Business To Manufacturing Markup Language

B2MML – Product Definition

Version 0500 – March 2011

Product Definition Schema Documentation

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Change History:

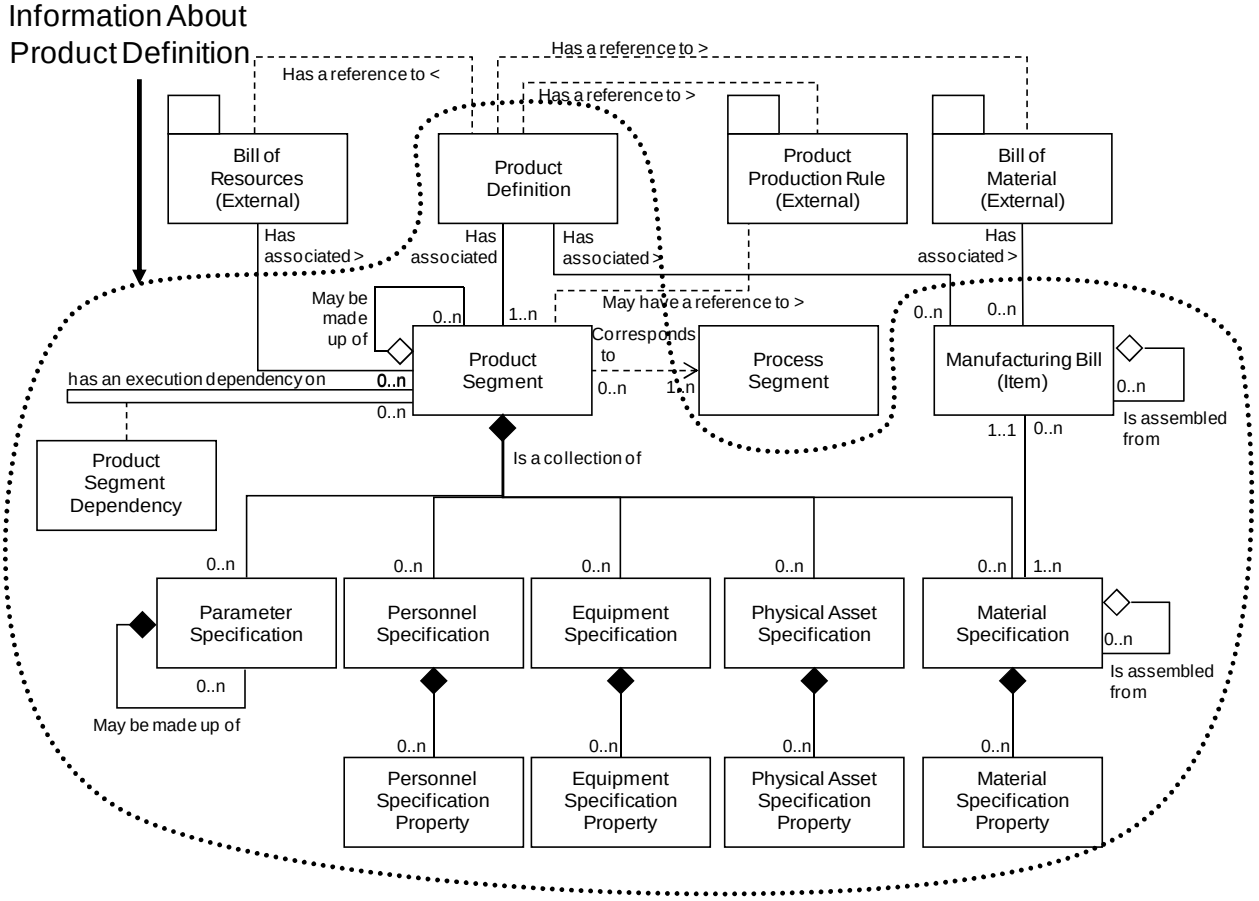
Change	Date	Person	Description
V01	7 April 2002	Dennis Brandl Dave Emerson	Initial release
V02	23 Sept 2003	Dennis Brandl Dave Emerson	• Changed ##any to "Any" element of type "AnyType"
V03	26 Aug 2005	Dennis Brandl Dave Emerson	• Added substitution groups. One group added just before each Any element.
V0301	29 Dec 2005	Dennis Brandl	• Changed “Value” elements to be 0..unbounded
V04	04 June 2007	Dennis Brandl	• Added transaction elements • Removed choice options in Manufacturing Bill, material, personnel, and equipment specifications.
V0401	Oct 2008	Dennis Brandl	• Changed version number
V0500	Mar 2011	Dennis Brandl	• Updated to match ISA 95.02-2010 • Added Physical Asset elements • Added material assembly elements • Removed AnyType

