Accelerate transformation across the product lifecycle via AI and semantics

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GLOBAL PRODUCT DATA
INTEROPERABILITY
SUMMIT
2018

ELYSIUM   Parker Aerospace   NORTHROP GRUMMAN   BOEING

- **Part Standardization & Sourcing**
  - **Part Reuse**
  - **Classification and Part # Reduction Intelligence**
- **Digital Twin/Thread Intelligence**
  - **Analytics or Business Intelligence?**
- **Industry Content Intelligence**
  - **Customer Intelligence**
  - **Competitive Intelligence**
  - **Supplier and Market Intelligence**
  - **Predictive Analytics**

Sourcing & Standardization Industry Cost Drivers
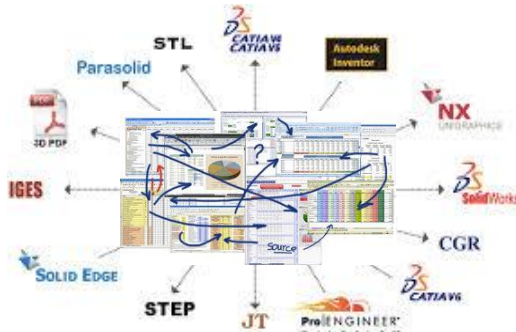
Global Product Data Interoperability Summit | 2018
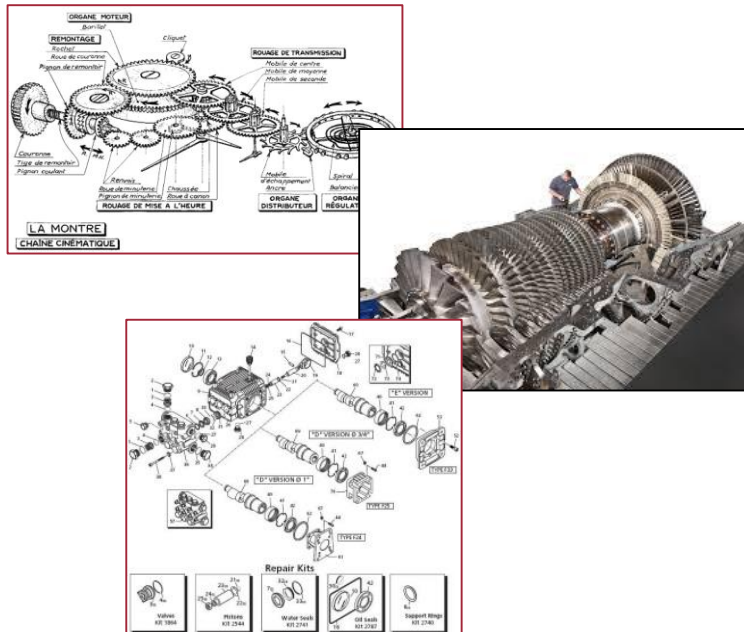
▶ Decrease number of referenced part through standardization process

