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CUST 302 - Using ESI PTC Windchill MPMLink to Integrate to ERP OOTB

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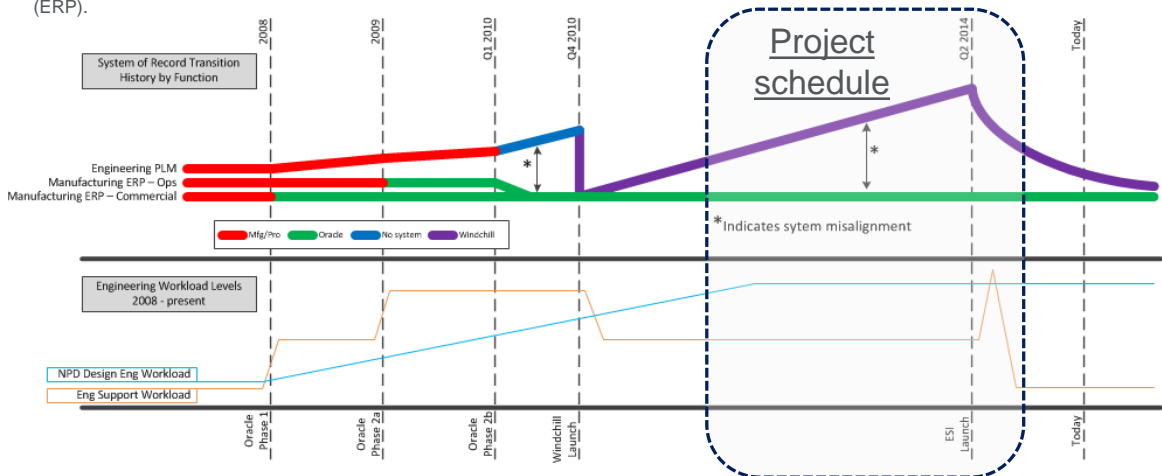


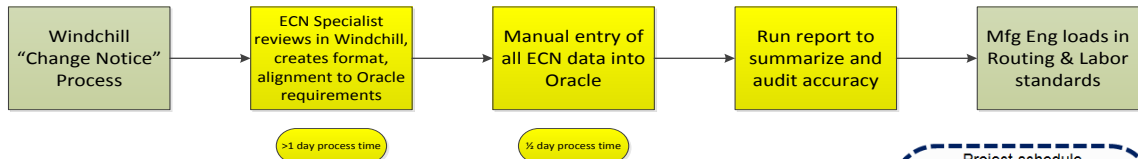
BACKGROUND

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Since 2008, Doosan Portable Power has executed many changes to its ERP and PLM systems including full platform changes. As a result, there has been increasing resource requirements to maintain each system. Despite best efforts, Bill of Material's also have become misaligned due to the manual nature of managing two unique systems.

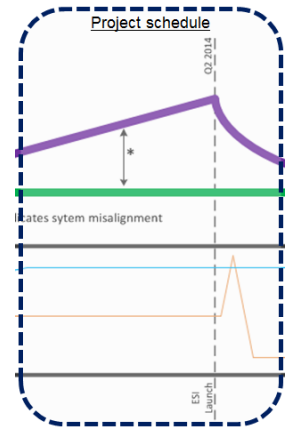
The increased workload, capacity and error rate prompted the need to automate the interface between Windchill (PLM) and Oracle (ERP).