1 Schema Scope

This document defines the information about the definition of product information that may be exchanged between business systems and manufacturing operations systems. This information is based on the data models and attributes defined in the ANSI/ISA 95.00.02 Enterprise/Control System Integration standard. Contact ISA (The Instrumentation, System, and Automation Society) for copies of the standard. Additional information on the standard is available at www.isa.org.

1.1 Key Information Assumptions

The data represented in these schemas is derived from the UML model below. This model is defined in the ANSI/ISA 95.00.02 standard. The information model in the figure below is hierarchical with references to, but does not include, the bill of materials and the bill of resources. The key assumption is that the information will be accessed by a Product Definition.



Model of Exchanged Product Definition Information

This schema uses a common schema for definition of elements that are used in multiple schemas, such as ID, Description, and Value. See the document defining the Common schema for definition of the common elements.

1.2 Key Use Assumptions

The model only defines the exchanged information and does not define the use of the information or encapsulation of the information in any defining transactions.

1.3 ProductDefinition

The main structuring element of the schema definition is ProductDefinition. ProductDefinition is the container object for exchanged information and includes references to the Product Production Rules, Bill Of Materials, and Bill Of Resources. The term Product Production Rule is used in ANSI/ISA-95.00.01 to indicate the information that used within manufacturing to manufacture the product, such as assembly instructions, flow sheets, or recipes. Additional information exists in the bill of materials, bill of resources, and manufacturing operations systems, but is not defined in the exchange schemas.

1.4 ManufacturingBill

A manufacturing bill identifies a material or material class that is needed for production of the product. The manufacturing bill includes all uses of the material in production of the product, while the product segment's material specification defines just the amount used in a segment of production.

For example: a manufacturing bill may identify 55 Type C left threaded screws, where 20 are used in one product segment, 20 in another product segment, and 15 used in a third product segment.

ManufacturingBill elements define materials that make up the manufacturing bill. These materials may be identified by material class or by material definition.

1.5 ProductSegment

The product segment information defines what manufacturing personnel, equipment, or material resources are required for execution of the product segment for a specified quantity of product (eg: a standard batch or lot size). It does this by defining the classes of resources, or in some cases the exact instance of a resource required. For example, an assembly segment may require 1 assembler for 2 hours, and 1 assembly machine for 2 hours. In some industries the exact assembly machine may have to be specified, such as "AssemblyMachine#1".

A product segment also defines parameters that may be specified when the segment is executed, such as production specification as color or manufacturing options.

1.5.1 PersonnelSpecification

PersonnelSpecification elements define the personnel resources, by class or instance, required for production of the product within a product segment. Such as 2 hours of a painter for a paint segment for a lot size of one widget.

1.5.2 EquipmentSpecification

EquipmentSpecification elements define the equipment resources, by class or instance, required for production of the product within a product segment. Such as 2 hours for a paint station for a lot size of one widget.

