Material Cost Reduction Approach to PLM Value

Abstract

Value can be derived from Product Lifecycle Management (PLM) Systems through improving speed to market, reducing quality costs, improving productivity and material cost reduction. In this session, we will discuss why material cost reduction should be addressed early in a value based PLM deployment and how to execute a material cost reduction strategy.

Many PLM systems are justified by the forecasted value obtained by reducing material costs through component rationalization and reuse. However, little provision is made for people being able to find and reuse components. After all, how can you reuse a component if you cannot find it?

Since material cost reduction has a direct relationship to profit and loss, it should influence the order in which process changes are deployed. Component rationalization and reuse requires classification and attribute data. Using this data, common components are identified, price variances calculated, data shared with supplies and prices negotiated resulting in lower material costs. A strategy for controlling new part number creation also must be deployed to prevent part proliferation after a component rationalization project.

Whirlpool is the #1 major appliance company leading a $120B industry.

$18+ billion in revenues in 2010

Products sold in more than 130 countries

71,000 employees

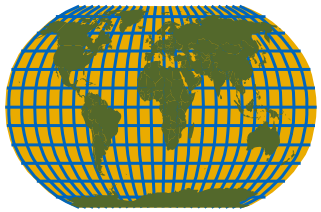
66 manufacturing and technology centers

1911 100 2011

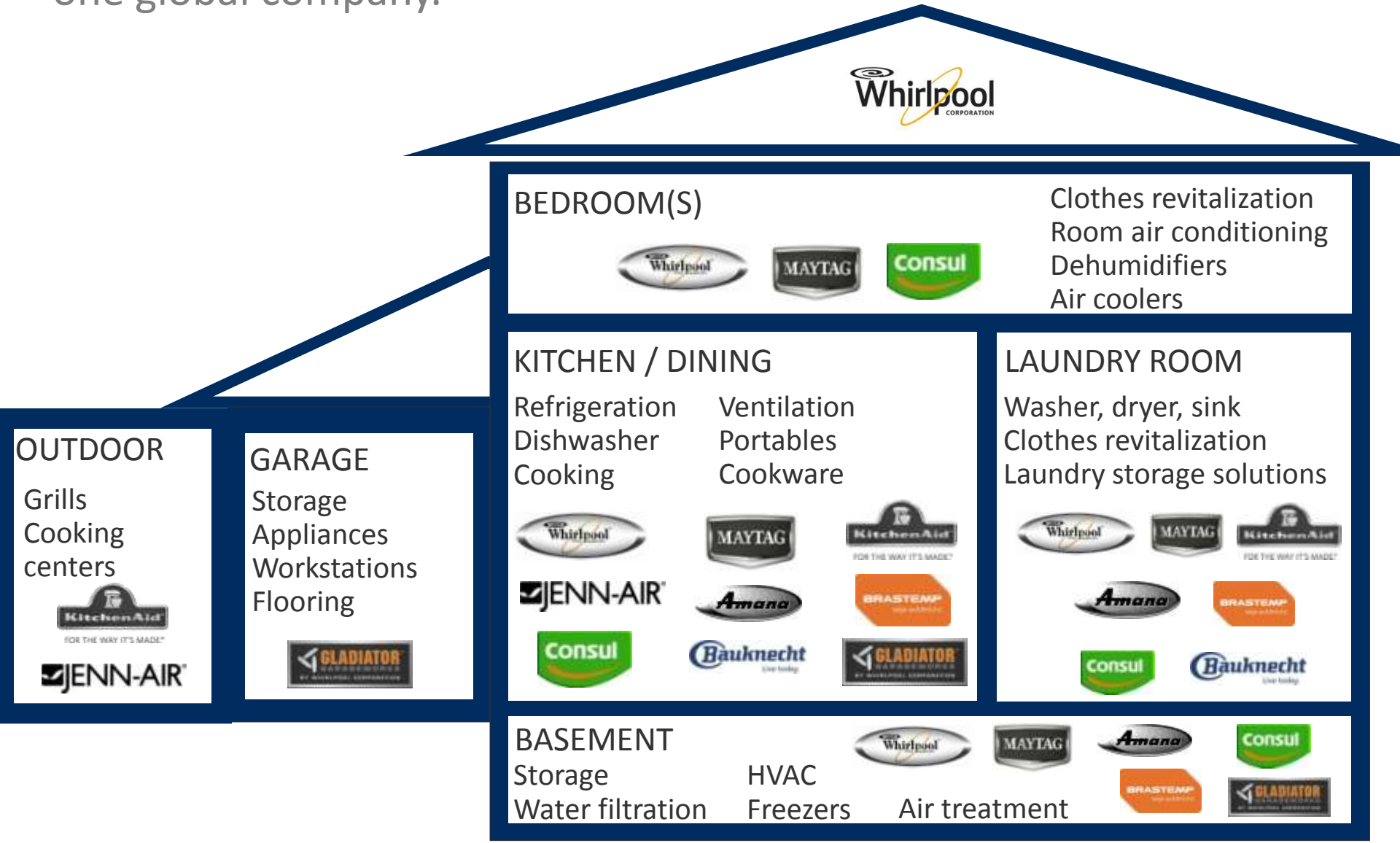
World headquarters in Benton Harbor, Michigan

We grew by acquisition...

1911-1948	1948-1980	1980s	1990s	2000s	Today
Manufacturing Technology, Single Product, Single Customer	Multi-Product and Whirlpool Brand	Multi-Brand, U.S. Trade Expansion	Globalization	Top Consumer Brands , Maytag Acquisition	Winning Global, Sustainable Appliance Company
Acquisitions Drive Growth	JV Inglis (Canada) JV Brasmotor (Brazil)	KA Purchase JV w/ Philips Roper Brand	China JV's & Purchases JV in Mexico JV in India	Acquired Maytag Polar (Poland) Whirlpool Mexico	
Sales	**$2.3M** (1942)	**$1.1B** (1970)	**$3.4B** (1985)	**$8.2B** (1995)	**$20B** (2007)



Many brands and associated products were integrated into one global company.