▶ Optimize cost driven sourcing decision on parts and preferred suppliers

▶ Enforce reuse in engineering processes by applying entreprise policy

Potential Inhibitors to Standardization

Multi PDM & Multi CAD

Location of engineering teams

Security: too much of a good thing

Usability

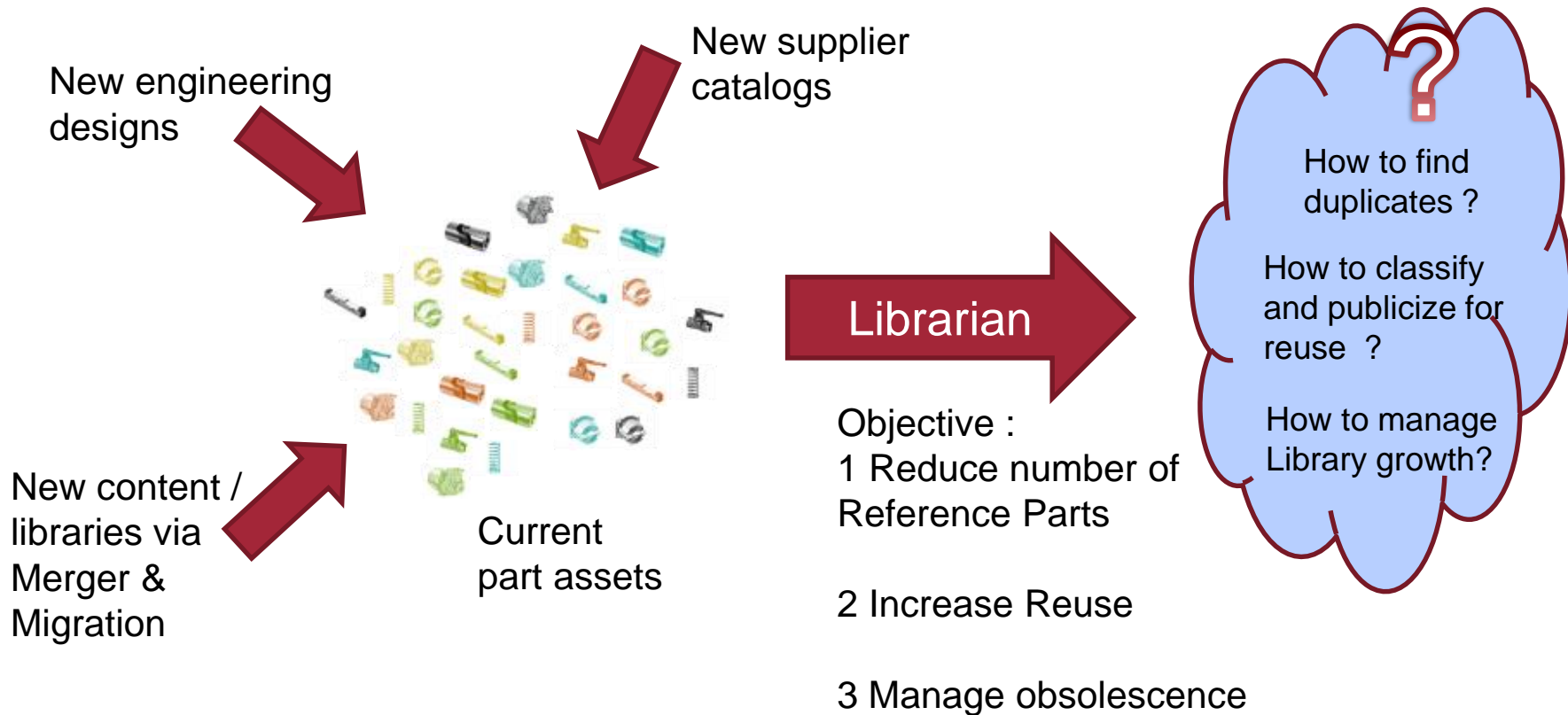

Inability to connect Engineering & Sourcing world

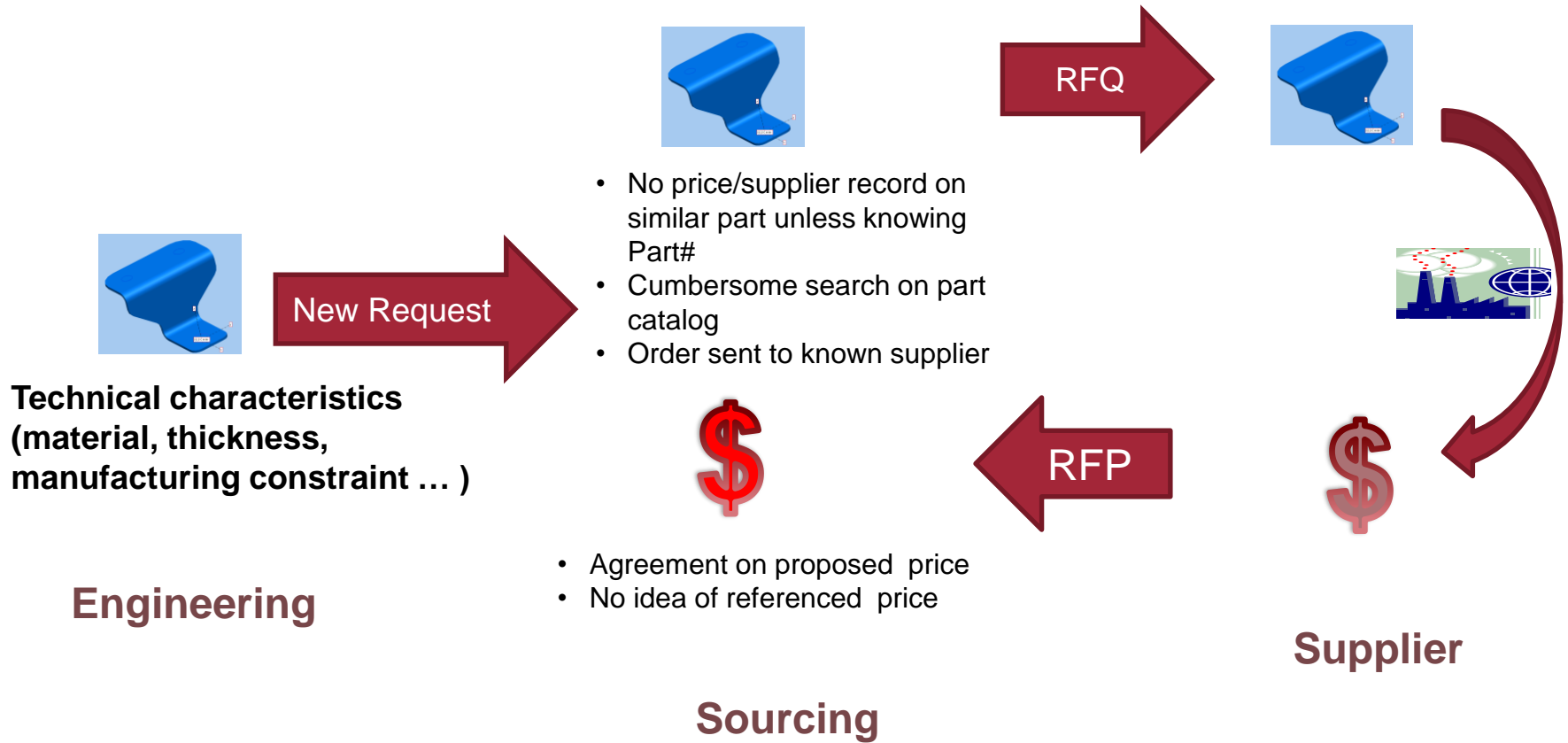Lack of data consistency No classification

Librarian Challenges

New engineering designs

New supplier catalogs

New content / libraries via Merger & Migration

Current part assets

Librarian

Objective :
1 Reduce number of Reference Parts

2 Increase Reuse

3 Manage obsolescence

How to find duplicates ?

How to classify and publicize for reuse ?

How to manage Library growth?

RFQ

• No price/supplier record on similar part unless knowing Part#
• Cumbersome search on part catalog
• Order sent to known supplier

New Request

Technical characteristics (material, thickness, manufacturing constraint …)