1.5.3 PhysicalAssetSpecification

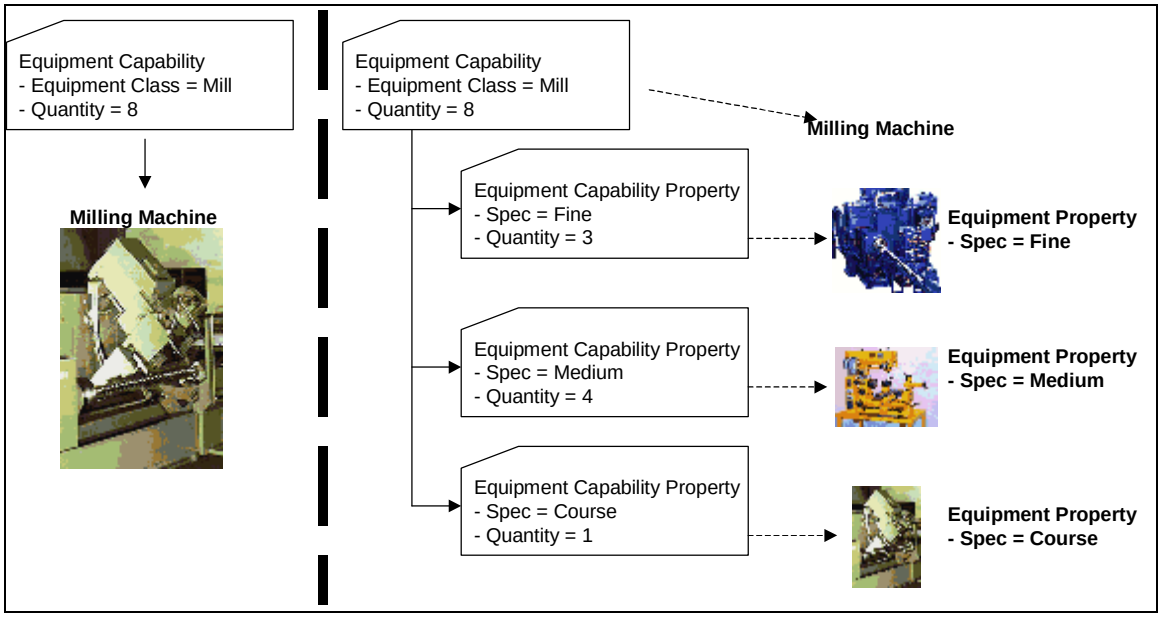
PhysicalAssetSpecification elements define the equipment resources, by class or instance, required for production of the product within a product segment.

1.5.4 MaterialSpecification

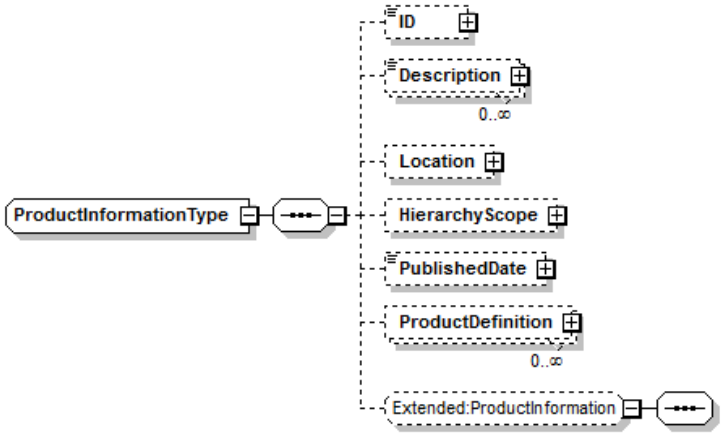
MaterialSpecification elements define the material resources, by material class or material definition, required for production of the product within a product segment. Such as 30 Kg of cooking oil (material class) required for the cooking segment for a lot size of 50 Kg.