We have over 4000 people developing products in 26 countries.

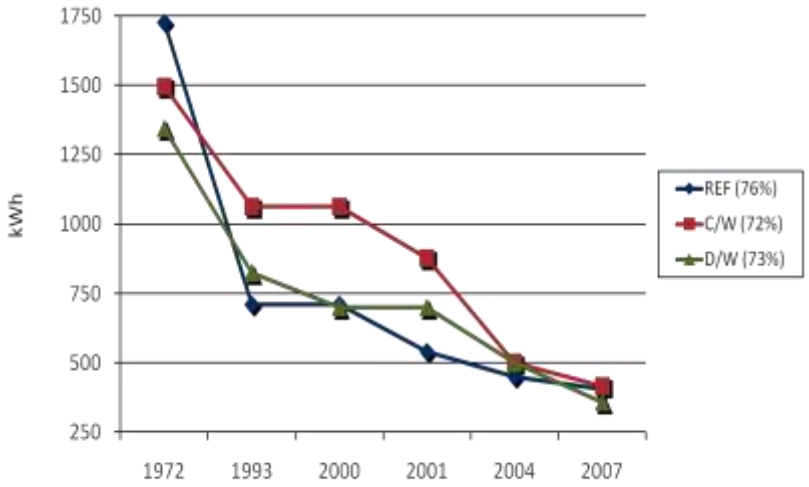
Product Development Center Foot Print

Innovation is core to our corporate strategy.

From a sea of white…
To a field of innovation…

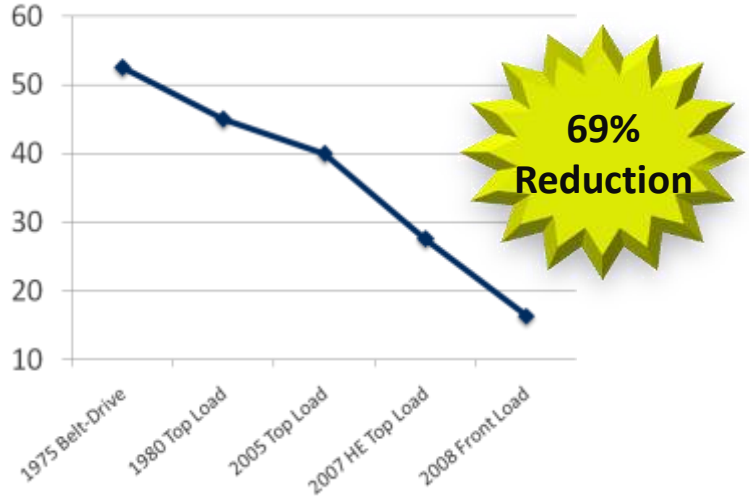
For example, continual innovation is essential to improving appliance efficiency.

ANNUAL AVERAGE KILOWATT-HOUR USAGE:

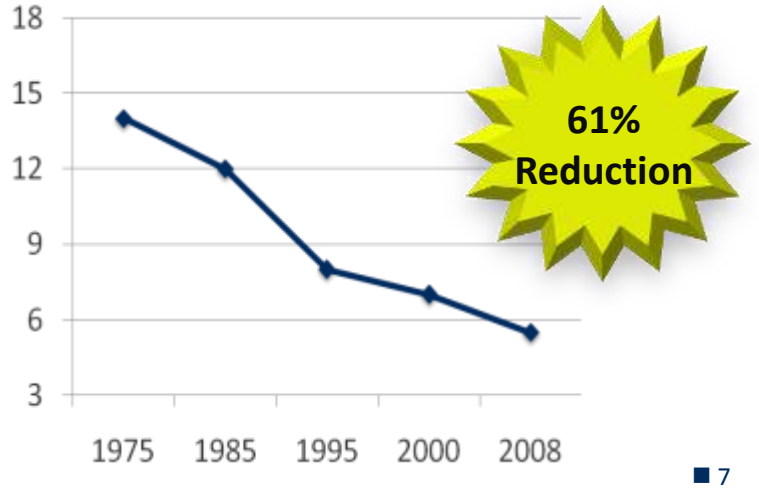


AVERAGE WATER USAGE IN GALLONS PER CYCLE:

Clothes Washers:



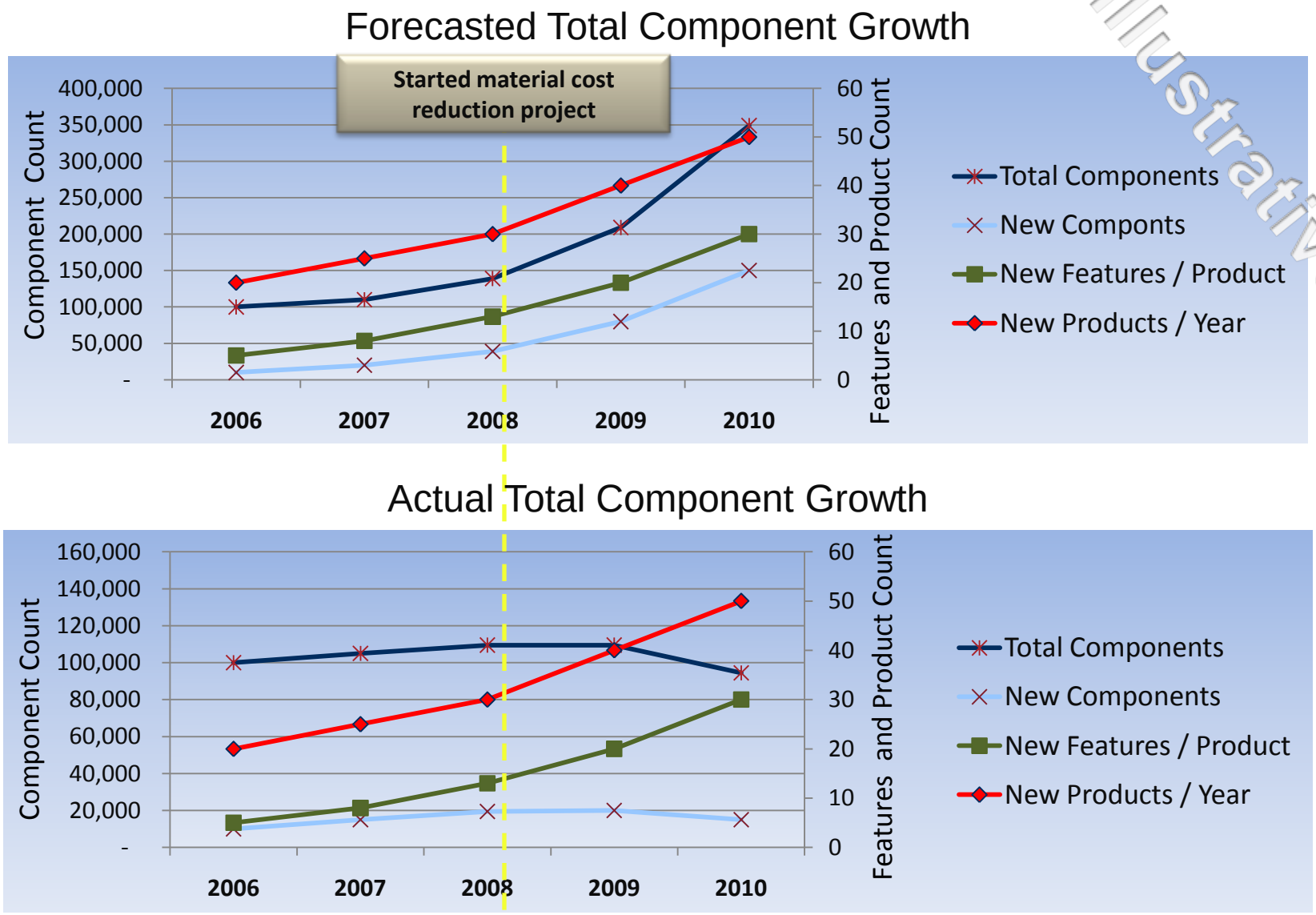
Dishwashers:



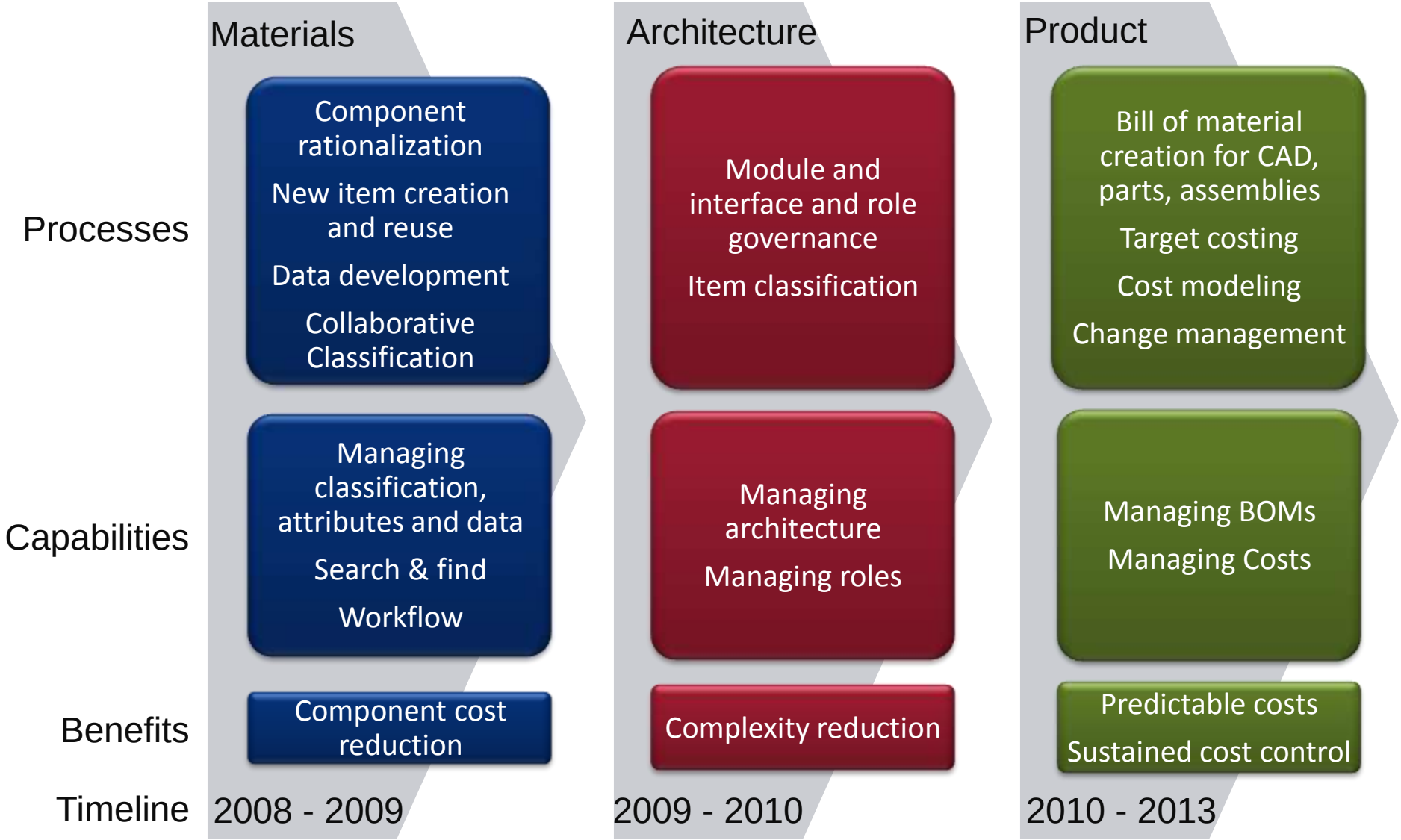
Initiatives:

2000	Integrated Home Solutions; green building
2001	Front-load laundry; Low- and zero-energy homes and communities
2003	Energy monitoring; GHG reduction pledge
2004	Grid-friendly appliances
2006	Connected appliances
2007	GREENKITCHEN; LEAF House; revised GHG pledge
2008	Green Touch for Builders
2009	Thermally-connected appliances Smart grid-connected appliances

Innovation and variation increases demand for new components which we now avoid with our material strategy.