RFP

• Agreement on proposed price
• No idea of referenced price

Engineering

Sourcing

Supplier

2,500 x
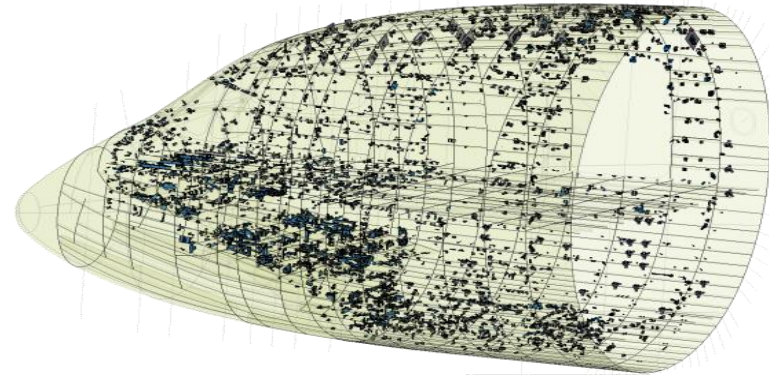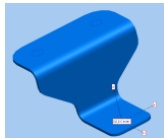
Engineering Costs:
40 hours to design a new bracket
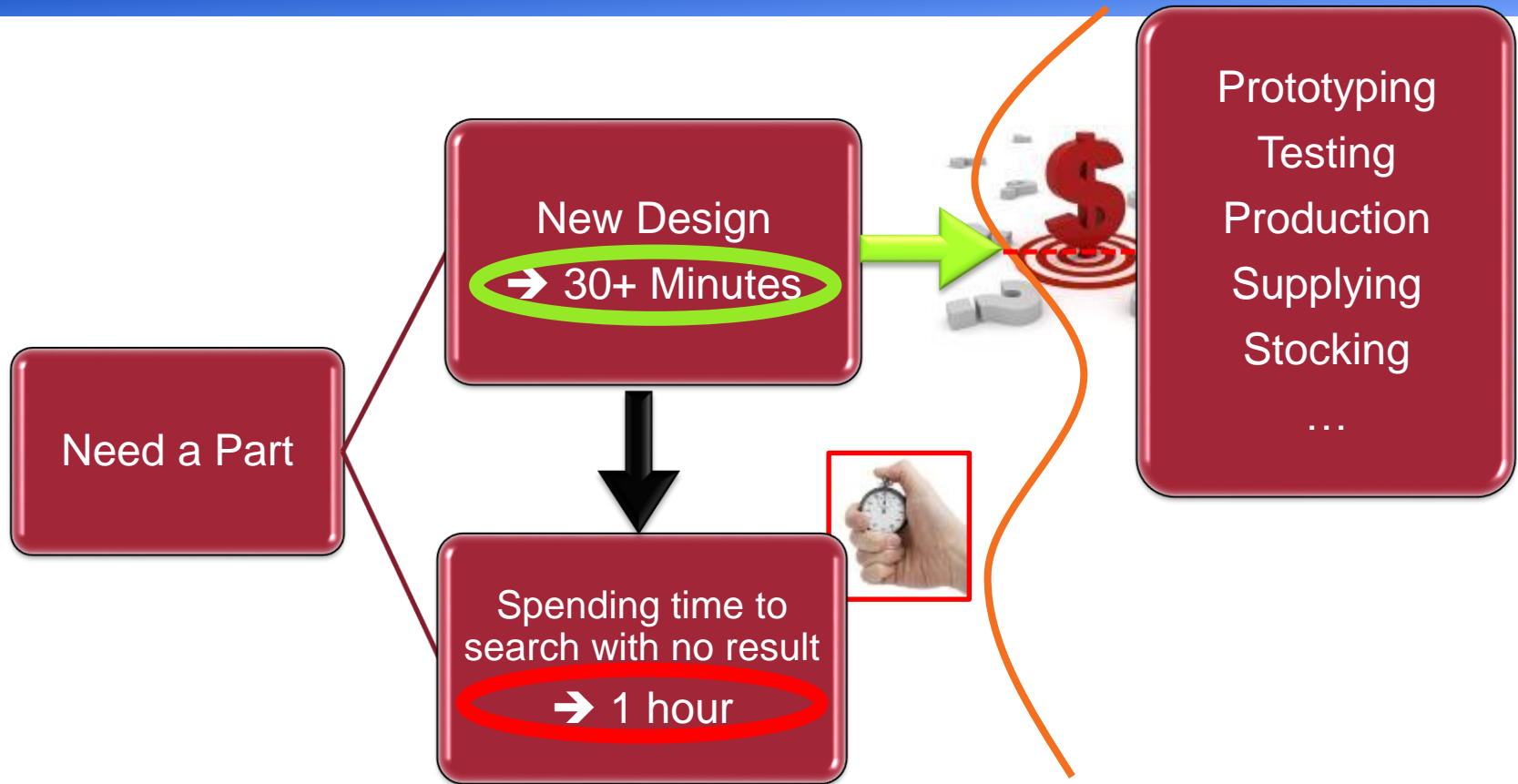Total of : 125 000+ hours, focused on brakets design

Additional Costs:
- sourcing costs
- testing & certification costs
- Documentation costs
- Administrative costs

10% of brackets duplicates?

New Part Introduction Process

Need a Part

New Design
➔ 30+ Minutes

Spending time to search with no result
➔ 1 hour

Prototyping
Testing
Production
Supplying
Stocking
…

**Improving "finding capabilities" by leveraging Search Technology
(The Design Reuse – Benchmark Report – Aberdeen Group – Feb. '07)**

Standardization Process

OnePart Reduce

Identify

Cluster

Select & Publish
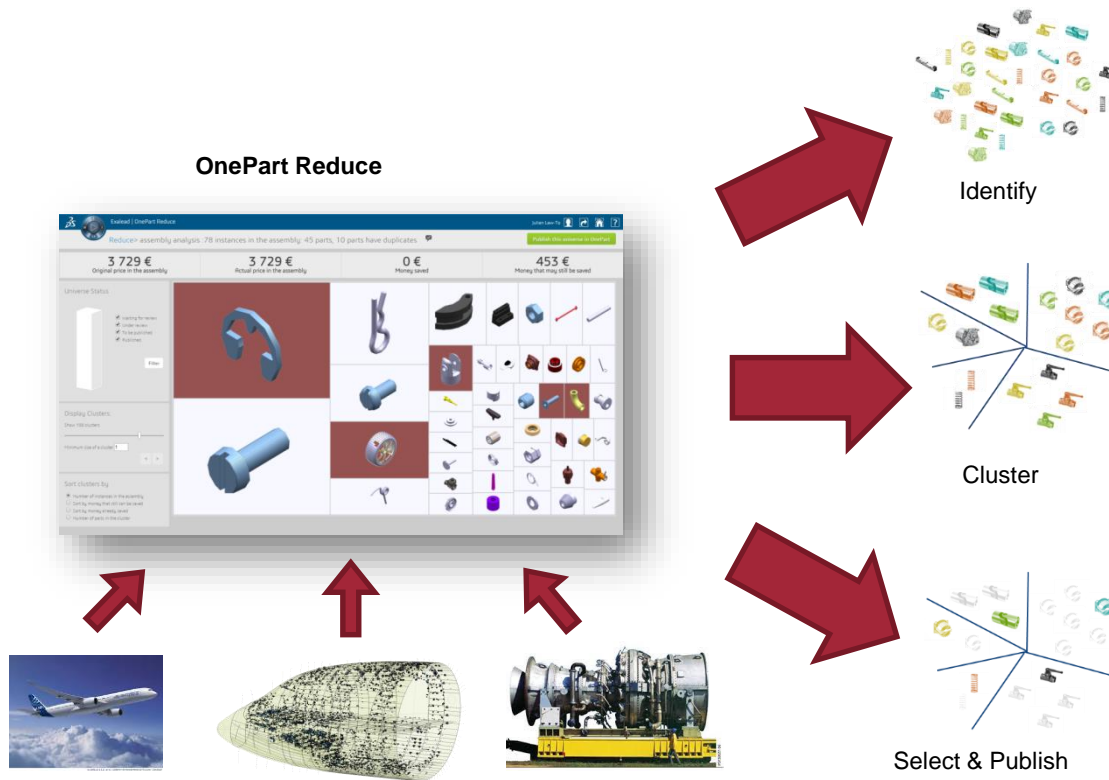
- **Identify similar part based on 3D Shape, Geometrical features and Semantic criteria thanks to Machine Learning capability**

