

PLM Customer Value Network
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Implementing and Integrating PLM with SAP Manufacturing Processes

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THE BEST-RUN BUSINESSES RUN SAP™



What the heck is Greenheck Fan?



Market leader in institutional and commercial air movement and controls products



Greenheck Business Background



2003 Greenheck begins SAP 4.7 implementation

2005 Greenheck Consolidates on Autodesk CAD Software (AutoCAD & Inventor)

2008 Greenheck implements PLM using Cideon Vault

2008 Upgrade to 6.0 for Production Client- Development Client still 4.7

SAP at Greenheck

Highly configurable product

- 230,000 active Materials in Material Master
 - 1/3 of these materials are configurable
- 180,000 Bills of Materials for 6,000 Parent or finished goods
- 125,000 unique manufacturing Routings
- 240,000 Documents stored within the vault.
- Heavy ALE and VC user

Why Implement PLM?

- Enable Inventor 3D model management
- Manage and secure drawings for global engineering and manufacturing locations
- Replace Greenheck-developed legacy drawing management system

A vault is required to meet these strategic initiatives:

Inventor 3D modeling

- Enables Inventor 3D model management, version control, and workflow management

Global engineering, manufacturing, and sourcing

- Enables security, distribution, and effective management of an increasing number of product documents across regional manufacturing sites and international boundaries

Faster time to market

- Enables design collaboration, integration with SAP, and Engineering Change Management

Product quality

- Enables part searching and design reuse
- Significantly reduces data entry and improves accuracy

Greenheck's Chosen Solution:

SAP PLM with Cideon CAD integration

- Tight integration with SAP processes
- Distributed drawing management
- No duplication of data
- Migrate to AutoCAD and Inventor Series II (115 network seats)



Phase One – Document Management



Installed a Test and Production content server

Configured DMS

- Document types
- Status Network
- Security

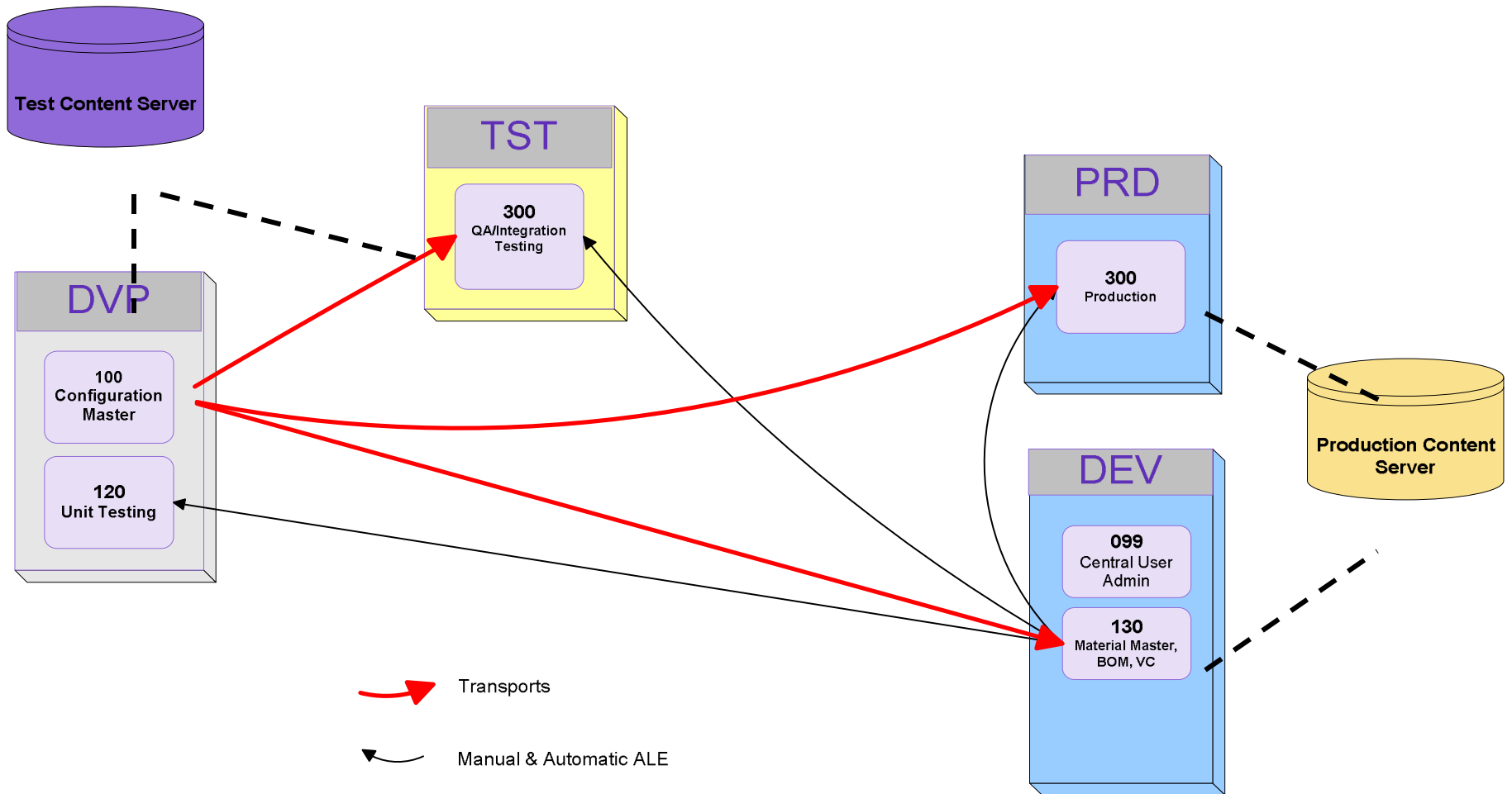
Created a drawing class with 16 characteristics