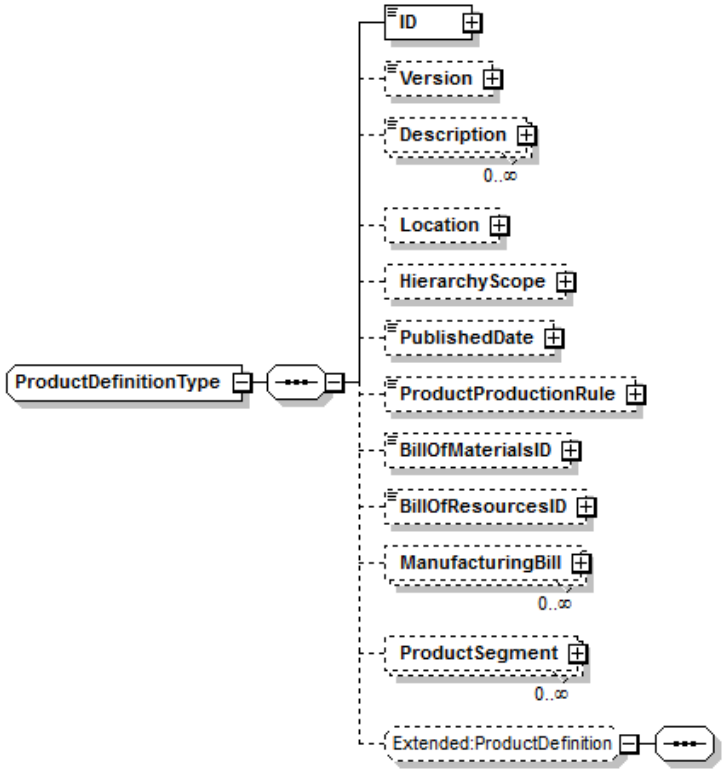
1.6 Resource Identification

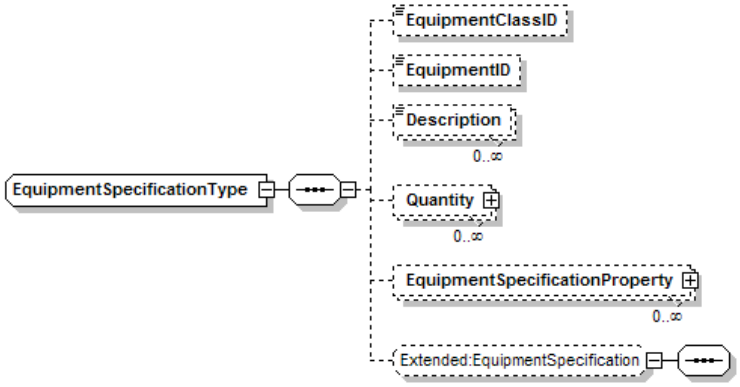
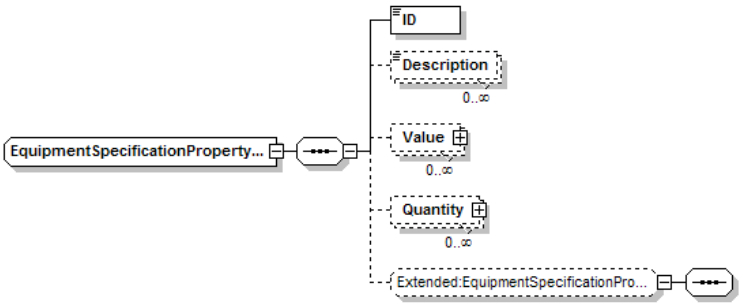
The schemas follow the ANSI/ISA-95 standard by defining resources by class ID or instance ID, or by defining them by class ID and a property value that is used to define a subset of the resource. For example, the figure below illustrates that a segment may require a certain number of milling machine, an equipment class. Other segments may require a subset of milling machine, such as “Fine” milling machines only. In the first case the class name, “Mill”, is sufficient to identify the resource required. In the second case the class name, “Mill”, and property name and value, “Spec” and “Fine”, define the required resource.