- **Classify the data depending on roles perspectives based on predefined taxonomy**

- **Select preferred part according to company policy**

- **Publish it to the engineering department**
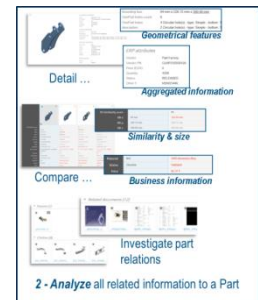
Internal Supplier Context With 3D CAD

- **CAD Part and ERP data**
  - **identify identical parts with supplier part and cost differences**
- **3D Similarity and Metadata Clustering**
- **Analyze assemblies for potential part replacement strategies**
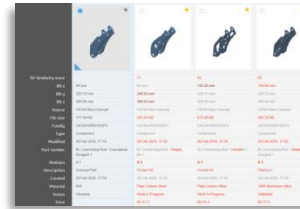
Search for similar part to the one to be quoted

Compare similar part price & the suppliers information

investigate related information

Challenge part price quotation basesd on knowledge of price and CAD reference

OnePart Reuse – Decision Assistant

1- Search similar parts corresponding to a string or a shape or geometrical feature

2 - Analyze all information related to a Part

Detail …

Geometrical features

Aggregated information

Compare

Similarity & size

Business information

Investigate part relations

3 - Decide

Reuse ?

Make ?

Buy ?

Publish Loopback to Engineering Users

- **To the designer in Saearch application … Preferred part label to guide part reuse which can be promoted to top of search results list.**

- **New parts can be auto-classified based on machine learning algorithms generated during clustering identification and classification activities**
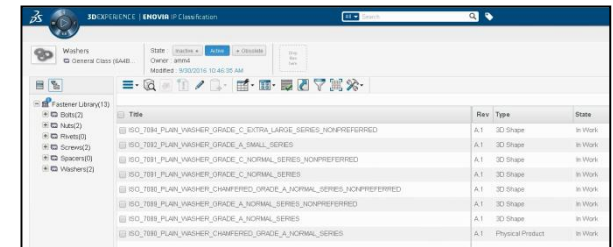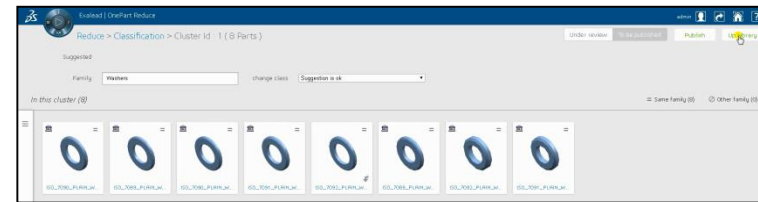
- **Monitor new part creation**
- **AI detects new or part - assigns default classification**
- **During design phase, show part similarity to existing one and enforce reuse by suggesting preferred replacements to engineers**

New design

Belongs to ?

Reuse ?

HoleConfig_#3O.CAT...
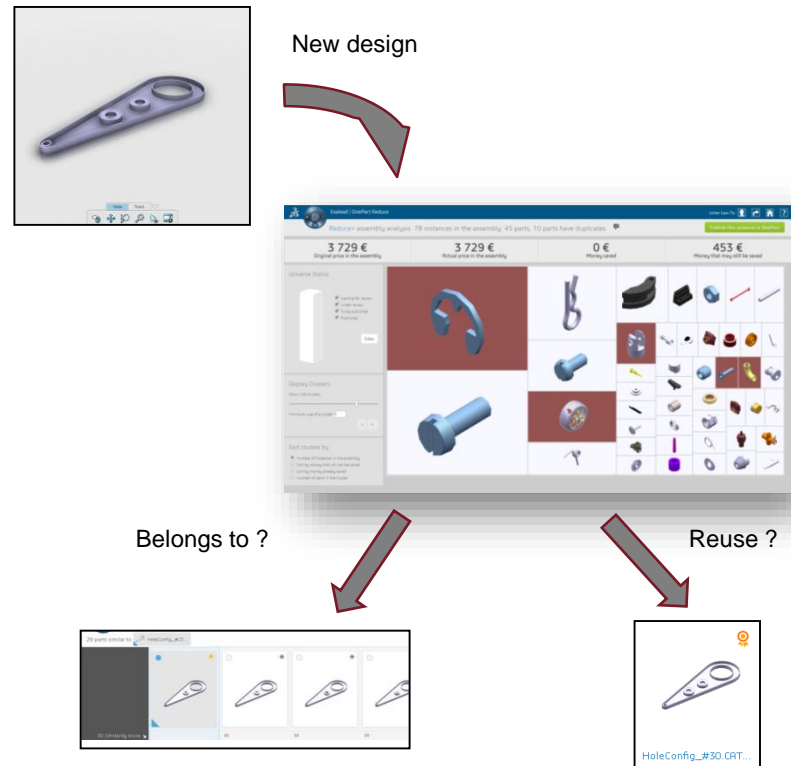
Holistic Parts View For Best Reuse Decision

