

Simplified guide to Windchill and ERP integration

ERP integration enables optimization of processes in an enterprise by introducing bi-directional, automated exchange of information between **PTC Windchill PLM** and an **ERP system**. This allows both acquiring data from ERP, as well as publishing information to it to continue a product's lifecycle. The main goal of such integrations is to decrease project implementation times through eliminating unnecessary operations and the need for manual data entry.

Thanks to solutions such as the Enterprise Systems Integration (ESI) users no longer need to switch between applications to, for example, verify stock quantities of a product or its price. The scope of an integration depends mainly on processes used by an organization. An analysis of existing processes should precede any other integration activities to allow identification of optimal processes and automation of data flow between Windchill and ERP.

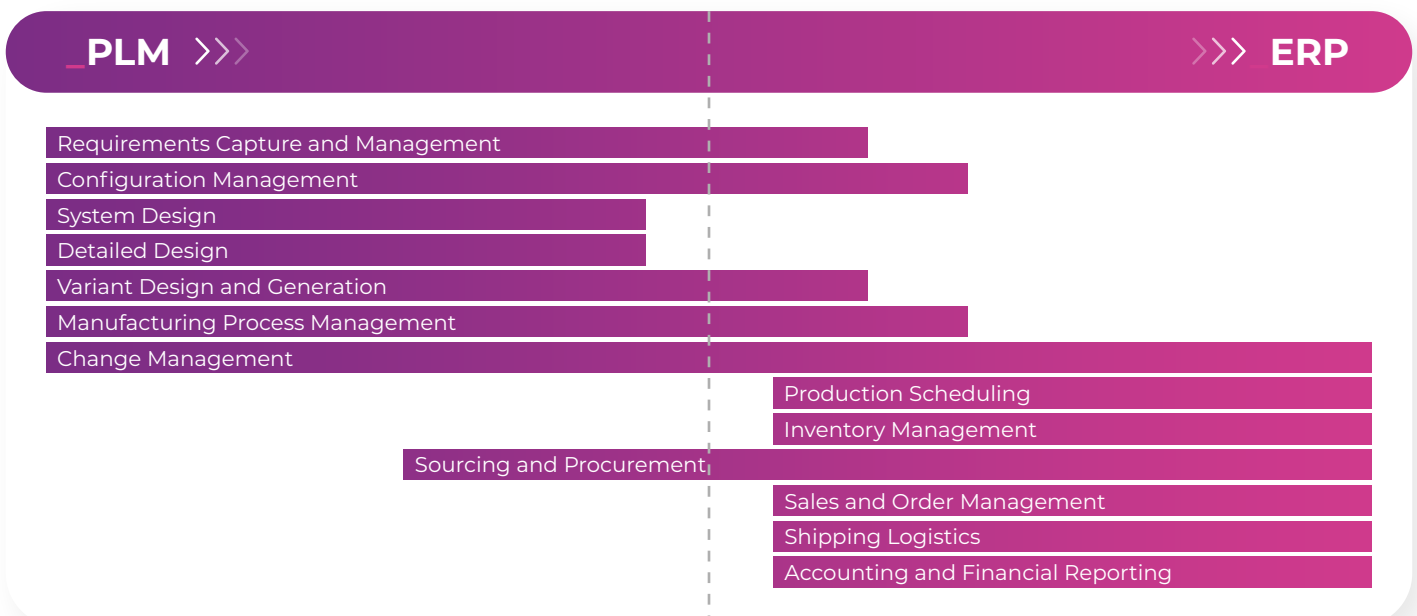
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PLM and ERP play different, complementary roles in product innovation and execution and are being used in conjunction with one another to help companies capitalize on the innovation opportunity.