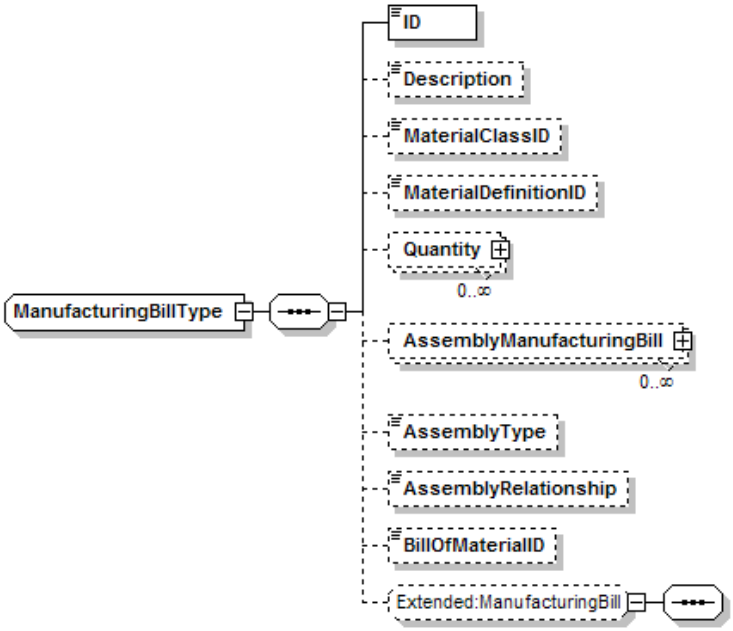


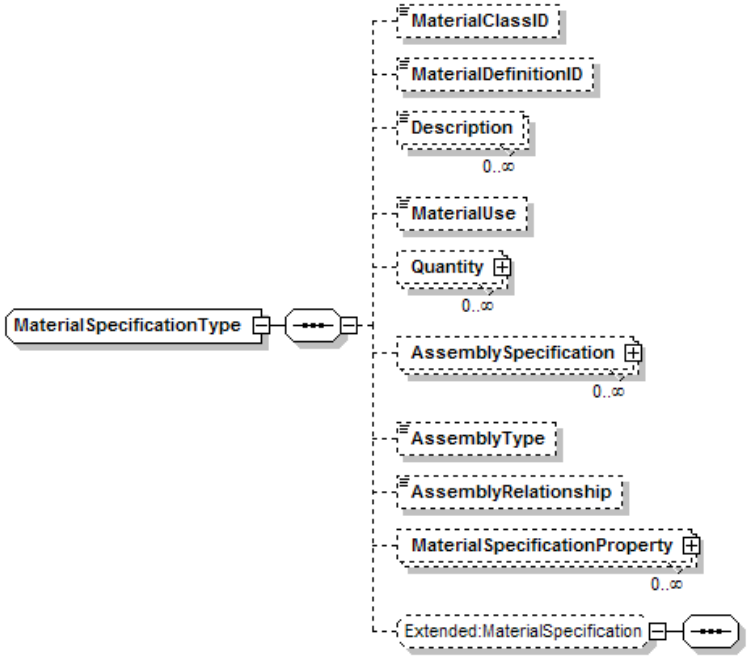
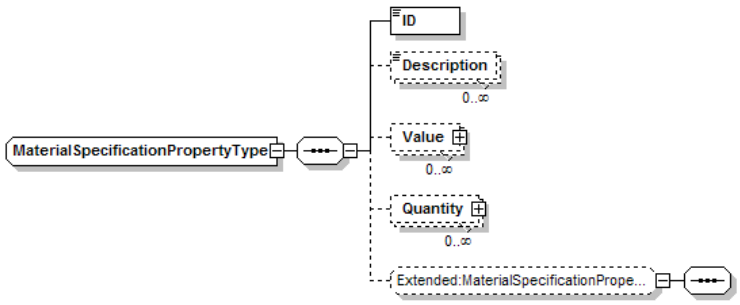
2 Element Definitions

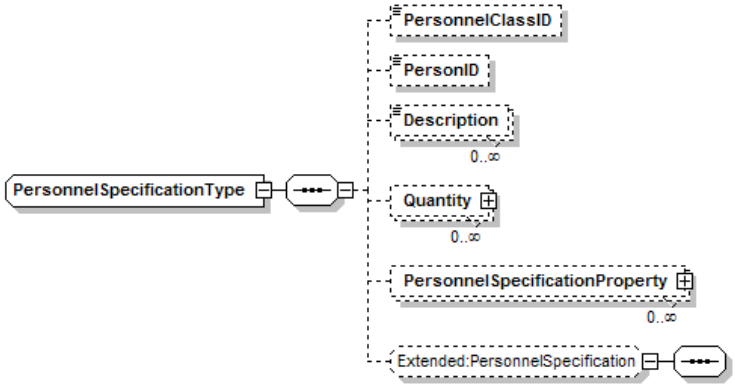
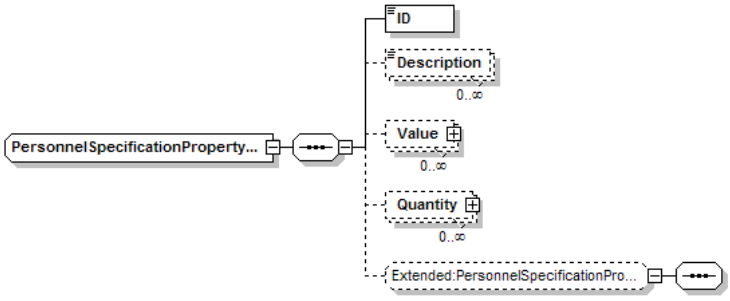
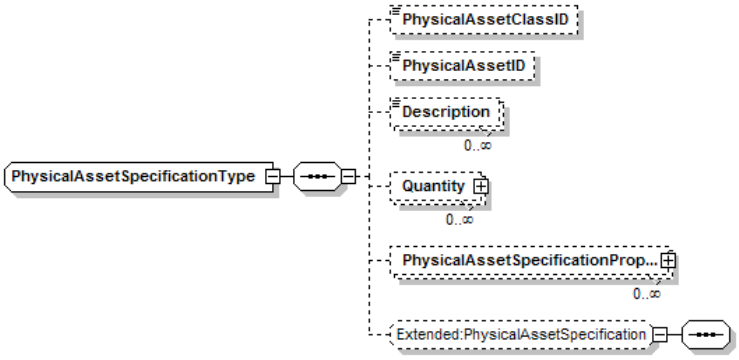
Element/Type	Description
ProductInformation ***ProductInformationType***	Contains a list of product definitions. Includes the location of the scope of the information, and the date of publication of the information. 