Configured ALE for documents & drawing class

Developed bulk-load program for legacy data

Developed an interface with legacy PDM system

Phase One - Greenheck's Landscape



Phase One – DMS Developments

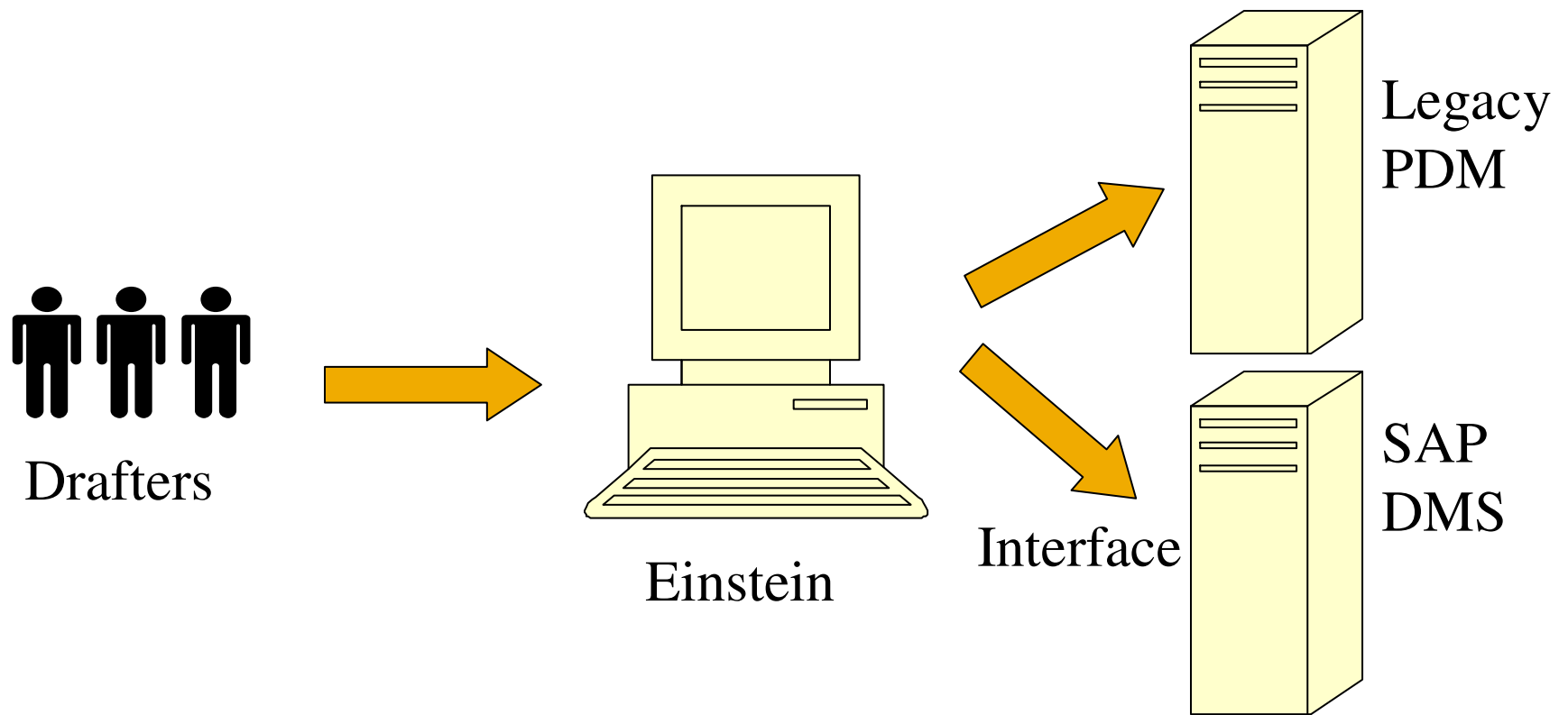


Bulk-load program for legacy drawings

- Bulk-loaded 250,000 documents in 3 weeks

Interface program for legacy PDM

- Uploads hundreds of drawings per day



