AUTODESK. UNIVERSITY

Automatic Feature-Based CAD Conversion into Inventor

Ben Baker

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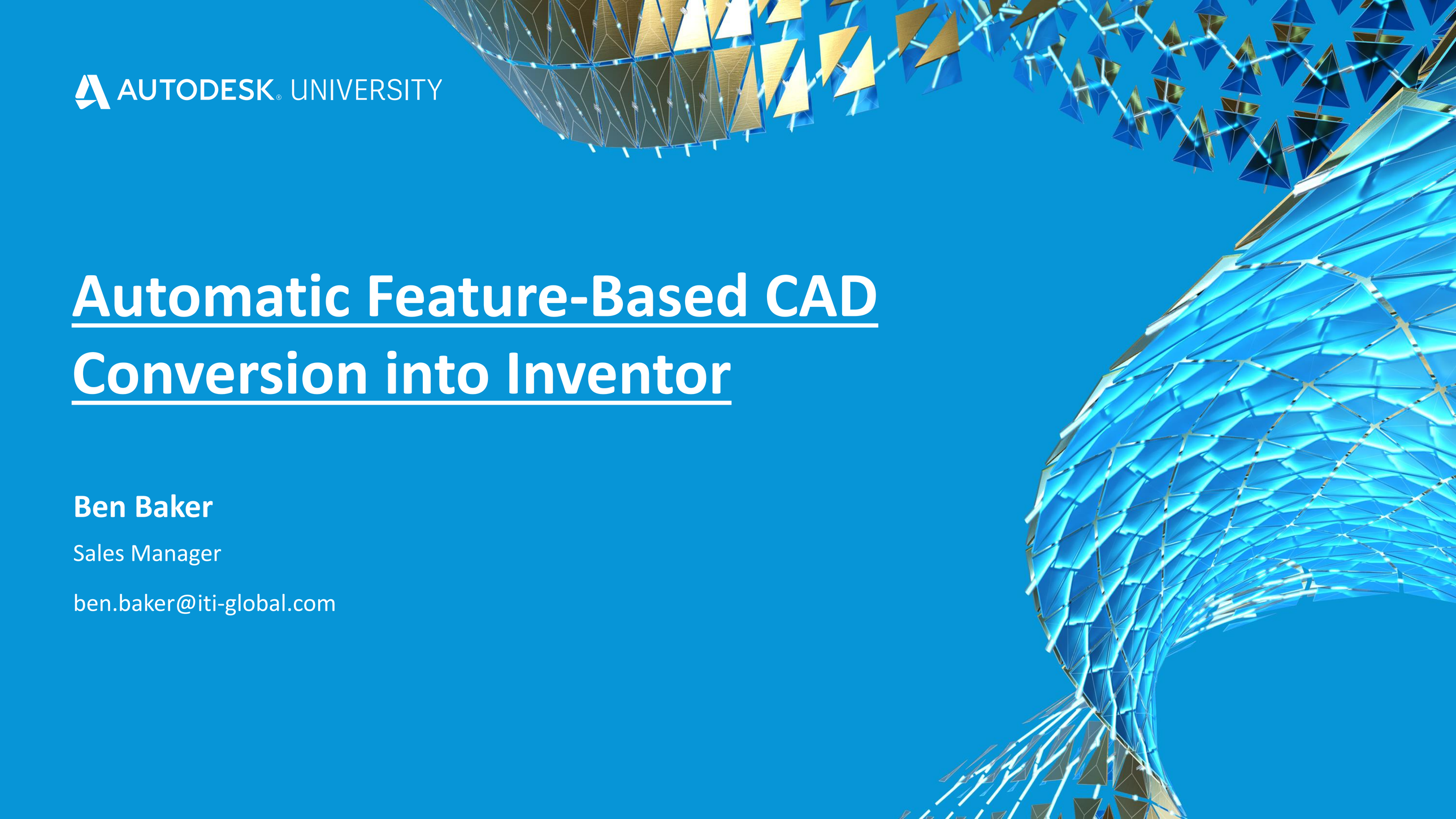

Ben Baker

- UK Business Development Manager at ITI
- Feature Based Conversion/Migration (SME) Subject Matter Expert
- 5 Years Software Sales
- 3 Years Feature-Based CAD Interoperability Solutions Consulting & Sales
- Cambridge, UK

