VOLVO

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Volvo Information Technology		Tech Note -		
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Product Identification – Product Structure				1 (5)
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Eirik Isene (8651)			2003-10-28	
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Explanation and definition of Information Objects and Attributes.

This explanation relates to the ppt-presentation of 2003-09-24 by Eirik Isene. Both are to be regarded as an attempt to solve the problems related to how Products and Options should be documented by Product Engineering in the PDM-applications replacing PROST.

It is assumed that Product Engineering will have a legitimate need to
- Document the entire Nominal Product with the related Options they develop.
- Document the entire Product Structure from single parts (excluding blanks) up through Assemblies, Modules and Component Products to the Model (or the Product Variant) and the Product Class (Product Group).
- Document which Options that may be used in combination with which Product (Model).
- Document how Options may be combined and not combined from a legal and technical viewpoint.
- Document rules that can be used in a Configurator downstream.

The proposal encompasses:

- **No Phantom Parts**
- **No Product Variants** (PV) – replaced by Option and Model
- **No HV:s** – replaced by Product Structure Views
- **No "Credit Parts"** – replaced by Options.
- **An acceptable replacement of PI/TA**.

Product Class (=Product Group)

Product Class signifies a class of Products with similar features and usage such as
- Heavy Wheel Loaders
- Compact Wheel Loaders
- Heavy Excavators on crawler substructure
- Heavy Excavators on wheels
- Back Hoe Loader
- Articulated Hauler
- Heavy Diesel engines
- Medium Range Diesel Engines
- Cabs
- Etc.

Product Class should have **a three-character identifier** that should be coordinated with the rest of the Volvo Group due to common components.
Should also be controlled centrally at Volvo CE, **not** to be freely decided by each Product Company.

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Each Product Class will contain a number of related Models.

Model.

Model is a designation of a range of Products with a set of common Properties and Options.
A Model belongs to **one** Product Class. Example: "**L120**"

Model Version

A Model may live through several "generations" or "face lifts". These are designated by a Model Version. Example: **"D HL"**
It may also happen that a Model may be manufactured in two different Versions at two different Plants.
Model Version is an attribute to Model. Both Model and Model Version are defined by SAMS and VDA.

Option Family.

Options Families are used to collect and specify Options with similar properties and that are strongly related. Example: **"Climate Control"**
Option Families are related to Models as "allowed" or "related". The same Option Family may be used for several Models.
Option Families are identified by Option Family Number: 3 characters.

Option Family Type

Option Family is either of the Type "M" (Mandatory of Must) or "A" (Accessories)
Definition:
> **M** = All Product Instances must always contain one, but only one, of the Options specified in each Option Family related to the Model.
> **A** = A Product Instance may contain one, several or none of the Options specified in the Option Family. May never contain any "credit parts".

Option identities.

An **Option Designation** is used as a **secondary ID** for an Option: Option Number within an Option Family and a Model. The Option Designation is used as an ID for the option in the Configuration Rules. Example: **"ACC"** or **"NOAC"**

The Option is identified by a Part Identifier for the Parent Part at the top of the Product structure. However, the Option Part is always a Configurable Part without any Version. Compare PV and UV.

The link between an Option Part (Parent Part in the Product Structure) and the Option Designation should be handled by an **ECN**: The Option Designation may at one point in time be related to a certain P/N and at a later date to another P/N.

The Option Designation may be used in Customer Orders while the Option Parts will have to be used in the Manufacturing Orders. At least, this may be a possibility.

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It is assumed that a **Product Variant** will just become another **Option**, i.e. a **Basic Option** in an Option Family where there are no other Options.

The presented proposal assumes that there will be no "credit parts". What was earlier documented as "credit parts" is replaced by an "Without-Option".

Option Type

Options may or may not contain material, i.e. they may sometimes lack BoM.
Typical for Options that lack material and BoM is the "Without-Options" where there are no "credit parts". Such Options will have to be Specified in the Sales Order but will not have any price/cost specified and no BoM.