ALE process makes drawing management more difficult

- Drawings cannot be ALE'd from Production to Test content server. DIR's can be ALE'd.
- Must configure ALE to not break object links on target system when a DIR is ALE'd
- Cannot have more than 50,000 object links on a document in target system

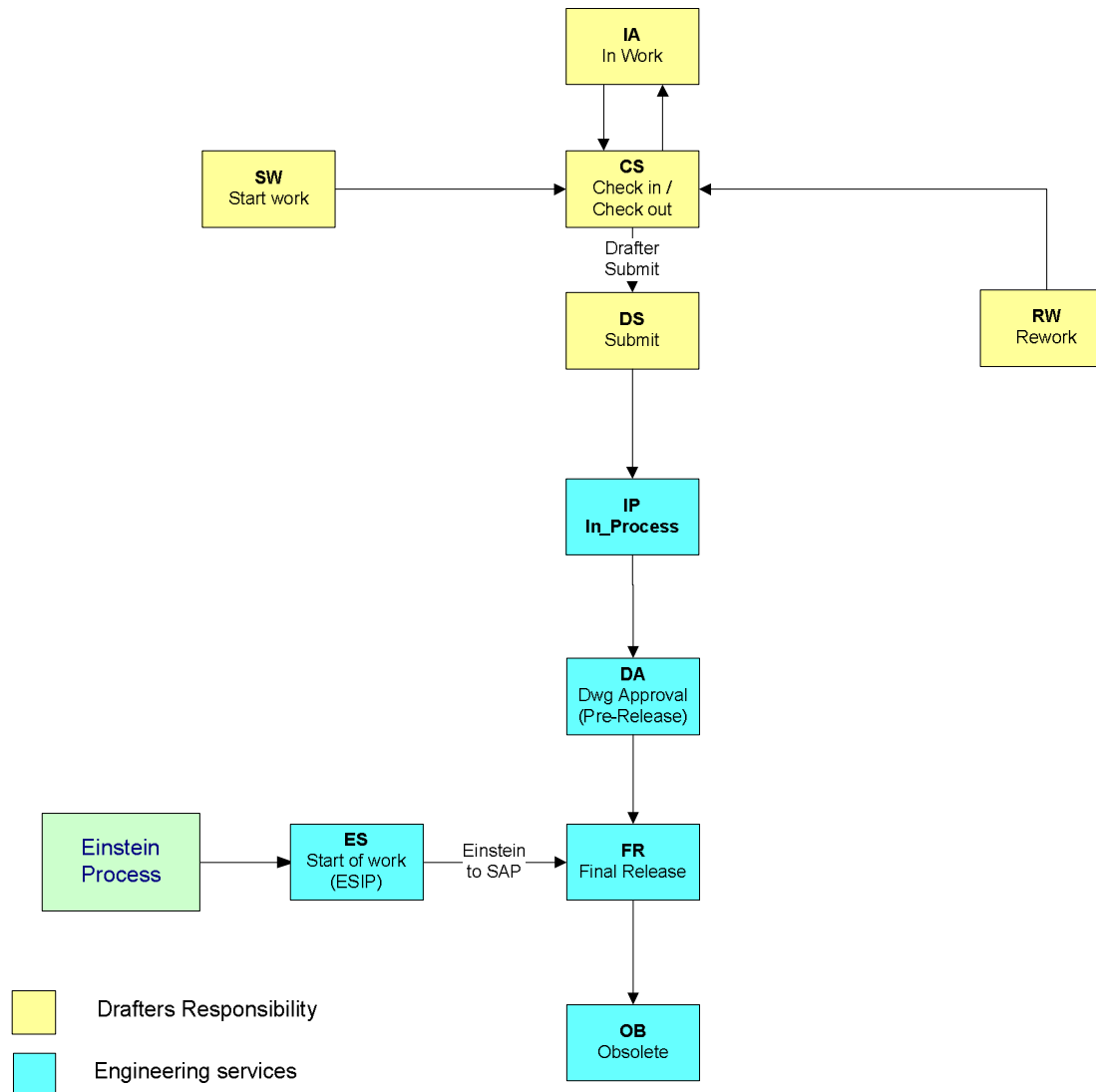
Add time in the project plan for knowledge transfer