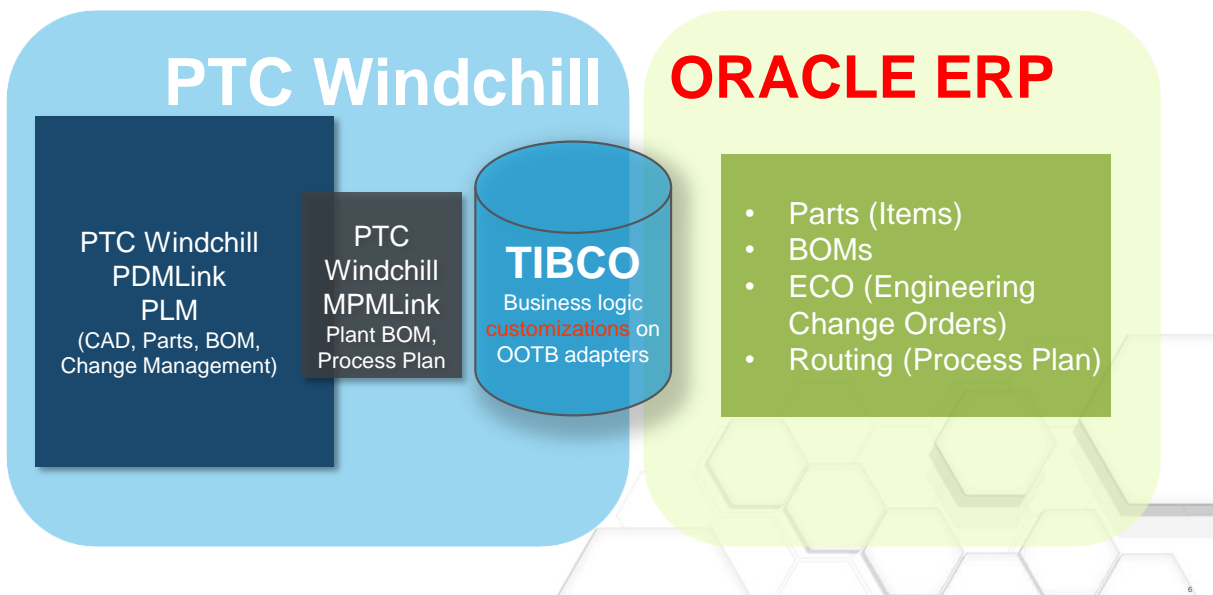
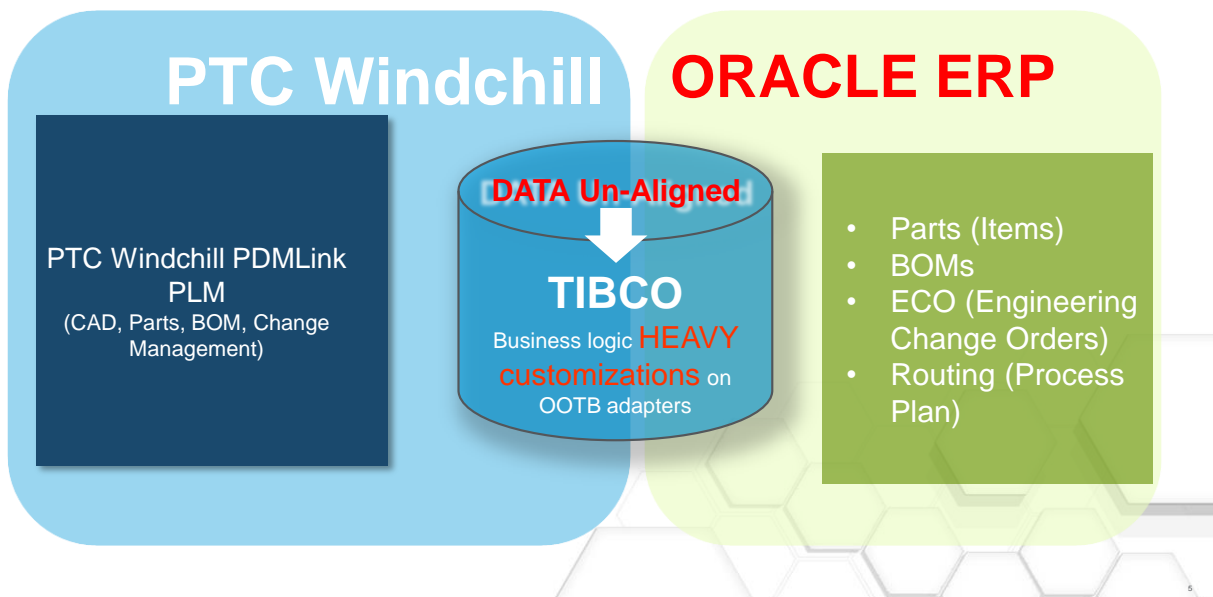