Jim Brown, Aberdeen

ERP integration overview

PLM-ERP integration links together critical up-stream and down-stream processes and data between classically disparate user groups working in different enterprise systems. Below are some of the typical processes that can span across both PLM and ERP and which can benefit from being integrated:



Common PLM to ERP integration scenarios:

Publication of Engineering Releases

(Product and Process Engineering)

- ✓ Pre-production release
- ✓ Production release

Engineering Query of ERP data, for example

- ✓ Variable cost by plant
- ✓ Quantity on hand by plant

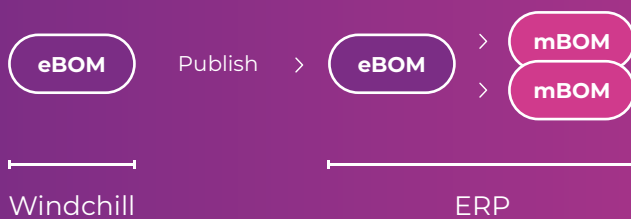
Other Scenarios

- ✓ Change process integration
- ✓ Reserve new part numbers in ERP

PLM to ERP BOM transfer scenarios

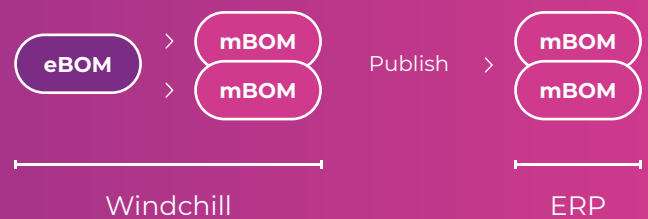
Only eBOM in Windchill; mBOM only in ERP

- Changes must be manually propagated



mBOM in Windchill, transferred to ERP

- Enables eBOM-mBOM associativity
- Often one view per plant



PLM and ERP common business objects

- Parts
- Documents
- Bills Of Material
- Change Notices
- Process Plans:
 - ✓ Operations
 - ✓ Sequences
 - ✓ Process Materials
 - ✓ Skills
 - ✓ Tooling

Windchill

- Change Notice
- Part
- Document
- EBOM
- MBOM
- Work Center
- Process Plan
- Sequence
- Operation
- Tooling
- Process Material
- Skill
- Work Instruction

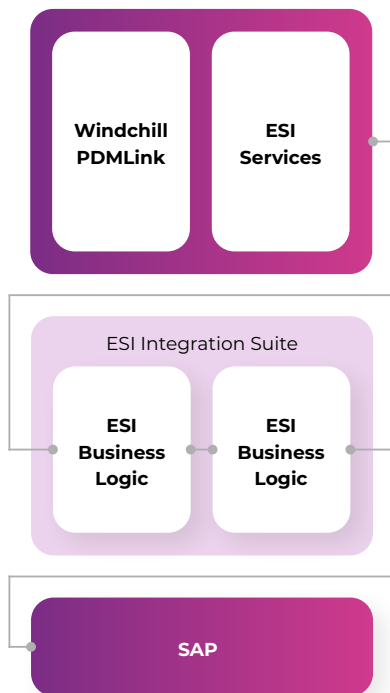
ERP

- Change Master
- Material/Item
- Document
- BOM
- BOM
- Work Center
- Routing
- Sequence
- Operation
- Tooling
- Process Material
- Skill
- Document

Windchill to ERP integration options

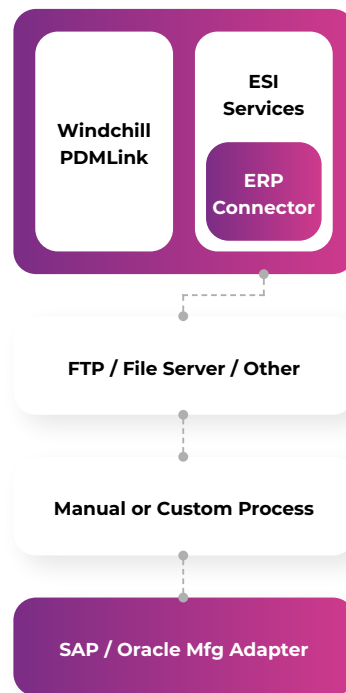
ESI / TIBCO

- ✓ Complete solution with implemented bi-directional, closed loop integration processes for transferring business objects along with their changes with end-to-end enterprise transaction management and error handling.
- ✓ Preferred for SAP and Oracle Manufacturing.