Phase Two – CAD Integration Steps



- Expand status network to include entire design lifecycle
- Install & configure conversion server, import, & export tools
- Develop and interface from conversion server to legacy PDM
- Install & configure Cideon Integration for Inventor & AutoCAD
- Test final solution
- Train drafters on new tools
- Use the software in production

Phase Two – Status Network



Using PLM – Submitting a Drawing and Pulling Part Attributes



Document Data Addit. Data

Document Data

Description: BELT TU
 Document Status: FR Rele
 CM Relevnce:
 User: JAGODZI
 Lab/Office:
 Change number:
 Authorization Group:

Superior Document

Document:

Originals

Appl.	Application
DWG	24493-01.DWG
PDF	24493-01.pdf
PLT	24493-01.plt
CAM	24493-01.dwg

Document Edit Goto Extras Environment Originals System Help

Display Document: Basic Data Engineering Drawings (DRW)

Document

Document: 24493 Part: 000 Version: 02

Deletion Ind. Document Structu CAD Indicator Hierarchy

Document Data Addit. Data Descriptions Part Attributes by CIDEON Object Links Originals

Engineering Drawing details

Primary Type (M)	Engineering Drawings
Document Subtype (M)	CNC
Design Project	
Title block description	BELT TUBE, BSG-160
Drawing creator	DAJ
Drawing creation Date	07/29/2008
Engineering change order	IAN23958
ECO Description	ADDED (2) 0.201 EXTRUSIONS
Part Tolerance	TOL3
Part area	254.000
Part Length	20.876
Part width	12.313
Part external	68.288
Part internal	0.000
Supersedes	22196B
Unit type	IN

Using PLM – Capturing Part Features



The screenshot displays the SAP PLM software interface. At the top, there is a menu bar with options: Document, Edit, Goto, Extras, Environment, Originals, System, and Help. Below the menu is a toolbar with various icons. The main window title is "Display Document: Basic Data Engineering Drawings (DRW)".

Below the title bar, there are several tabs: "Document Data", "Addit. Data", "Descriptions", "Part Attributes by CIDEON", "Object Links", and "Originals". The "Part Attributes by CIDEON" tab is currently active.

The "Part" section contains a table with the following data:

Ty.	Document	Part	Vs	ID	Document Part	Material	Gauge	Description
D...	24493	000	02	1	582632	CRS	14	CS
D...	24493	000	02	2	649850	GALV	14	CS G90

Below the "Part" section, there is a "Features" section with a table showing feature details:

Feature ID	Size	Count
EXTRUSION	0.201	10
FORM	10.0520	1
FORM	11.4070	2
FORM	11.4380	2
FORM	4.2760	2

Phase II Post Go Live Storm



- Materials with Multiple and incorrect Engineering Drawings attached
- Production Orders with Multiple and incorrect Drawings attached
- Legacy system didn't match SAP but still viewed as correct
- Lots and Lots of phone calls from unhappy people!
- We Stopped implementation with approximately 1/3 of our company drafters using PLM



Steps taken to resolve the issues:

Research system design for attaching materials to production orders and Material Masters. Standard SAP functionality wasn't working properly for us, both in MM03 and Production order/ work center priorities transactions.