> R = Regular Option
> C = Option with no material or BoM

The **Technical Authorization** in PROST is replaced by the updated relation between a Product Class, the Model and the "allowed" Option Families.

Option Inclusion (rule)

An Option Inclusion is a rule that specifies that if a certain Option is chosen for a Product Instance, one or several other Options will have to be included in the Manufacturing Order.

Option Exclusion (rule)

An Option Exclusion is a rule that specifies that if a certain Option is chosen for a Product Instance, one or several other Options will have to be excluded in the Manufacturing Order, i.e. may not appear in the Manufacturing Order.

"Option Kit"

Option Kit is used by Marketing to bundle two or several Options, very often at a price that is different from the sum of prices for the constituent options.

Option Kits should be handled in Marketing and Sales only. Should not be reflected in Engineering Configuration Rules. Option Kits should be broken down to regular Options before being transformed to a Plant Order intended to be manufactured.

Option Kits as used by EXC in VPM should be handled as any other Option. The only difference should be that such an Option is not sold with the Product. It is an Option intended for the After Market only.

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Customer Related Special Options.

Volvo CE may accept orders from large customers for some special equipment not contained in the regular pre-designed Option variety and the Manufacturing Plan. Such Options should be specified, designed and manufactured on the customers or dealers expense. The specification should be outside the Product Structure specifying the regular Product Program. Such specification may contain "credit parts" and may be built at a Volvo CE Plant or at the Dealer. It may also be considered whether such Options shall be available through Parts or not.

Product Structure Records (PSR) in stead of Phantom Parts.

The PSR is a Relation Object that defines the relation between the Part and the Parent Part. The PSR defines such things as

- Quantity
- The Effectivity of the PSR in terms of "Valid from date" and "Valid to date" for Plants affected and with reference to an ECN.
- A relation to a Function Group
- Relations to other Constituent Parts related to the same Function Group, i.e. sequence decided by the Engineer and/or
- Relation between constituent parts that normally should be shown together. Example: Screw, Washer and Nut.
- Relations to Balloon Numbers on an Assembly Drawing (PIX-Spec)
- Relation to a System Classification Number when and if such is applicable.
- Relation to a Module (manufactured of purchased pre-assembled assembly) Part Number when and if such is applicable.
- Relation to where a constituent part is located in a coordinate system and the orientation in that coordinate system (virtual vehicle).
- Etc.

The PSR will make it unnecessary to have separate databases for "History" since the effectivity of a changed PSR related to an ECN always has "effected from date" or "effected to date".

The PSR with information as indicated above gives a flexibility to present the Product Structure in wide variety of ways:

- "Sliced" in different ways by Models or Options or Function Groups or combinations of these etc.

  ❖ Display one Model with one Option Family and pertaining Options

  ❖ Display one Model with selected Options

  ❖ Display one Model with one Function Group and pertaining Options.

  ❖ Display one Product Class and one Variant Family with all pertaining Options.

  ❖ Display one Product Class and one Function Group with all pertaining Options.

  ❖ Display selected Models and one Function Group with all pertaining Options

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- ❖ Display one Product Class and one System Class with all pertaining Options.

- ❖ Display two or more related Assemblies with easy assessment of commonalities and differences. Relation captured in the PSR when created or later.

- ❖ Etc.
- Presented in a "Time Frame": From date – To date where only ECNs with an effectivity within the window will be shown.
- Where used across all Products regardless or within on Model or Option and within a "Time Frame etc.
- PSRs related to a certain ECN and Plant etc.

MAPICS is used at 8 or 9 Plants within Volvo CE. The Product Structures in these applications will **not** be converted as we migrate from PROST to another PDM application. This will pose problems in the communications between the new PDM application and MAPICS.
The PSR will provide a possibility to recreate Product Structure in MAPICS that resembles what they have and, more important, will make it possible to provide ECN information that will coincide with MAPICS current Product Structure Information.