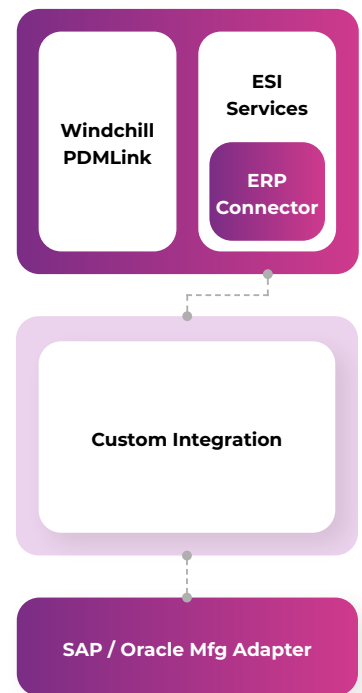
ERP Connector

- ✓ Windchill framework allowing publishing product data on product release to XML format.
- ✓ Uni-directional, open-loop mechanism.
- ✓ Can be a starting point for integration but a lot of work is required to implement creating / updating / deleting objects in SAP as well as transaction / feedback mechanism, error handling etc.
- ✓ Preferred for other ERPs.



Custom

- ✓ Completely custom option is also possible if above doesn't match needs but it's very unlikely.
- ✓ Preferred for custom scenarios (e.g. when on product release is not required).



ESI advantages

Complete solution

- ✓ Implemented integration business logic:
 - OOTB support for Parts, BOMs, CNs, Process Plans and Resources.
 - Data mapping and transformation from PDMLink format to SAP / Oracle Mfg format.
 - Logic around business objects creation and modification in SAP / Oracle Mfg.
 - Defaulting of SAP/Oracle Mfg object values (those that are required in SAP/Oracle Mfg but not provided in PDMLink).
- ✓ E2E transaction management and error handling.
- ✓ Support is handled via PTC tech support.

Mature solution with best practices from the market

- ✓ On the market for around 15 years and has more than 500 implementations (according to PTC) world wide.
- ✓ Incorporates best practices from market experience.

Faster implementation

- ✓ No need to start from scratch but rather tailor the solution for customer needs so it takes less time to implement.

ESI disadvantages

Additional license required for:

- ✓ ESI product (includes Tibco software cost).

Additional middleware is required (Tibco ActiveMatrix Business Works)

- ✓ Additional skills to handle administration and monitoring are required.

Windchill Enterprise Systems Integration (ESI)

Windchill Enterprise Systems Integration (ESI)

- ✓ Module for Windchill PDMLink
 - Ensures information synchronization with downstream manufacturing systems such as ERP
 - Flexible configuration allows release of all pertinent business objects
 - Reliable closed-loop transaction management
 - Advanced administrative tools
 - Efficient user model
- ✓ Turnkey solution for SAP and Oracle Apps
- ✓ Simplified implementation for other ERP systems



Built on powerful, reliable
middleware technology (Tibco)

Open, **Standards-Based**, architecture for use
with other EAI vendors

Windchill ESI Features

1 Pre-built Release-to-Manufacturing Capability (OOTB Functionality)

- Publishes Parts, BOMs, Documents, ECNs, Substitutes, Alternates, Line Numbers, Reference Designators when supported by the ERP system
- Publishes Process Plans and Resources
- Supports date, serial and lot effectivity
- Provides ERP data query for cost and inventory
- Business Logic, User and Admin GUI's, Process Workflows Included
- End-to-end transaction integrity
- Technology enables bi-directional exchange
- Multi-Organization, Multi-ERP capability is built in