Our PLM strategy was to apply information technology capabilities to materials, product architecture and products.



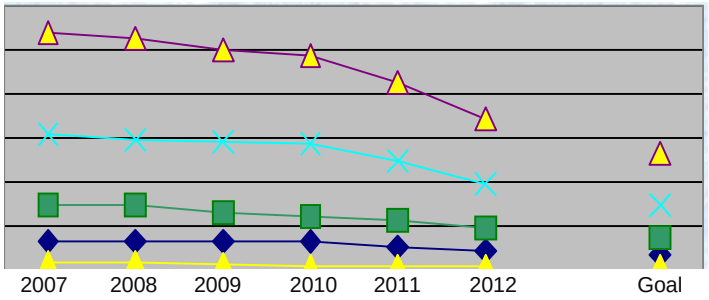
Material management resulted in reductions in platform and component count and improved components per product.

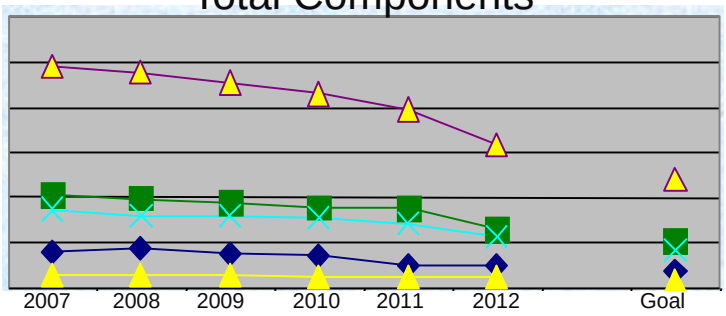
Materials

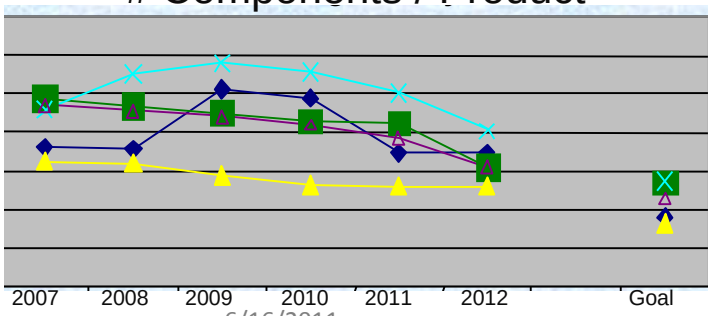
- Component rationalization
- New item creation and reuse
- Data development
- Collaborative Classification
- Managing classification, attributes and data
- Search & find
- Workflow
- Component cost reduction

2008 - 2009

Measurements	Targets
Product Platforms	40% reduction
Total Components	35% reduction
# Components / Product	25% improvement







Material cost reduction contributed to actual savings to fund the rest of the PLM strategy.

Materials

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2008 - 2009

Results:

- 40% reductions in platforms
- 35% reduction in Components
- 25% improvement in # components / product
- 20% average reduction in component cost

Net Cash from Operating Activities

2009 $1.5B
2010 $1.1B

Architecture

- Module and interface and role governance
- Item classification
- Managing architecture
- Managing roles
- Complexity reduction

2009 - 2010

Product

- Bill of material creation for CAD, parts, assemblies
- Target costing
- Cost modeling
- Change management
- Managing BOMs
- Managing Costs
- Predictable costs
- Sustained cost control

2010 - 2013

Using our component rationalization approach we lowered material costs and reduced the total number of components.

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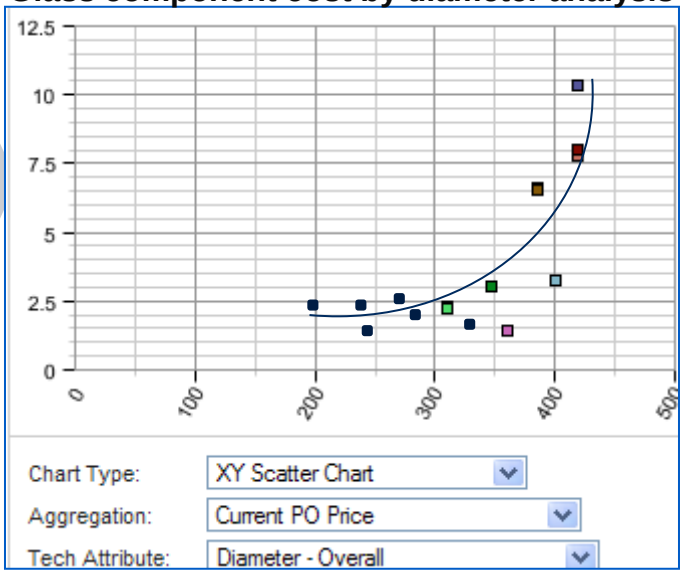
2008 - 2009

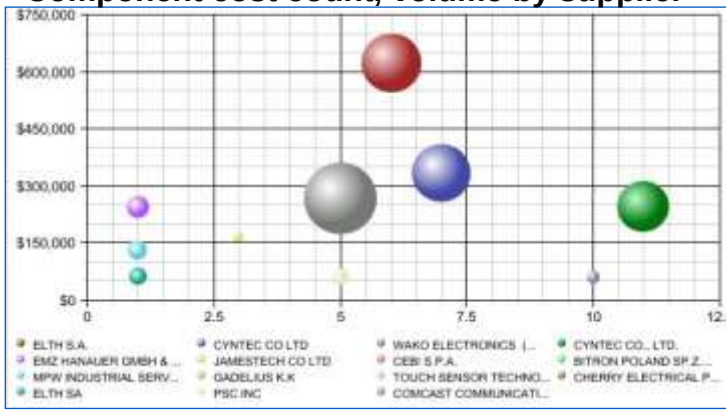
1. Structure Data
2. Validate Specifications
3. Rationalize Components
4. Establish Cost Targets
5. Apply Competitive Intelligence
6. Determine Supplier Strategy
7. Determine Best Cost Country Sourcing