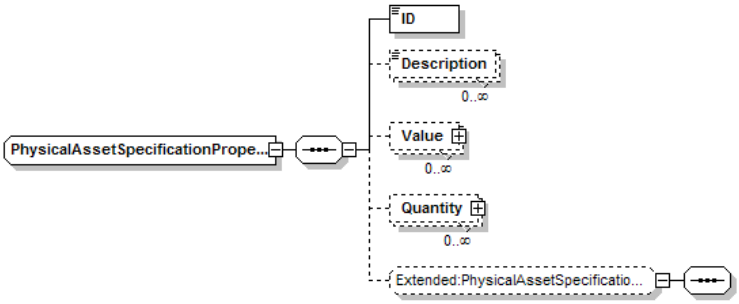
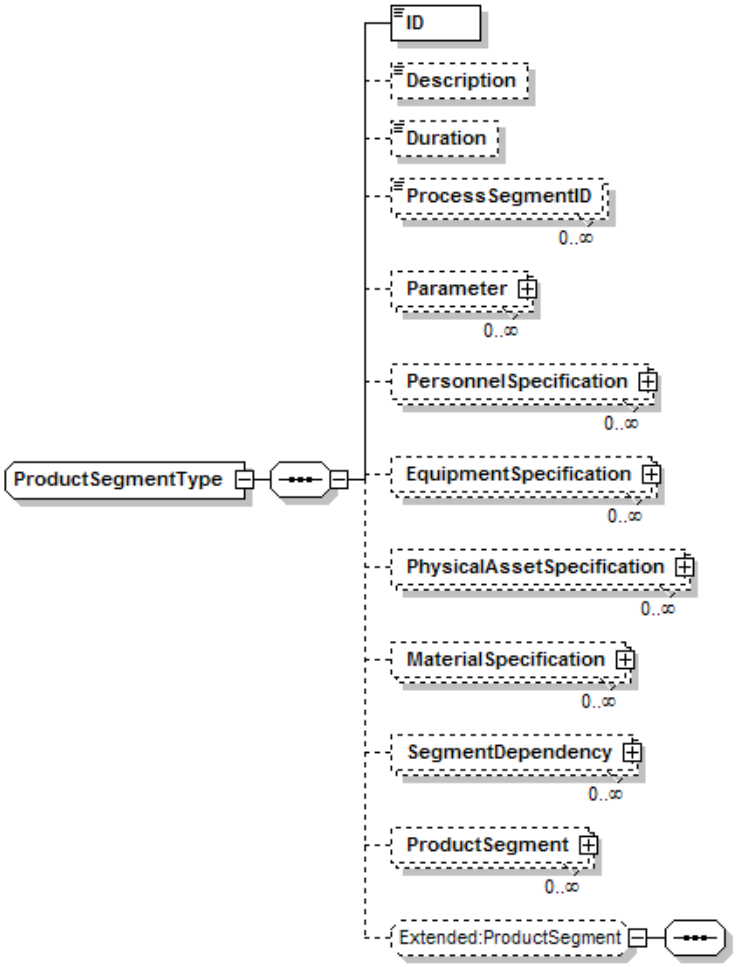
Element/Type	Description
ProductDefinition ***ProductDefinitionType***	Contains a product production rule. Includes the location of the scope of the information, the date of publication of the information, the list of materials in the manufacturing bill, the identification of the bill material, the identification of the bill of resources, and the definition of product segments.  The BillOfMaterialsID in a ProductDefinitionType should contain the ID of the complete bill of materials in the ERP system. This is usually the same as the ID of the material, but there are cases where the bill of material ID can be different. (For example several co-branded products may have different product IDs but the same bill of materials. There is either zero or one BillOfMaterialsID The BillOfMaterialsID identifies the list.

Element/Type	Description
EquipmentSpecification ***EquipmentSpecificationType***	Contains a definition of the equipment resources required for the product segment. Includes the identification of the class or instance of the resources, the quantity of the resource, and the property specification if required to identify the resource. 
EquipmentSpecificationProperty ***EquipmentSpecificationPropertyType***	Contains a definition of a equipment property required for the product segment, including the quantity of the resource, and a value used to identify the subset of the class. 