2 Built-In Industry-Leading EAI Tool

- TIBCO Business Works and Adapters are included as part of ESI.
- PTC handles sales, service and support needs for Windchill ESI.
- GUI Administration and Development Environments

ESI Modular Architecture



3 Enterprise transaction management and error handling

- ESI publication is a closed loop process encapsulated by a transaction.
- Transaction traces publication status all the way down to creation/modification of business objects in SAP.
- Transaction contains a status for each business object for each distribution target (eg. SAP Plant).
- Transaction statuses are returned back to PDMLink and are available to users from the UI.
- Transaction statuses contain information returned from SAP BAPI invocation.
- Errors from the entire integration process are handled and returned to transaction status in Windchill on a per object basis.

Windchill to SAP integration remarks

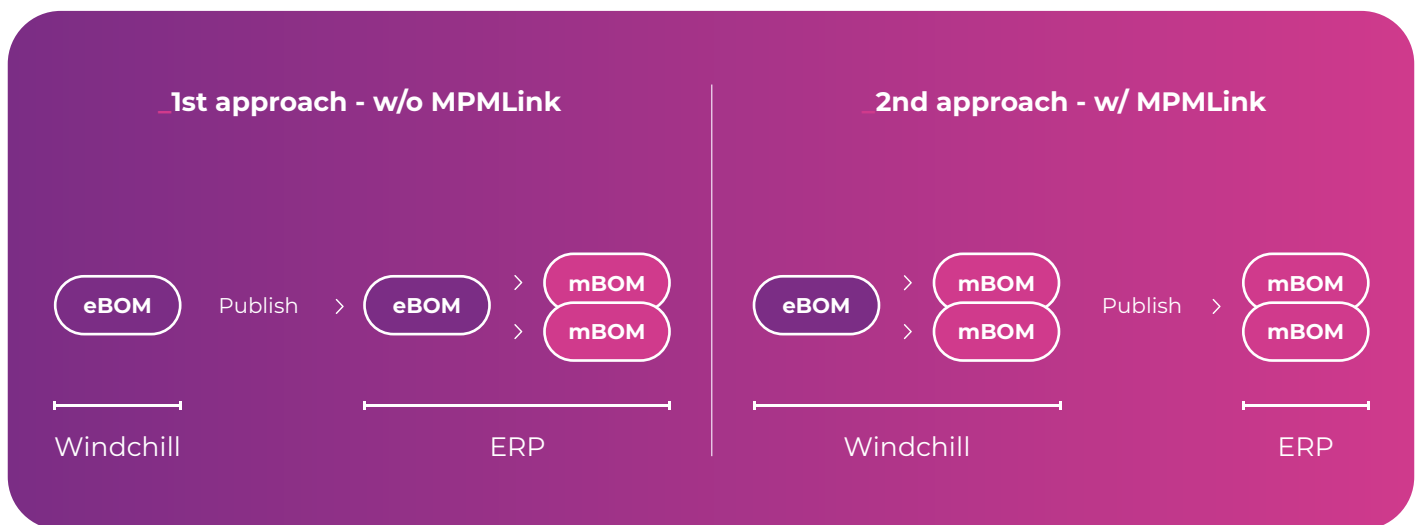
eBOM vs. mBOM publishing

Windchill ESI can send both plant-independent general eBOM as well as mBOMs which correspond to specific plants in SAP. It depends on how data is organized in Windchill and where BOM transformation is suppose to happen (Windchill/SAP).