Related Docs

Parents/Children

Designer

Mechanical Features

Additional Metadata

3D Signature

Drawings

Modification Date
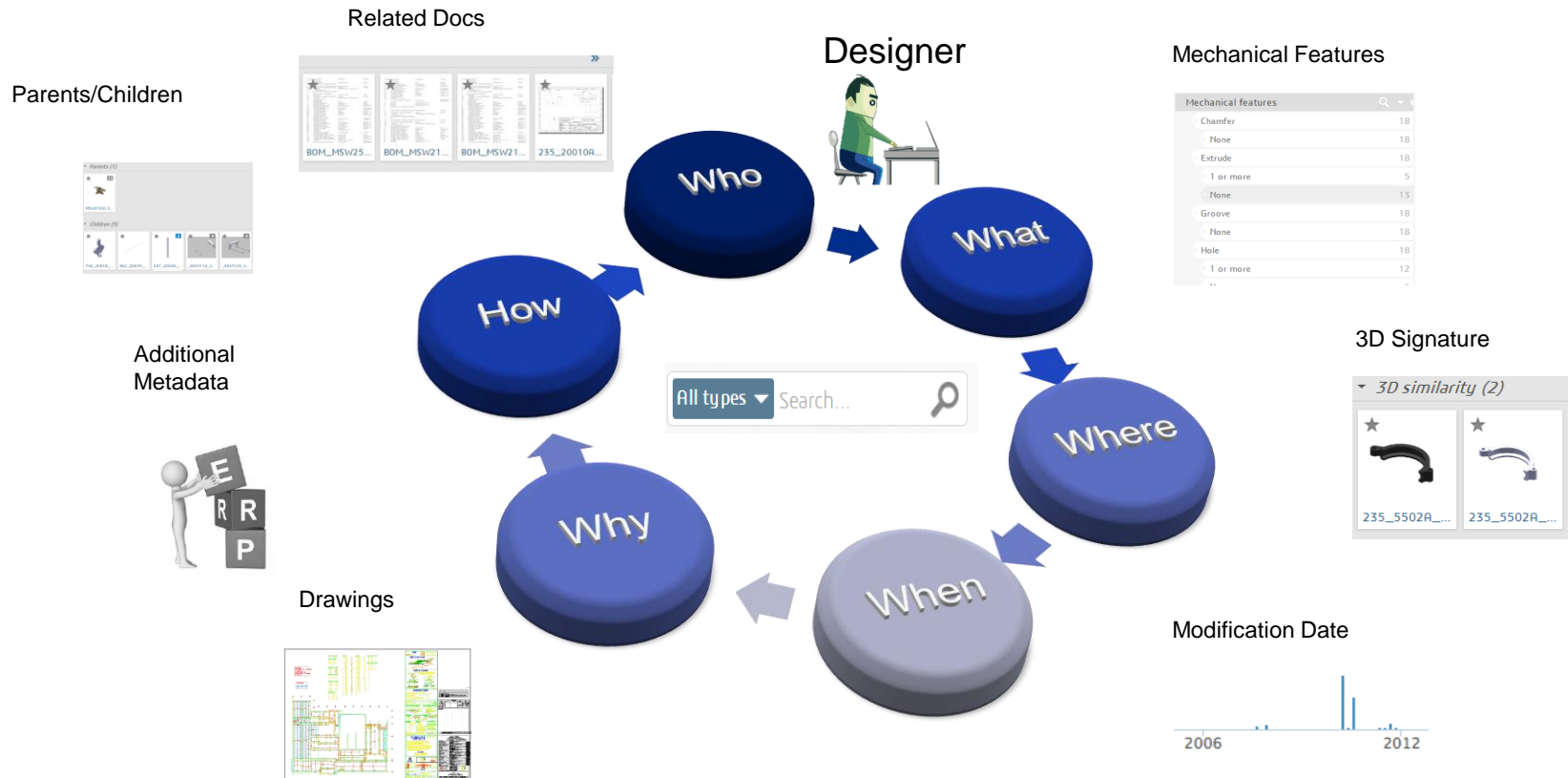
Decisions Via Extended Parts Knowledge (demo)
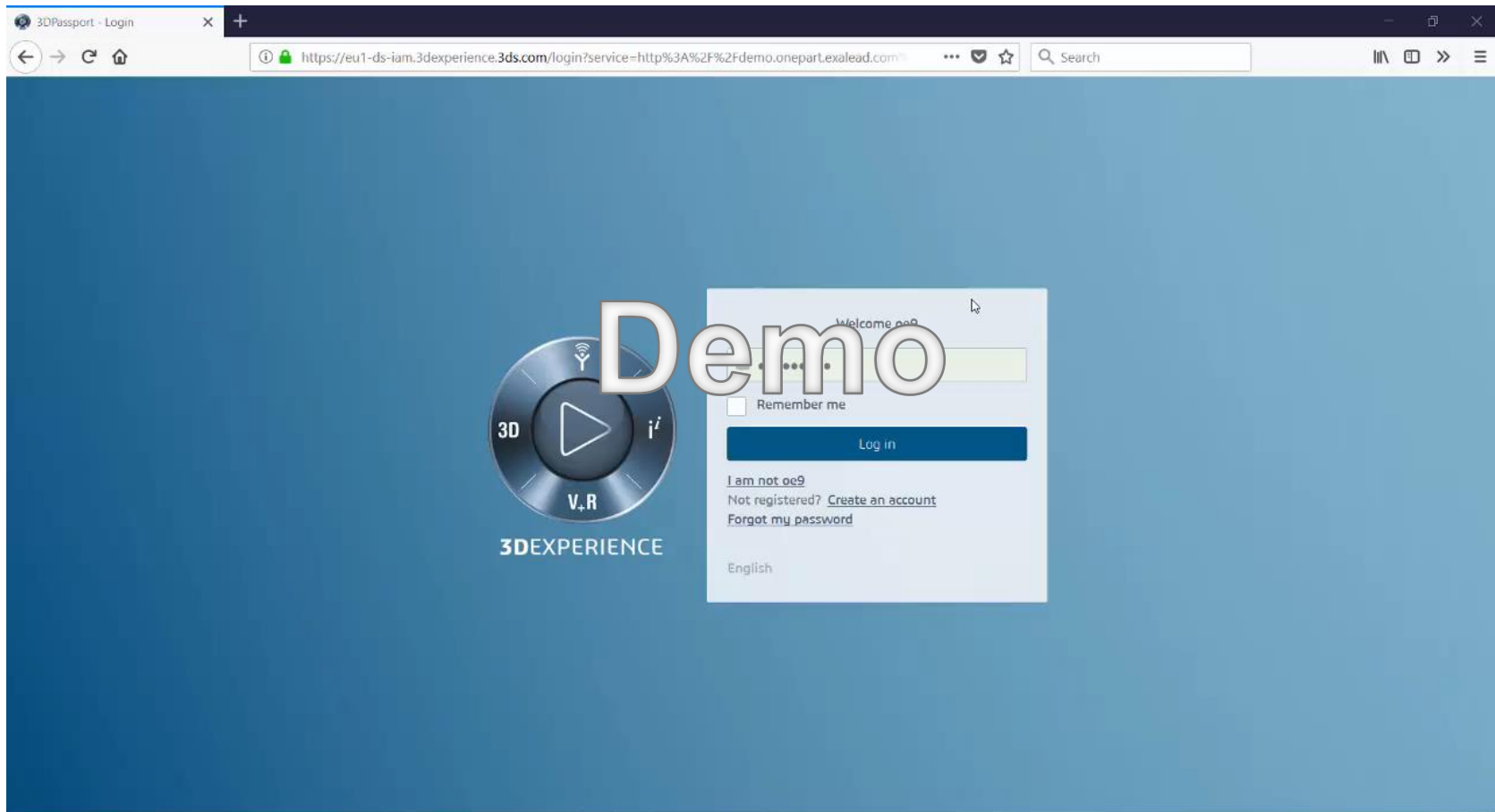
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- **Digital Twin/Thread Intelligence**
  - **Analytics or Business Intelligence?**