- Changes to Existing Product
- Changes to New Product
- Changes to Supply Chain

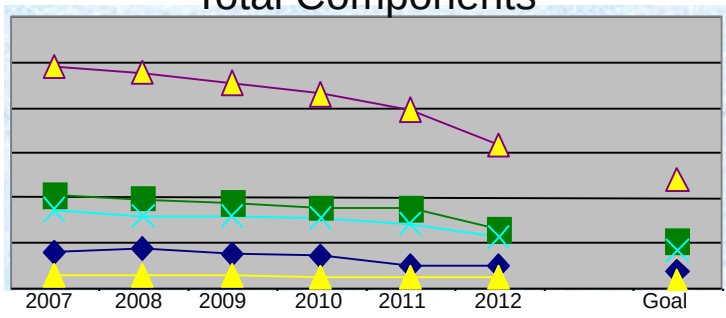
Glass component cost by diameter analysis



Component cost count, volume by supplier

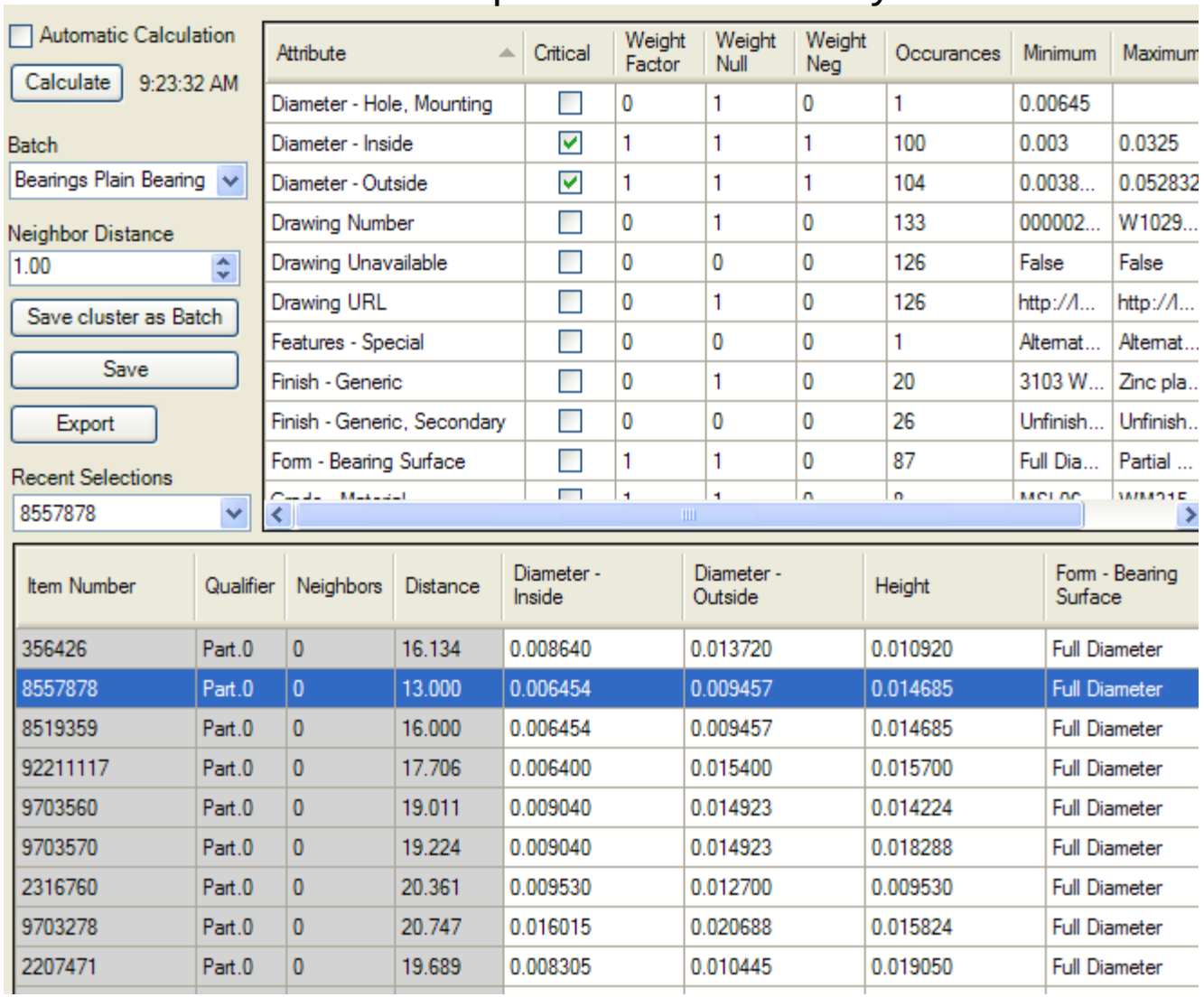


Total Components



Indentifying similar items was essential to determining PO cost change opportunities.

Similar Component Cluster Analysis



Automatic Calculation

Calculate 9:23:32 AM

Batch

Bearings Plain Bearing

Neighbor Distance

1.00

Save cluster as Batch

Save

Export

Recent Selections

8557878

Attribute	Critical	Weight Factor	Weight Null	Weight Neg	Occurances	Minimum	Maximum
Diameter - Hole, Mounting	☐	0	1	0	1	0.00645	
Diameter - Inside	☑	1	1	1	100	0.003	0.0325
Diameter - Outside	☑	1	1	1	104	0.0038...	0.052832
Drawing Number	☐	0	1	0	133	000002...	W1029...
Drawing Unavailable	☐	0	0	0	126	False	False
Drawing URL	☐	0	1	0	126	http://I...	http://I...
Features - Special	☐	0	0	0	1	Alternat...	Alternat...
Finish - Generic	☐	0	1	0	20	3103 W...	Zinc pla..
Finish - Generic, Secondary	☐	0	0	0	26	Unfinish...	Unfinish..
Form - Bearing Surface	☐	1	1	0	87	Full Dia...	Partial ...