Research available notes and their functionality- none applied to ECC6

Created 7 scenarios and completed integration testing on each of these before and after the following changes were made.

Phase II Post Go Live Storm



Product Lifecycle Management - Scenario Reference															
From Dwg - To Dwg of				Source Drawing								Target Drawing			
Transfer Part Number				Before Operation				After Operation				After Operation			
Scenario	Doc Type	To Dwg	Part	No.	Rev.	Type	Status	No.	Rev.	Type	Status	No.	Rev.	Type	Status
1	Same/Different	New	1/all	123	00	DRW	FR	123	01	DRW	OBS	NEW	00	DRW	FR
2	Same/Different	New	Not all	123	00	DRW	FR	123	01	DRW	FR	NEW	00	DRW	FR
3	Same/Different	Existing	1/all	123	00	DRW	FR	123	01	DRW	OBS	XXX	INC	DRW	FR
4	Same/Different	Existing	Not all	123	00	DRW	FR	123	01	DRW	FR	XXX	INC	DRW	FR
Drawing Conversion				Source Drawing								Target Drawing			
Scenario	Doc Type	To Dwg	Part	No.	Rev.	Type	Status	No.	Rev.	Type	Status	No.	Rev.	Type	Status
5	Different	New	1/all	123	00	DRW	FR	n/a	n/a	n/a	n/a	123	01	IDW	FR
Obsolete Part				Source Drawing								Target Drawing			
Scenario	Doc Type	To Dwg	Part	No.	Rev.	Type	Status	No.	Rev.	Type	Status	No.	Rev.	Type	Status
6	Any	n/a	1/all	123	00	DRW	FR	123	1	DRW	OBS	n/a	n/a	n/a	n/a
7	Any	n/a	Not all	123	00	DRW	FR	123	1	DRW	FR	n/a	n/a	n/a	n/a

Our Solution:

Create Auto Archive Program: This program runs when a document status is changed to FR or OB to automatically archive previous versions of that document number.

Create Auto ALE Program: This program runs when a document status is changed to FR, OB, or AR to automatically ALE that document from DEV to PRD.

Latest version filter Program: A program has been modified so non-released revisions of documents will be filtered out and will not show as current in MM03. Non-released drawings will not be allowed to attach to a production order. (non-released also includes archived and obsolete).

Production needs to know the correct version of the material's drawings to attach to production orders.

- Correct version is based on the drawing status and drawing validity dates.
- Only the latest Released (FR) version is correct and will be attached to production order.
- If no Released versions, then nothing is attached to production order.

None released, none will be used

Type	Document	Vr	Part	StatusText	From date
DRW	124504	00	000	Archived	01/23/2009
DRW	124504	01	000	Archived	01/23/2009
DRW	124504	02	000	Obsolete	01/23/2009



- All released, latest will be used

Type	Document	Vr	Part	StatusText	From date	U
DRW	M57055	02	000	Released	01/01/2008	F
DRW	M57055	03	000	Released	05/13/2008	F
DRW	M57055	04	000	Released	07/16/2008	F

...	Type	Document	Vr	Part	StatusText	From date
	DRW	D110650	00	000	Released	02/10/2009
	DRW	D110650	01	000	Released	10/15/2004

- One released, that one is used

Type	Document	Vr	Part	StatusText	From date	U
DRW	34989	00	000	Released	07/09/2007	F
DRW	34989	01	000	Obsolete	11/26/2008	F

Linking Drawings to Production Orders



SAP looks at all DIRs linked to Material Master and BOM.

The correct version of each DIR is linked to production order when order is created.

When order is released, SAP re-determines the correct version of each DIR and links those to the order and will remove any incorrect DIRs.

After order is released, drawing links are static, unless manually updated. (i.e. re-reads)

Multiple DIRs may be linked to a production order. Only one version of each DIR.

- One engineering drawing
- Other supporting drawings

- Once a production order is RELEASED, the drawing links do not get updated automatically.
- Only a manual Re-Read will update the drawing links to the correct versions and will update the production order with the latest BOM, routing and drawing changes.
- If more than one Released version exists (invalid), SAP will use the Order BOM's explosion date to find which released version is to be linked.