Element/Type	Description
ManufacturingBill ***ManufacturingBillType***	Contains a definition of a material in the manufacturing bill, including the quantity of the material needed, an identification of the material class or definition, any manufacturing bill item assemblies, and the corresponding bill of material ID. A **ManuacturingBill** element may have a set of contained **ManufacturingBill** elements to support hierarchical manufacturing bills.  There is one ManufacturingBill element for each material in the BOM. The ID is the local ID of the bill element. The BillOfMaterialID contains the ID of the BOM item in the BillOfMaterials. There is one BillOfMaterialID for each material in the manufacturing bill. The BillOfMaterialID identifies each item in the BillOfMaterialsID list.

Element/Type	Description
MaterialSpecification ***MaterialSpecificationType***	Contains a definition of the material resources required for the product segment. Includes the identification of the class or instance of the resources, the quantity of the resource, the use (consumed, produced), any specification assemblies, and the property specification if required to identify the resource. A **ManufacturingSpecification** element may have a set of contained **ManufacturingSpecification** elements to support hierarchical manufacturing bills. 
MaterialSpecificationProperty ***MaterialSpecificationPropertyType***	Contains a definition of a material property required for the product segment, including the quantity of the resource, and a value used to identify the subset of the class. 

Element/Type	Description
PersonnelSpecification ***PersonnelSpecificationType***	Contains a definition of the personnel resources required for the product segment. Includes the identification of the class or instance of the resources, the quantity of the resource, and the property specification if required to identify the resource. 
PersonnelSpecificationProperty ***PersonnelSpecificationPropertyType***	Contains a definition of the personnel resources required for the product segment. Includes the identification of the class or instance of the resources, the quantity of the resource, and the property specification if required to identify the resource. 
PhysicalAssetSpecification ***PhysicalAssetSpecificationType***	Contains a definition of the physical asset resources required for the product segment. Includes the identification of the class or instance of the resources, the quantity of the resource, and the property specification if required to identify the resource. 

Element/Type	Description
PhysicalAssetSpecificationProperty ***PhysicalAssetSpecificationPropertyType***	Contains a definition of the physical asset resources required for the product segment. Includes the identification of the class or instance of the resources, the quantity of the resource, and the property specification if required to identify the resource. 
ProductSegment ***ProductSegmentType***	Contains a definition of a product segment, including the quantity of resources required for the segment (per unit of production), an estimated duration of the segment, an identification of the corresponding process segment, parameters associated with the segment, the segment dependencies, and any encapsulated segments. May also contain application specific elements. 

3 Transaction Elements

The following elements are defined to support the ISA 95 Part 5 transactions, using the transaction data types defined in the B2MML-Common.xsd schema.

Product Definition Information Elements	Description
GetProductDefinitionInformation	Get *ProductDefinition* definitions.
ShowProductDefinitionInformation	Returned information from the *GetProductDefinitionInformation* message.
ProcessProductDefinitionInformation	Process *ProductDefinition* definitions.
AcknowledgeProductDefinitionInformation	Returned status from the *ProcessProductDefinitionInformation* message.
ChangeProductDefinitionInformation	Change *ProductDefinition* definitions.
RespondProductDefinitionInformation	Returned status from the *ChangeProductDefinitionInformation* message.
CancelProductDefinitionInformation	Cancel *ProductDefinition* definitions.
SyncProductDefinitionInformation	Published *ProductDefinition* definitions.

Product Definition Elements	Description
GetProductDefinition	Get a *ProductDefinition* definition.
ShowProductDefinition	Returned information from the *GetProductDefinition* message.
ProcessProductDefinition	Process a *ProductDefinition* definition.
AcknowledgeProductDefinition	Returned status from the *ProcessProductDefinition* message.
ChangeProductDefinition	Change a *ProductDefinition* definition.
RespondProductDefinition	Returned status from the *ChangeProductDefinition* message.
CancelProductDefinitionI	Cancel a *ProductDefinition* definition.
SyncProductDefinition	Published *ProductDefinition* definition.

4 Diagram Convention

The schema diagrams using the following convention to illustrate the structure of the schema elements, the type of the elements and attributes, and the rules for optional elements and repetition.