Item Number	Qualifier	Neighbors	Distance	Diameter - Inside	Diameter - Outside	Height	Form - Bearing Surface
356426	Part.0	0	16.134	0.008640	0.013720	0.010920	Full Diameter
8557878	Part.0	0	13.000	0.006454	0.009457	0.014685	Full Diameter
8519359	Part.0	0	16.000	0.006454	0.009457	0.014685	Full Diameter
92211117	Part.0	0	17.706	0.006400	0.015400	0.015700	Full Diameter
9703560	Part.0	0	19.011	0.009040	0.014923	0.014224	Full Diameter
9703570	Part.0	0	19.224	0.009040	0.014923	0.018288	Full Diameter
2316760	Part.0	0	20.361	0.009530	0.012700	0.009530	Full Diameter
9703278	Part.0	0	20.747	0.016015	0.020688	0.015824	Full Diameter
2207471	Part.0	0	19.689	0.008305	0.010445	0.019050	Full Diameter

Addressing material costs resulted in an average savings opportunities of 10%.

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2008 - 2009

Small Sample of Material Savings

Material	Consolidation Lever	Complexity 2009		Complexity 2011	Savings Opportunity (hard savings only)
Valves	Flow Rates, Brackets	141	74%	36	12-18 %
Steel Coils	Gages, Grades, specs	1008	60%	402	3-5 %
Resins	Colors, Filler, Specs	384	39%	233	4-8 %
Tier II Electronics	Mounting, Ratings	2901	74%	754	10-12 %
Wire Harness Components	Wire Gage, Terminals Housings	2743	56%	1783	9-12 %
Brand Badges	Common Technology, Adhesive	326	77%	76	10-20 %

Component rationalization benefits are sustained by reinforcing reuse which requires search and find capability.

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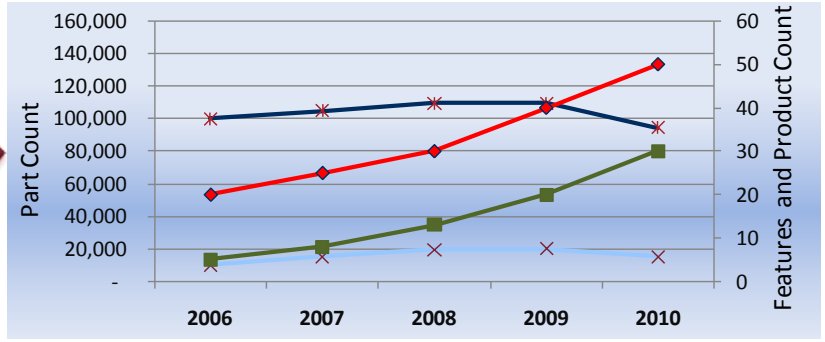
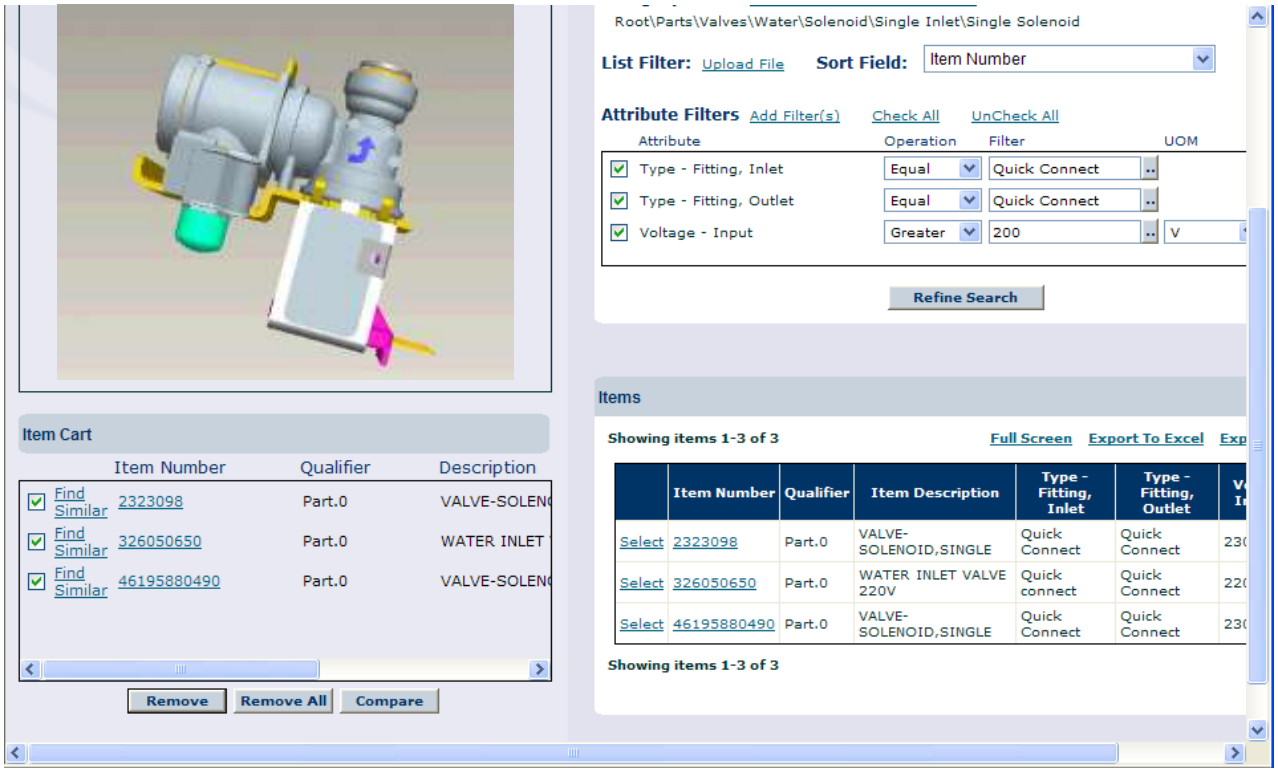
2008 - 2009

Reuse



Robust Attribute Search and Find



Most companies load existing components into their PLM which results in inadequate search and find and limits reuse.