Production Order Example



Create new drawing versions after drawing is linked to a production order	
Activity	Result
1 Create Production Order for part	DRW 1234 00 (FR) is linked to Order
2 Create new drawing version	DRW 1234 01 (FR) created DRW 1234 00 changes to AR
3 Production Order (in CRTD status)	DRW 1234 00 (AR) is still linked to Order
4 Release Production Order	DRW 1234 01 (FR) is linked to Order.
5 Create new drawing version	DRW 1234 02 (FR) is created DRW 1234 01 changes to AR
6 Production Order (in REL status)	DRW 1234 01 (AR) is still linked to Order
7 Production Order Re-Read	DRW 1234 02 (FR) is linked to Order

This is not an engineering/ CAD initiative, it is a systems project that touches all parts of SAP.

SAP patch level is critical. Our patch level required us to disable some functionality.

Verify existing document types

- Document type must be the same as file extension
 - Eg. Inventor drawing = Doc Type "IDW"
 - Eg. Inventor part = Doc Type "IPT"

Integration testing must include all touch points including MM and PP modules

Realized Benefits:

Integration of drawings with existing SAP processes & transactions- For Greenheck this was huge, we now have one system that connects all of our product data!

Storage of drawings and data in centralized location

Lifecycle management of drawings

Classification of drawings (query capability on 26 characteristics)

Ability to create One to many drawing relationships

Next Steps:

Creation of Materials and Bills of Materials using CDESK and data stripped off of the drawings.

Automated Creation of routings based on part attributes

PLM Next Steps



We are starting to use the attributes pulled from the drawing to create Material Masters and Bills of Materials from CDESK

The screenshot displays the SAP CAD Desktop interface. On the left, a 'Document List' table shows various documents. The main window displays 'Display Document: Basic Data Inventor Drawing (IDW)' for document 260648. A red circle highlights the 'Part Attributes by CIDEON' section, which lists drawing details. Another red circle highlights the 'Material BOM' section, which lists material descriptions and their quantities.

Document	Vr	Version	Display (Icon)	Ma
259356	01		○○○	61
259357	01		○○○	61
260648	01		○○○	90
260737	01		○○○	90
264547	00		○○○	61
264559	00		○○○	61
264736	00		○○○	61
264745	00		○○○	61
264758	00		○○○	61
264761	00		○○○	84
265182	00		○○○	61
265185	00		○○○	61
265190	00		○○○	84
265285	00		○○○	61
265333	00		○○○	61
265353	00		○○○	61

Document	Part	Version	Material Description	St.	S
_IDW_000.IDW	000	01	ACTUATOR COVER-BACK HALF	FR	R
_IDW_000.IDW	000	01	ACTUATOR COVER-FRONT HALF	FR	R
_IDW_000.IDW	000	01	PLENUM BOTTOM INLET COVER	FR	R
_IDW_000.IDW	000	01	SPACER BOX BOTTOM INLET COVER	FR	R
_IDW_000.IDW	000	01	SD, WTHD RT	FR	R
_IDW_000.IDW	000	01	SD, WTHD LF	FR	R
_IDW_000.IDW	000	01	SAFETY SCREEN FLANGE	FR	R
_IDW_000.IDW	000	01	SAFETY SCREEN CROSS BAR-LONG	FR	R
_IDW_000.IDW	000	01	SAFETY SCREEN CROSS BAR-SHORT	FR	R
_IDW_000.IDW	000	01	ASSY, SAFETY SCREEN	FR	R
_IDW_000.IDW	000	01	PANEL HALF, ACCESS DOOR-DOUBLE WALL	FR	R
_IDW_000.IDW	000	01	FLANGE, ACCESS DOOR-DOUBLE WALL	FR	R
_IDW_000.IDW	000	01	ASSY, ACCESS DOOR-DOUBLE WALL	FR	R
_IDW_000.IDW	000	01	PANEL HALF, DAMPER DOOR-30 " DAMPER	FR	R
_IDW_000.IDW	000	01	FLANGE A, DAMPER DOOR	FR	R
_IDW_000.IDW	000	01	FLANGE B, DAMPER DOOR	FR	R

Questions ?