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« Serious » Analytics Program running for PLM?

Supply & Operation

| $ 25.4 B | $ 9.4 B | 37% Of budget in analytics |
| *ERP* | *BI* | |

Marketing & Sales

| $ 23.2 B | $ 6.8 B | 30% Of budget in analytics |
| *CRM* | *BI* | |

PLM

| $ 35 B | $ 100 M | <1 % Of budget in analytics |
| *PLM* | *BI* | |
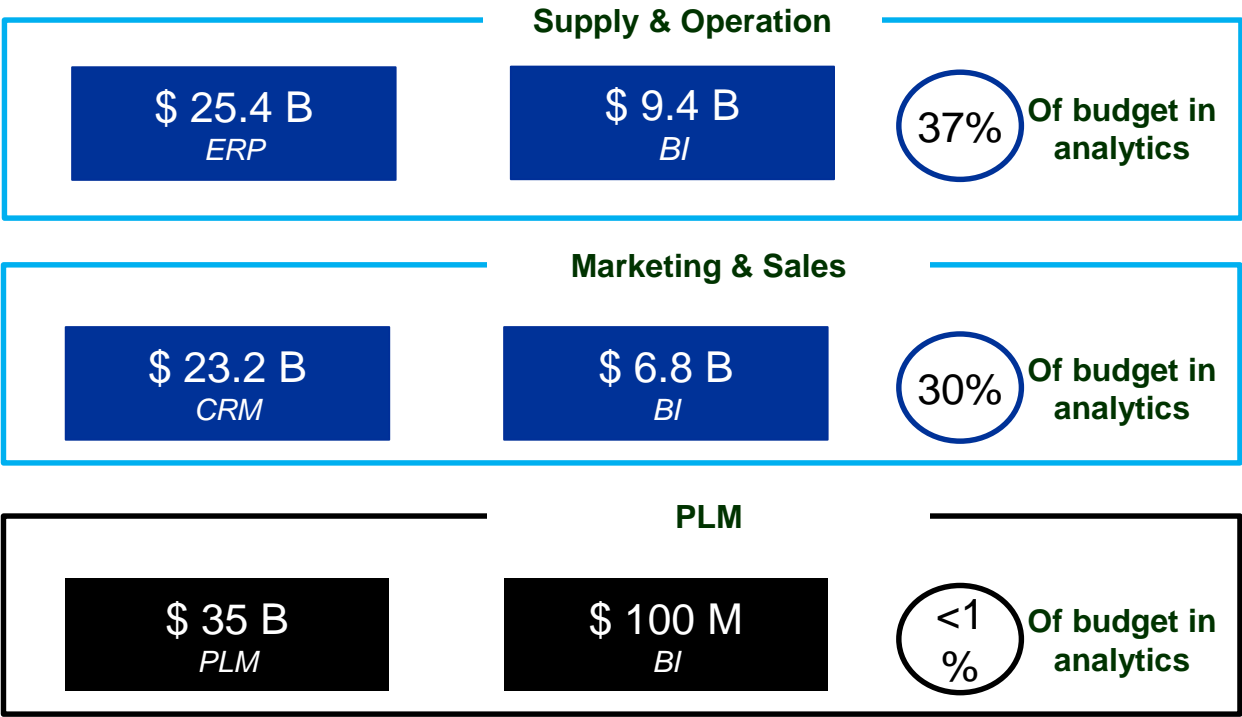
Analytics made with
EXCEL
&
Manpower

Why no serious analytics programs for PLM?

A. No decision made in the PLM world, then no need for PLM Analytics

B. Analytics does not help to make important decisions; everything can be done by intuition

C. Analyzing and understanding product lifecycle is so complex that ERP BI approach is not sustainable

Do you use Excel for PLM Analytics?

Do you use Excel for PLM Analytics?

Do you use Excel as a dashboarding solution to monitor and drive your PLM program?

▶ Majority **YES**

Do managers/executives trust the PLM information analyzed through iterative Excel manipulations?

