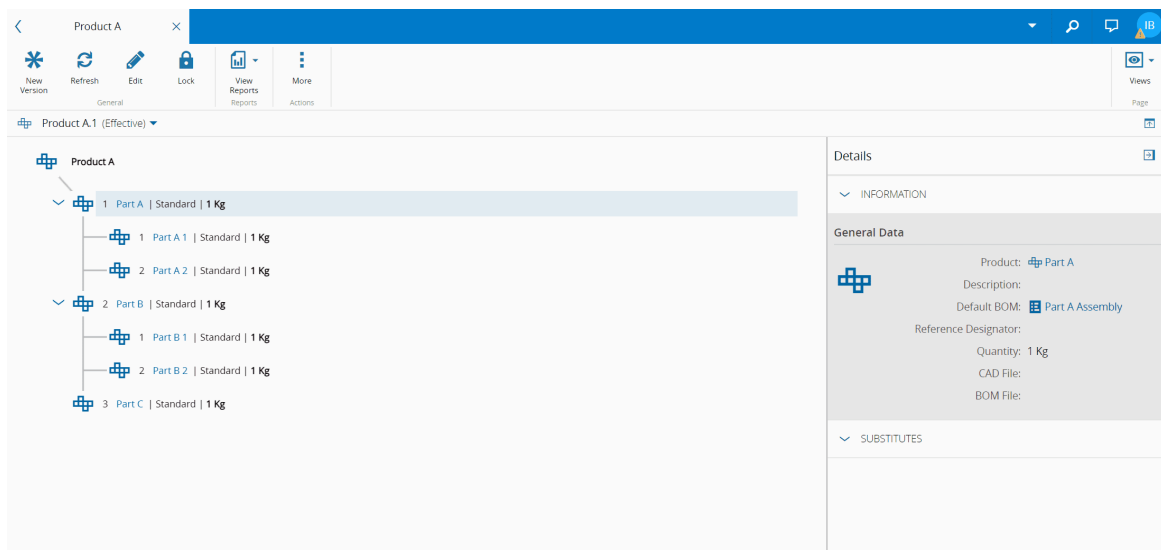
If a Product has a CAD file defined, the CAD view will become available, as displayed in the Figure below.

On the right-hand side of the screen it is possible to show/hide layers. On the left-hand side of the screen, it is displayed the Product tree, with the Product Components and Reference Designators and it is also possible to select a Reference Designator that will be highlighted in the CAD drawing. By double-clicking on a Reference Designator in the CAD drawing, the Reference Designator name will be highlighted in the Product tree.



## Product BOM Structure Visualization

If a Product has a Default BOM defined, the BOM Structure view will become available, as displayed in the Figure below. If the BOM Items of the Product also have a Default BOM defined, their BOM Items will be displayed as well.



## Perform Checklist

When performing a Checklist, if a Diagram is defined, it will appear together with the defined annotations, as displayed in the Figure below.

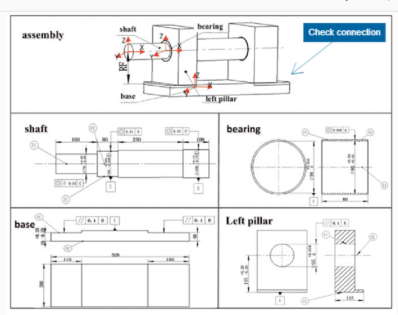
**Perform Checklist**

Product A 1 (InProcess) / Product A / Mixing / 1 Kg

Product A Assembly Items (1 of 8)

- Parts gathering (No Instructions)
- Set-up workstation (No Instructions)
- Verify Parts' lot (No Instructions)
- Verify Production Order details (No Instructions)
- Place Part A (No Instructions)
- Place Part B (No Instructions)
- Place Part C (No Instructions)
- Test connection (No Instructions)

INSTRUCTIONS | **DIAGRAM** | NOTES | INFO



Comments:

Cancel Save Now Perform

## Record Material Defect using Picture

When recording a Defect for a Material, you can specify a Defect Reason in a Drawing, either in a snapshot of the Product CAD file or in an image. The image can either be provided by the Drawings linked to the Product of the Material or provided when recording the Defect, as displayed in the Figure below.

**Record Material Defects**

FILE | DEFECTS

MAT\_D01 (Queued) / Product 01 [A] / Mixing / 10 Kg

Select Image From File

985172b\_odb\_withTopBottom.zip (07/25/2023 12:55 AM | 2 MB) From Product

Custom File

Drag files to upload or Browse Files

Comments:

Cancel < Back Next >

### **Info**

For further information, see the [Material Defects Tutorial](#).



# Legal Information

## **Disclaimer**

The information contained in this document represents the current view of Critical Manufacturing on the issues discussed as of the date of publication. Because Critical Manufacturing must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Critical Manufacturing, and Critical Manufacturing cannot guarantee the accuracy of any information presented after the date of publication. This document is for informational purposes only.

Critical Manufacturing makes no warranties, express, implied or statutory, as to the information herein contained.

## **Confidentiality Notice**

All materials and information included herein are being provided by Critical Manufacturing to its Customer solely for Customer internal use for its business purposes. Critical Manufacturing retains all rights, titles, interests in and copyrights to the materials and information herein. The materials and information contained herein constitute confidential information of Critical Manufacturing and the Customer must not disclose or transfer by any means any of these materials or information, whether total or partial, to any third party without the prior explicit consent by Critical Manufacturing.

## **Copyright Information**

All title and copyrights in and to the Software (including but not limited to any source code, binaries, designs, specifications, models, documents, layouts, images, photographs, animations, video, audio, music, text incorporated into the Software), the accompanying printed materials, and any copies of the Software, and any trademarks or service marks of Critical Manufacturing are owned by Critical Manufacturing unless explicitly stated otherwise. All title and intellectual property rights in and to the content that may be accessed through use of the Software is the property of the respective content owner and is protected by applicable copyright or other intellectual property laws and treaties.

## **Trademark Information**

Critical Manufacturing is a registered trademark of Critical Manufacturing.

All other trademarks are property of their respective owners.