There are 2 recommended scenarios:

- 1 Windchill eBOM is mapped to SAP eBOM. EBOM is transformed to multiple plant-specific mBOMs in SAP.**
- 2 eBOM is transformed to plant-specific mBOMs in Windchill and plant-specific mBOMs are sent to SAP.**

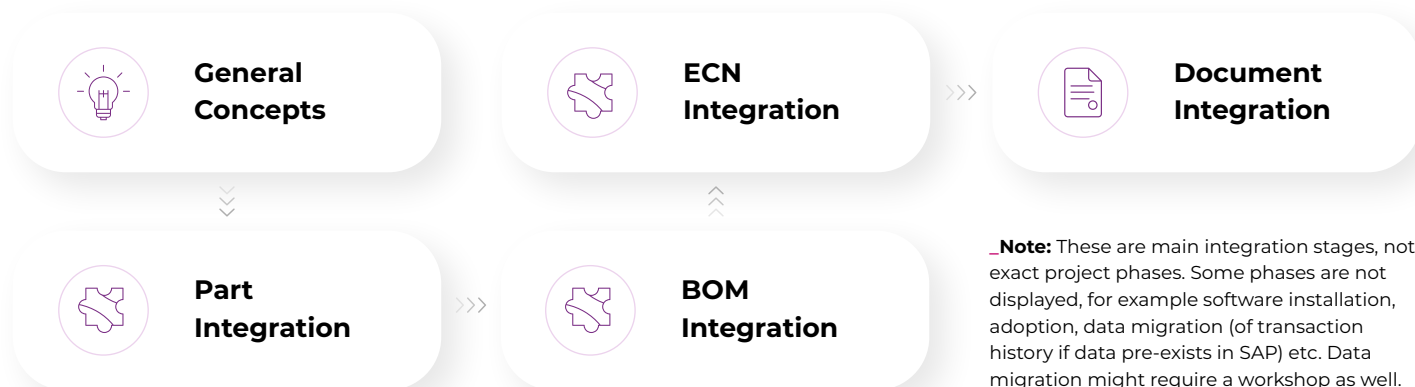
- Windchill supports plant-specific part versions which allows creating plant specific mBOMs.
- In recent Windchill ESI releases (11.2) there were improvements done around plant specific attributes for parts.
- There might also be cases where both eBOM and mBOMs are transferred to SAP – for example parts might be transferred to SAP at an earlier stage, followed by releases of plant-specific mBOMs.
- It's recommended to publish BOMs from Windchill 1:1 regardless whether it's eBOM or mBOM. It is discouraged to include eBOM to mBOM translation logic inside integration code as trace between BOMs will be lost.



Integration working methods

Windchill Enterprise Systems Integration (ESI)

- ✓ PSC strongly recommends a workshop driven, prototype based, agile-iterative approach when building integration to SAP.
- ✓ This means, that we recommend to:
 - Divide project into smaller functional areas (part, BOM, ECN etc.).
 - Do not scope and design everything at the beginning but rather design general concepts and then detail
 - Install Tibco software as soon as possible in the target infrastructure and prototype against customer's SAP, which might have customization. This also enables early creation of data in customer's SAP instance (e.g. material masters) so customer can see what is missing, what is invalid and give early feedback.
- ✓ Project starts with initial requirements workshop 1-3 days after which we draft fist solution concept with high level solution approach for main areas (what is released, what triggers, what type of BOMs, etc) and some ROM.
- ✓ Following workshops are scheduled to detail further integration areas:
 - Part integration
 - BOM integration
 - ECN integration
 - Document integration
- ✓ After each workshop each area is detailed (data mappings, business logic, etc) and we start implementation early.



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PSC advantages in integrations of PTC software



TT PSC (both as a PTC partner and independently) has been involved in **more than 100 integration projects** between different PTC software solutions



These include **more than 10 Windchill and SAP integration projects** for big and medium size PLM deployments



We have **complete ESI for SAP infrastructure** available locally so we can do research on our sandbox



16 years of experience



Used both **ESI for SAP** (with Tibco) as well as **ERP Connector** for integrating Windchill with SAP



The **official partner** of PTC

They trusted us:



Let us be your guide on the road to **digital excellency**

Contact us!

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