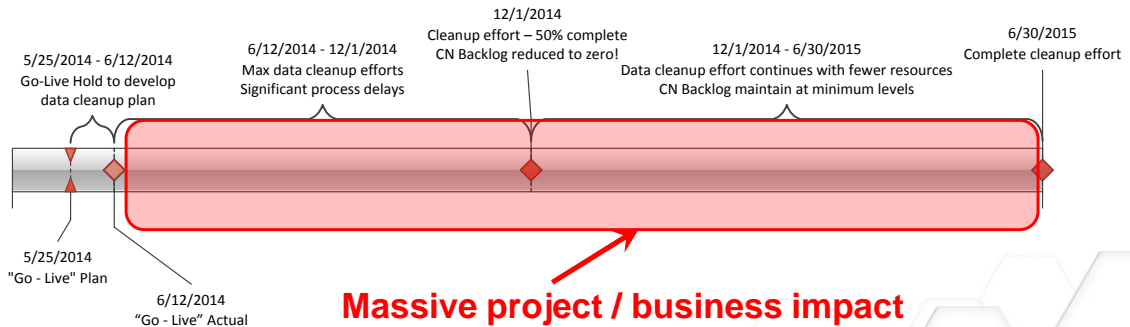
Three key metrics

- 2420 hours/year resource time was excessive and created a significant bottleneck in this process
- Many errors created due to manual entry process (not measured but negatively impacted daily process)
- Misalignment between engineering PLM and ops ERP



- **Front Loaded BOM**
 - Engineering creates the mBOM (plant BOM) and does not maintain a unique eBOM (engineering BOM)
 - Engineering is responsible for creating basic assembly/manufacturing instructions on the BOM
- **Same part exists on BOM level multiple times**
 - Because engineering creates the mBOM, certain components (i.e. fasteners, adhesives, lubricants, etc.) will be placed on multiple lines at a single level of a BOM
 - This creates issues when trying to automate the assignment of these parts on multiple BOM lines to an ERP Operation
- **Painted Sheetmetal part handling discrepancies in PLM vs. ERP**
 - ERP stores painted sheetmetal parts with a “Paint” and “Material” code as a suffix on the part number
 - i.e. 46565748GA (8 digit non-intelligent part number with ‘G’ paint code, and ‘A’ material code)
 - PLM stored the “Paint” and “Material” codes as unique attributes on the BOM usage link





Significant project and business impact as a result of data issues.

Data Issues

How did data discrepancies cause issues in the project?

- **Data migration**
 - As a result of gaps in the BOM data between ERP and PLM, the data loading process for existing BOM to Process Plan and Process Plan to Operation failed.
 - Data was extracted from ERP to build existing Process Plans and Operations in PTC Windchill MPMLink
 - Data was misaligned as a result of BOM discrepancies.
 - This caused too much manual work during the data migration phase of the project
 - Forced the addition of extra review and validation steps in every Change Notice (CN)
 - Decreased efficiency of EC process
- **Post Go-Live Cleanup Efforts**
 - Significant time/resources have to be put into cleanup efforts
 - Extended project time-line and go-live date
- **Who's right?**
 - Decisions had to be made in many cases to decide what data set was correct in the case of certain data discrepancies.

XML Loaders Require 100% Data Integrity

The image shows two screenshots. The left screenshot is a Notepad++ window displaying XML code for an XML loader. The code includes a handler for 'com.ptc.windchill.mpml.processplan.operation.Loader' and a 'WCTYPE' definition for 'MPMOperation'. The right screenshot shows the PTC Windchill interface with a table of operations. The table has columns for Name, Number, Version, State, Quantity, and Unit. The operations listed include various 'Operation' entries with their respective numbers and versions.