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2008 - 2009

In most PLM implementations, try finding a bearing that meets specific requirements: outside diameter, race, material, etc.

Part Number	Type	Status	Description
4619-640-39641	part	released	FC BALL BEARING ASSY JET CHEF
4619-640-49541	drawing	released	BEARING SUPT&THERMO ASSY(SERVI
4619-640-49541	assembly	released	BEARING SUPT&THERMO ASSY(SERVI
4619-641-89271	part	released	TT BEARING
4619-641-89272	part	released	TT BEARING A6
4619-644-174	drawing	released	BEARING SUPPORT
4619-644-17481	drawing	released	BEARING SUPPORT
4619-644-17481	part	released	BEARING SUPPORT
4619-644-17482	part	released	BEARING SUPPORT
4619-656-98011	drawing	released	BALL BEARING
4619-656-98011	part	released	BALL BEARING
4619-670-03651	part	obsolete	BALL BEARING HOLDER
4619-670-03652	drawing	released	BALL BEARING HOLDER
4619-670-03652	part	released	BALL BEARING HOLDER
4619-670-03741	part	obsolete	BALL BEARING HOLDER 1
4619-670-03741	drawing	released	BALL BEARING HOLDER
4619-670-04821	drawing	released	BEARING HOLDER
4619-670-04821	part	released	BEARING HOLDER
4619-677-40381	drawing	released	TT BEARING PF
4619-677-40381	part	obsolete	TT BEARING PF
4619-677-40391	drawing	released	TT-BEARING PF
4619-677-40391	part	obsolete	TT-BEARING PF
4619-677-41671	drawing	released	TT-BEARING PF
4619-677-41671	part	obsolete	TT-BEARING PF
4619-677-50061	part	released	BEARING
4619-677-50061	drawing	released	BEARING

People can't reuse what they can't find!

A new item creation process enabled by a workflow limits component proliferation.

Materials

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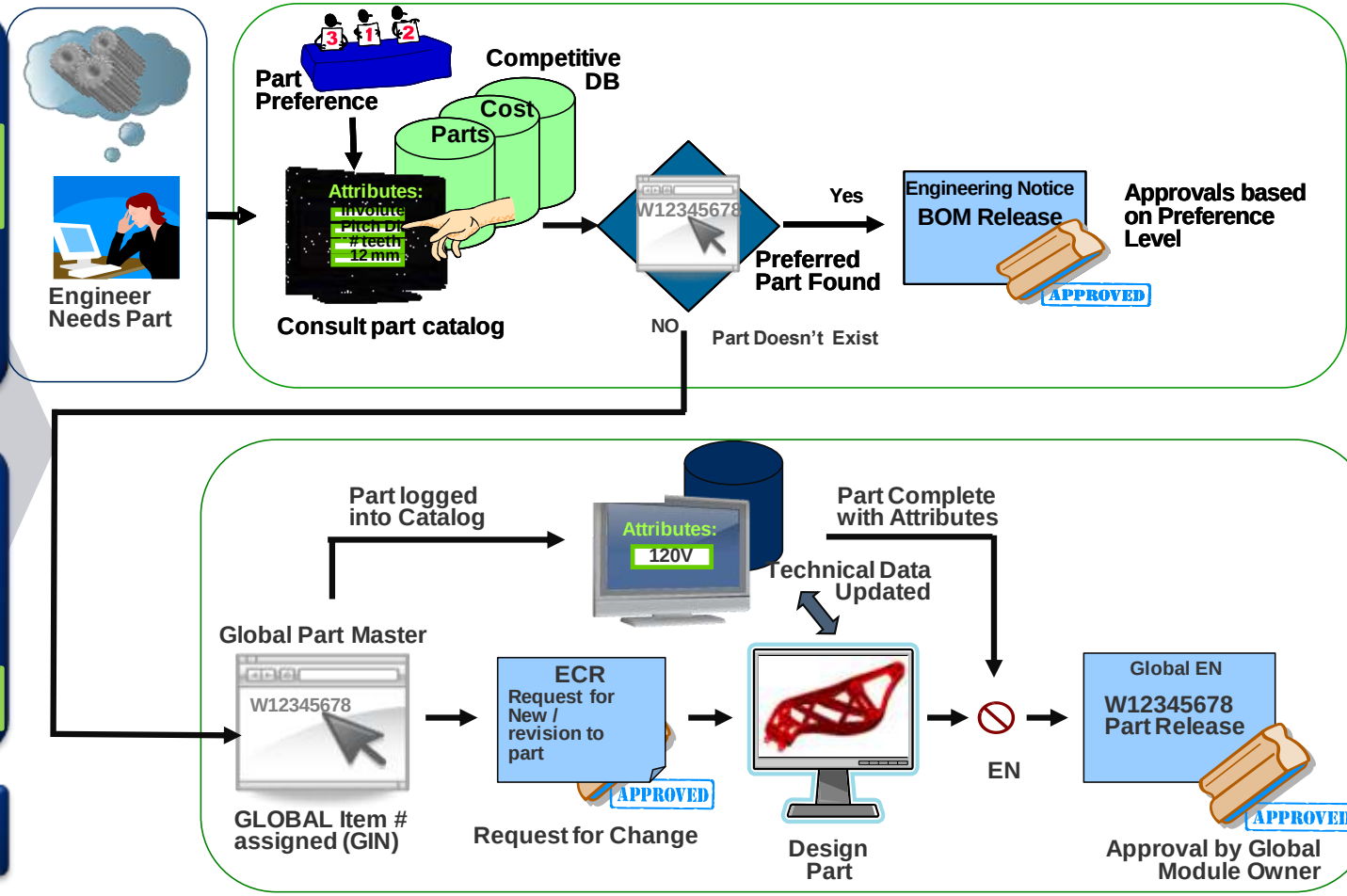
2008 - 2009

New Item Creation Workflow



A data development process with classification and attribute management is required for component rationalization.