▶ Majority **Excel**

HINT 1

The only way to enforce & secure a **SINGLE SOURCE OF TRUTH** is to ensure that users **CANNOT** leverage reporting systems (**Excel**) to modify data

Why can't BI answer PLM Analytics Needs?

Requirements | Functional View | Logical/ Product View | Product Configuration | Design | EBOM - Compliance | MBOM - Packaging | As-Built Service

Conf A
Conf B
Conf C
Conf D
Conf E
Conf F

Program analytics

Issue analytics

Change analytics
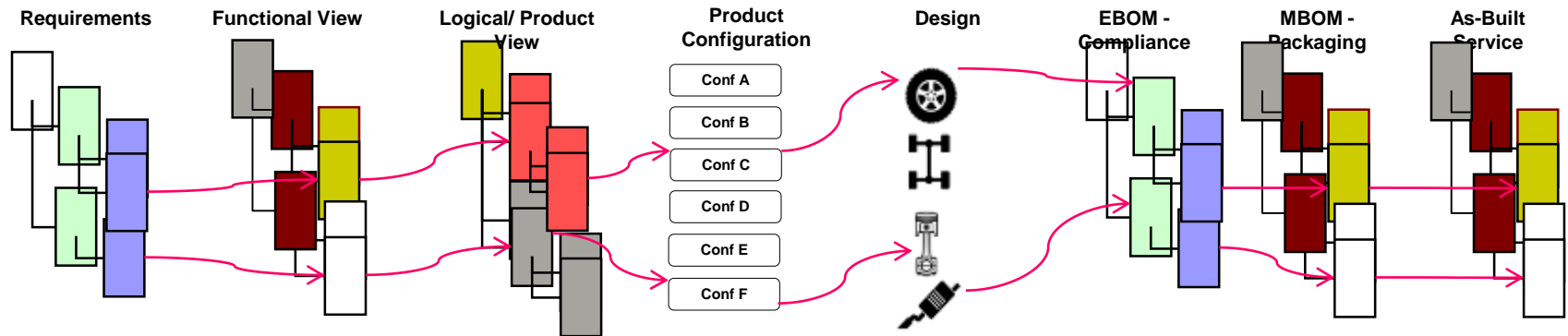
… analytics

For Years PLM was a Means to Record Data

PLM
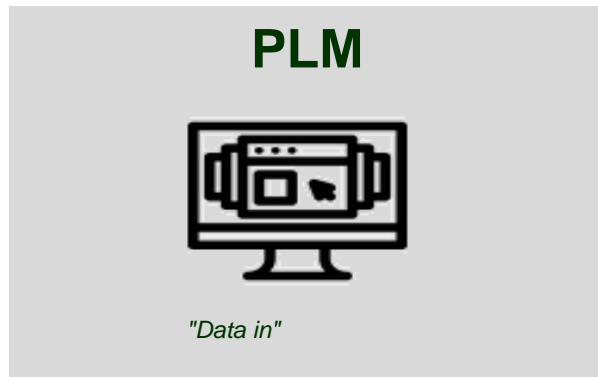
"Data in"

For Managers & Executives PLM is
FINO
F…. I. N…. O..:

First In Never Out

A large NAM "teamcenter" customer

Analytics Helps Drive the Business

PLM Roles

Optimize product performance

Optimize Go-To-Market & track execution

Optimize engineering operations

Manage manufacturing operations

Pratt & Whitney
A United Technologies Company

"If you can't measure it, you can't…
Optimize it
Manage it!"

Analytics Provides PLM Status to Executives

Before
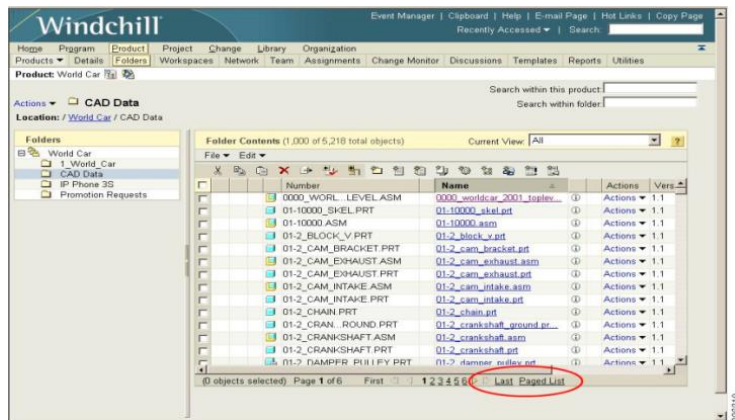
After

> " *Analytics accelerates business review with executives and makes them adopt PLM* "

EXALEAD Provides Analytics Solution Optimized for PLM

1. Part Analytics

3. Process Analytics

5. Production/Operation Analytics

2. Product Analytics

4. Project/Program Analytics
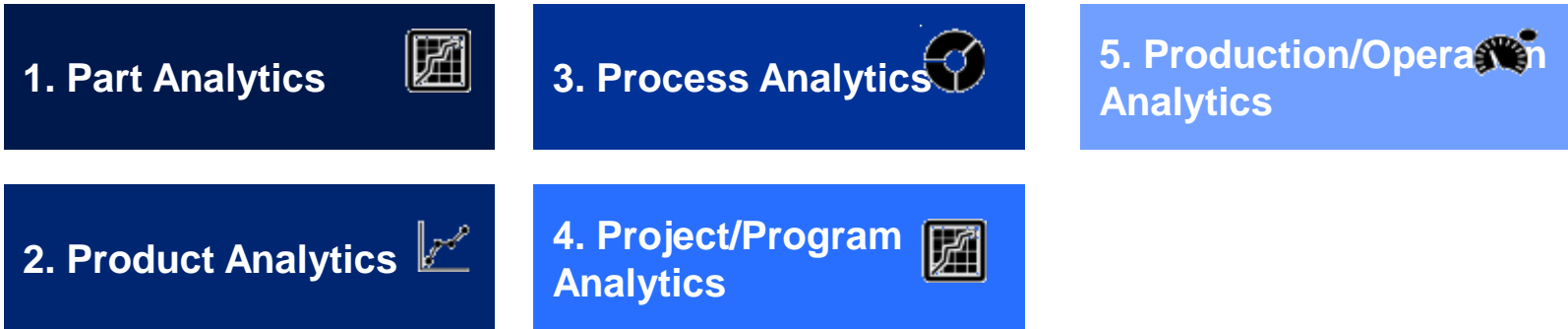
> " *We had solutions to monitor every dimension of our business except our core expertise: program management* "