Name	Number	Version	State	Qu...	Unit	Assem
46585081	4658508...	A.1 (Design)	Released	1	each	46585081 (
1000 Operation_1000	OPR0011...	A.1 (Design)	Released	1	each	
1001 Operation_1001	OPR0012...	A.1 (Design)	Released	1	each	
1002 Operation_1002	OPR0013...	A.1 (Design)	Released	1	each	
1003 Operation_1003	OPR0014...	A.1 (Design)	Released	1	each	
1004 Operation_1004	OPR0015...	A.1 (Design)	Released	1	each	
1005 Operation_1005	OPR0016...	A.1 (Design)	Released	1	each	
1006 Operation_1006	OPR0017...	A.1 (Design)	Released	1	each	
1007 Operation_1007	OPR0018...	A.1 (Design)	Released	1	each	
1008 Operation_1008	OPR0019...	A.1 (Design)	Released	1	each	
1009 Operation_1009	OPR0019...	A.1 (Design)	Released	1	each	
100 Operation_100	OPR0011...	A.1 (Design)	Released	1	each	
1010 Operation_1010	OPR0021...	A.1 (Design)	Released	1	each	
10 Operation_10	OPR0009...	A.1 (Design)	Released	1	each	
11 Operation_11	OPR0028...	A.1 (Design)	Released	1	each	
130 Operation_130	OPR0030...	A.1 (Design)	Released	1	each	
150 Operation_150	OPR0032...	A.1 (Design)	Released	1	each	
1 Operation_1	OPR0007...	A.1 (Design)	Released	1	each	
200 Operation_200	OPR0036...	A.1 (Design)	Released	1	each	
240 Operation_240	OPR0038...	A.1 (Design)	Released	1	each	
260 Operation_260	OPR0040...	A.1 (Design)	Released	1	each	
270 Operation_270	OPR0043...	A.1 (Design)	Released	1	each	
290 Operation_290	OPR0047...	A.1 (Design)	Released	1	each	
2 Operation_2	OPR0035...	A.1 (Design)	Released	1	each	
300 Operation_300	OPR0051...	A.1 (Design)	Released	1	each	
320 Operation_320	OPR0053...	A.1 (Design)	Released	1	each	
340 Operation_340	OPR0055...	A.1 (Design)	Released	1	each	
360 Operation_360	OPR0057...	A.1 (Design)	Released	1	each	
370 Operation_370	OPR0059...	A.1 (Design)	Released	1	each	
380 Operation_380	OPR0060...	A.1 (Design)	Released	1	each	
3 Operation_3	OPR0049...	A.1 (Design)	Released	1	each	

What was it used for?

- Process Plan creation and maintenance
 - Including Operations, Workcenters and resources
- Process Plan aligns directly to ERP "Routing" (Required for BOM creation)

The image shows two screenshots from the PTC Windchill interface. The left screenshot is a table of operations with columns for Name, Number, Version, State, Quantity, and Unit. The right screenshot shows a detailed view of a specific operation, 'Operation_2', with fields for Number, Name, Version, Status, State, Context Name, Base Unit of Measure, Life Cycle, Team, and Category.