Materials

- Component rationalization
- New item creation and reuse
- **Data development**
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- **Managing classification, attributes and data**
- Search & find
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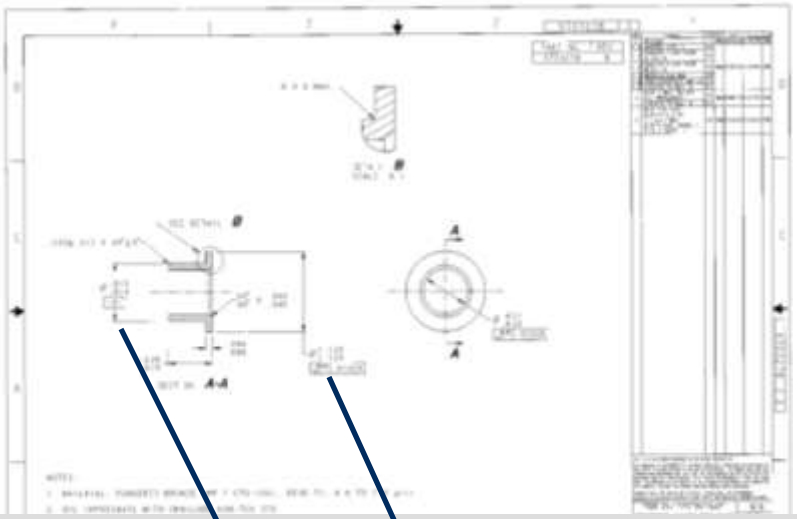
2008 - 2009

Classification Structure

- _Engineering CAD Assemblies
- Adhesive - Die Cut
- Air Flow Systems
- Bases And Supports
- Bearings
  - Dishwasher Rail Components
  - Dishwasher Rails
  - Drawer Glides
  - Plain Bearings
    - Linear
    - Rotary
    - Spherical
    - Thrust
  - Rail Systems - Module Variants
  - Roller Bearings
  - To Be Classified
- Bowls And Jars
- Brackets And Braces
- Brand Badges

Data is extract from drawings and entered into the database



Item Description	Status	Create User	Create Date	Update User	Diameter - Inside	Diameter - Outside	Drawing Number	Drawing URL	Height
BUSHING-HINGE	In Work	Admin	6/13/2008	dfr_api_p	6.4540 mm	9.4565 mm	8557878	http://ldesr	14.6850 mm
BEARING - SLEEVE	In Work	Admin	6/13/2008	dfr_api_p	6.2550 mm	12.7150 mm	8558877	http://ldesr	32.2500 mm
BEARING - SLEEVE BRONZE	In Work	stratpd	6/1/2009	dfr_api_p	6.2700 mm	12.7300 mm	8559101	http://ldesr	32.2500 mm
BUSHING - HINGE	In Work	Admin	6/13/2008	dfr_api_p	8.2620 mm	12.4940 mm	8577253	http://ldesr	14.6750 mm
PLASTIC BUSHING	In Work	Admin	6/13/2008	dfr_api_p	6.4000 mm	15.4000 mm	92211117	http://ldesr	15.7000 mm
BUSHING AGITATOR SHAFT	In Work	Admin	6/13/2008	dfr_api_p	19.1150 mm	25.4400 mm	92312913	http://ldesr	33.3200 mm
SLEEVE BEARING - FGA	In Work	Admin	6/13/2008	dfr_api_p	0.6305 in	0.8145 in	9703278	http://ldesr	0.6230 in
BEARING - UPPER, CENTER	In Work	stratpd	6/1/2009	dfr_api_p	0.5020 in	0.6905 in	9703368	http://ldesr	0.5700 in

Collaborative classification and attribute management is used to facilitate organization agreement.

Materials

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- New item creation and reuse
- Data development
- **Collaborative Classification**
- **Managing classification, attributes and data**
- Search & find
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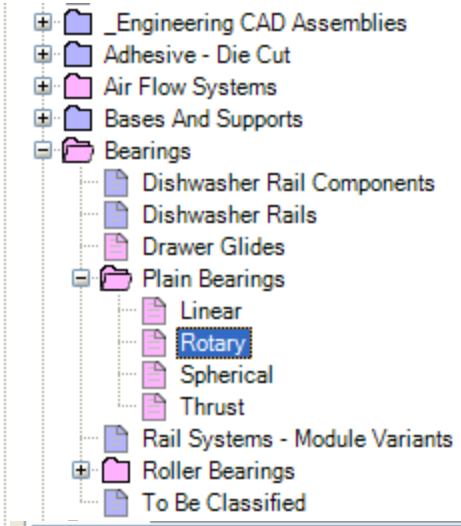
2008 - 2009

Classification Structure



Attribute Name	Description	Data Type	Measure	Required	Status
Item Number					
Revision					
Qualifier					
Item Description					
Legacy Item Number					
3D Viewable URL	URL to 3D viewable	URL	NO UNITS	No	Approved
Active Item	Has this Item had usage in the past mo...	Boolean	NO UNITS	Yes	Approved
Drawing Number	A unique number that identifies the dra...	String	NO UNITS	Yes	Approved
Drawing Unavailable	A drawing PDF is not available for this it...	Boolean	NO UNITS	Yes	Approved
Drawing URL	Link to latest released version of the PD...	URL	NO UNITS	Yes	Approved
Item Master URL	Universal Resource Locator (URL) to th...	URL	NO UNITS	Yes	Approved
Item Notes	Notes about the item: attributes missing...	String	NO UNITS	No	Approved
Item Type Code	Identifies the type of the item. a - asse...	String	NO UNITS	Yes	Approved
Length	The nominal length of an item. Perpend...	Numeric	mm	No	Pending

Basic Functional Requirements

- Controlled, yet flexible classification structure development
- Simple process and workflow
- Role definition
- Status and security
- Inheritance

Our strategy was to apply information technology capabilities to materials for a value based approach to PLM deployment.