Project Intelligence Example

Bob log in to the 3DEXPERIENCE platform to access his project Dashboard

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- **Industry Content Intelligence**
  - **Customer Intelligence**
  - **Competitive Intelligence**
  - **Supplier and Market Intelligence**
  - **Predictive Analytics**

Demo

Demo

BACKUP Slides

Working With Structured & Unstructured Data

Administration, deployment, security

- Shared Files
- PDM/PLM
- ERP/Database
- Other Content

Connectors

Convertors & Processing Pipeline

CAD ? → CAD Convert

Other Content Convert → Semantics and Other Processing

Index

Search Server

User Interface

web browser
http
ADMINS

web browser
http
End Users

Over 300+
file formats

Date
normalization,
Metadata
processing

125
languages
supported

Split words,
detect end
of phrase,
…

Detect kind
of words
(noun, verb,
…)

Determine
lemma and
stem of the
word

Document Conversion

Document Processors (Others & Custom)

Language Detection

Tokenizer

Part of Speech

Lemmatization / Stemming

Synonyms

Built-in Named Entities

Custom Named Entities (Ontology, Thesaurus)

Related Terms

Semantic Processors (Others & Customs)

Indexing

Associate
synonyms
for
predefined
tokens

Extract
People,
Location,
Organization,
…

Based on your
own thesaurus

Determine
important
Keywords

Others
semantic
processors
such as
Sentiment
Analysis, …

EXALEAD Content Analysis Example

Word detection

Lemma of "months" is **month**

Part of speech tagging

adjective   noun

[Six] [months] [into] his administration, President Obama is at a pivotal moment.

He has pushed through a $787 billion economic stimulus package, bailed out Wall

Street and, on Tuesday, managed to beat the defense industry in the Senate,

which voted to kill a high-profile fighter jet program. On Wednesday night Mr.

Obama addresses the nation in a prime-time news conference as the public, and

lawmakers, are growing skittish over his next big plan, to remake the American

health care system.

Negative Sentiment

Synonyms
member of Congress
senator
deputy
representative

Examples of entity detection

People   Monetary value

Organization

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ERP + textual data + Web data
Semantic Factory recognize, extract and normalize different specifications within unstructured content, such as size, price, brand, …
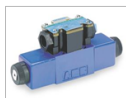
10998 - VALVE,SOLENOID
Part number: DG4V3S6CMFTWLB560
manufacturer: VICKERS, INC.
class: 10998 - VALVE,SOLENOID
property: MATERIAL/FLUOROCARBON,VALVE OPERATION METHOD/HYDRAULIC,VALVE OPERATION METHOD/SOLENOID,VOLTAGE IN VOLTS AND CURRENT TYPE/120
sapno: 1044859
Show web text

05487 - VALVE,CHECK
Part number: CP0M2DDV
manufacturer: PARKER HANNIFIN CORP.
class: 05487 - VALVE,CHECK
property: CRACK PRESSURE/15.0 POUNDS PER SQUARE INCH,FLOW CONTROL DEVICE/POPPET,MATERIAL/STEEL,MAXIMUM OPERATING PRESSURE/5000.0 POUNDS PER SQUARE INCH,VALVE OPERATION METHOD/HYDRAULIC
sapno: 1056503
Show web text

10998 - VALVE,SOLENOID
View similar parts
Part number: 554SS600K000030
manufacturer: NUMATICS INCORPORATED
class: 10998 - VALVE,SOLENOID
property: MATERIAL/CRES,MAXIMUM OPERATING PRESSURE/150.0 POUNDS PER SQUARE INCH,MAXIMUM OPERATING TEMP/115.0 DEG FAHRENHEIT,MEDIA FOR WHICH DESIGNED/AIR,MEDIA FOR WHICH DESIGNED/VACUUM,MINIMUM OPERATING TEMP/10.0 DEG FAHRENHEIT,VALVE OPERATION METHOD/AIR,VALVE OPERATION METHOD/SOLENOID,VOLTAGE IN VOLTS AND CURRENT TYPE/120
sapno: 1066530
Show web text

05490 - VALVE,PLUG
View similar parts
Part number: 8APR6VTB
manufacturer: PARKER HANNIFIN CORP.
class: 05490 - VALVE,PLUG
property: MATERIAL/BRASS,MATERIAL/FLUOROCARBON,MATERIAL/METAL,MATERIAL/SYNTHETIC RUBBERS,MAXIMUM OPERATING PRESSURE/150.0 POUNDS PER SQUARE INCH,MAXIMUM OPERATING PRESSURE/3000.0 POUNDS PER SQUARE INCH,MAXIMUM OPERATING TEMP/450.0 DEG FAHRENHEIT,MINIMUM OPERATING TEMP/10.0 DEG FAHRENHEIT,VALVE SIZE/0.5 INCHES
sapno: 1079023
Show web text

10998 - VALVE,SOLENOID
Part number: PS1E28101F
manufacturer: PARKER HANNIFIN CORP.
class: 10998 - VALVE,SOLENOID
property: VALVE OPERATION METHOD/SOLENOID,VOLTAGE IN VOLTS AND CURRENT TYPE/115

Auto-Classification Clickable Filters

-- Select a value --

MATERIAL
-- Select a value --

MAXIMUM OPERATING PRESSURE
-- Select a value --

VALVE OPERATION METHOD
-- Select a value --

VOLTAGE IN VOLTS AND CURRENT TYPE
-- Select a value --

CONNECTION TYPE
-- Select a value --

THREAD SERIES DESIGNATOR
-- Select a value --

FLOW CONTROL DEVICE
-- Select a value --

MEDIA FOR WHICH DESIGNED
-- Select a value --

Height
- 0" - 1" (3)   x
- 1" - 2" (1)   x
- 2" - 3" (1)   x

Length
- 0" - 1" (1)   x
- 1" - 2" (1)   x

Width
- 0" - 1" (1)   x