Name	Number	Version	In Work	State	Quantity	Unit
46665556	000000328	D.2 (Design)	In Work		1	each
2 Operation_2	OPR00010706	A.1 (Design)	Released		1	each
1010 Operation_1010	OPR00010707	A.1 (Design)	Released		1	each
490 Operation_490	OPR00010708	A.2 (Design)	Released		1	each
320 Operation_320	OPR00010709	A.1 (Design)	Released		1	each
780 Operation_780	OPR00010710	A.1 (Design)	Released		1	each
1001 Operation_1001	OPR00010711	A.1 (Design)	Released		1	each
940 Operation_940	OPR00010712	A.1 (Design)	Released		1	each
1007 Operation_1007	OPR00010713	A.2 (Design)	Released		1	each
130 Operation_130	OPR00010714	A.2 (Design)	Released		1	each
SPECIFICATION, C...	35514371	J.3 (Design)	Released		1.0	each
WORKCENTER	WORKCENTER	A.1 (Design)	Released		1	each
10 ASSEMBLY	ASSEMBLY	A.1 (Design)	Released		1	each
930 Operation_930	OPR00010715	A.2 (Design)	Released		1	each
TEST SPEC_P425(X...	46674698	A.2 (Design)	Released		1.0	each
WORKCENTER	WORKCENTER	A.1 (Design)	Released		1	each
10 TESTER	TESTER	A.1 (Design)	Released		1	each

Process Plan Overview - Operation

Processing time captured on each Operation

Name	Number	Version	State	Quantity	Unit
46666556	000000328	D.2 (Design)	In Work	1	each
2 Operation_2	OPR00010706	A.1 (Design)	Released	1	each
1010 Operation_1010	OPR00010707	A.1 (Design)	Released	1	each
490 Operation_490	OPR00010708	A.2 (Design)	Released	1	each
320 Operation_320	OPR00010709	A.1 (Design)	Released	1	each
780 Operation_780	OPR00010710	A.1 (Design)	Released	1	each
1001 Operation_1001	OPR00010711	A.1 (Design)	Released	1	each
940 Operation_940	OPR00010712	A.1 (Design)	Released	1	each
1007 Operation_1007	OPR00010713	A.1 (Design)	Released	1	each
130 Operation_130	OPR00010714	A.2 (Design)	Released	1	each
SPECIFICATION, C...	35514371	J.3 (Design)	Released	1.0	each
WORKCENTER	WORKCENTER	A.1 (Design)	Released	1	each
10 ASSEMBLY	ASSEMBLY	A.1 (Design)	Released	1	each
930 Operation_930	OPR00010715	A.2 (Design)	Released	1	each

Attribute	Value
Setup Time	0.0 hr
Queue Time	0.0 hr
Labor Time	0.0 hr
Processing Time	0.23 hr
Waiting Time	0.0 hr
Teardown Time	0.0 hr
Move Time	0.0 hr
Other Time	0.0 hr
Lag Time	0.0 hr

Lessons Learned

What are the key take-aways?

It's all about the DATA

- Ensure data alignment between PLM and ERP dataset
- Analyze all data to discover gaps in data and address the gaps PRIOR to an integration project

Controls / Process

- Close the gaps in process / controls that will allow for future data issues
- ERP permissions
- Proper ECO process

Training

- PTC Windchill MPMLink training for Manufacturing Engineers
- Document the changes in process for all involved parties

Results Achieved – TIME / COST SAVINGS

Amount of resources are significantly reduced as shown below
Is applicable to ~550 engineering change notices per year

Manual Interface			ESI Interface		
6 hrs	CN034201	C185WDZ T4F RELEASE NEW SHEETMETAL COMPONENTS	7 min	CN036321	P185WDO Sheetmetal Release
0.5 hrs	CN034864	Release Remaining Sheet Metal Parts and Update BOM from Virtual Pre-Production for C185 Deutz T4F			
			3 min	CN037106	P185WDO - Update engine drawing and structure engine service parts
2.5 hr	CN035462	C185/P185 Deutz Engine Parts Release	2 min	CN036981	P185WDO - Release Additional Doosan Engine Service Parts
5 hrs	CN034965	P185WDZ T4F BOM Structure	10 min	CN036226	P185WDO Long Lead Part Release
			13 min	CN036315	P185WDO Medium Lead Time Release

13

Results Achieved – DATA INTEGRITY

- **System and Process now ensure DATA INTEGRITY between PLM and ERP**
 - Single source of truth
 - Product Development / Operations working through single process / system
 - Improved controls on Change Management



14

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