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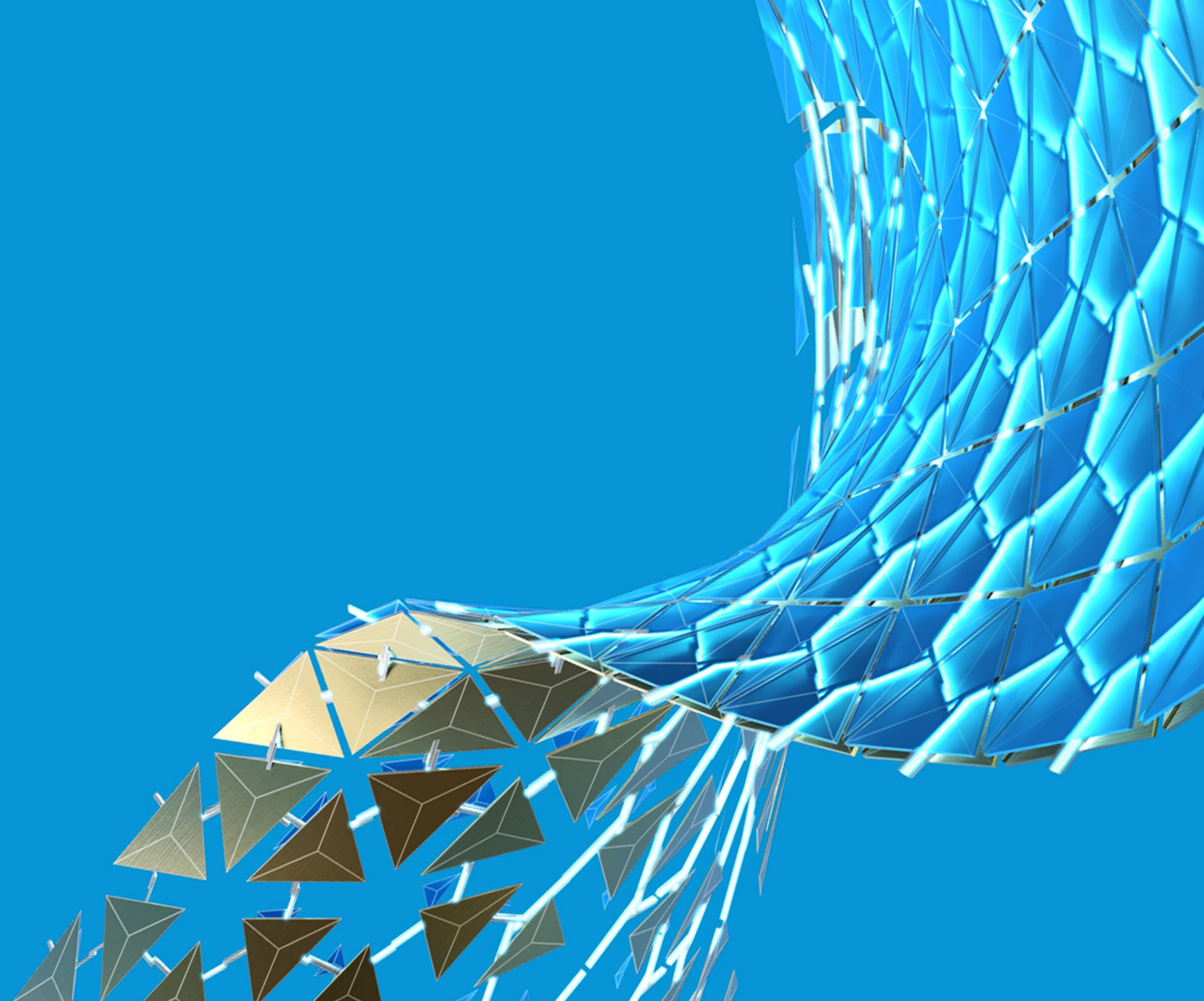
Agenda

- About ITI
- CAD Conversion Trends & Project Essentials
- Understanding Featured-Based Conversion Technology
- GoToINVENTOR Migration Solution
- Conversion Services Case Studies
- Conclusion

About ITI



International TechneGroup

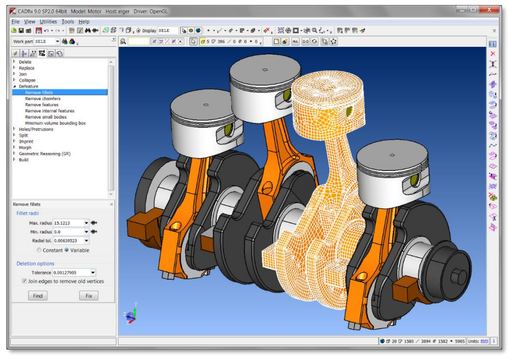
ITI solves complex product data interoperability problems, so that our customers can focus on making great products.

Customer Initiatives	ITI Solutions	Locations
Model Based Enterprise	Conversion	Milford, Ohio USA (HQ)
Product Lifecycle Mgt.	Integration	Cambridge, UK
Advanced Simulation	Validation	Munich, Germany
Digital Manufacturing	Migration	Tel Aviv, Israel
		Bologna, Italy

Founded in 1983 | Private U.S. Corporation | 130 Employees

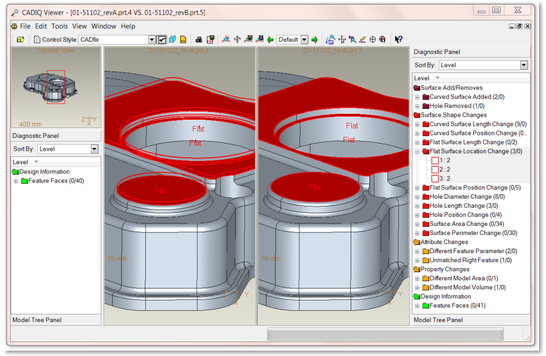
CAD/CAM/CAE Interoperability Products

Proven solutions for product data interoperability



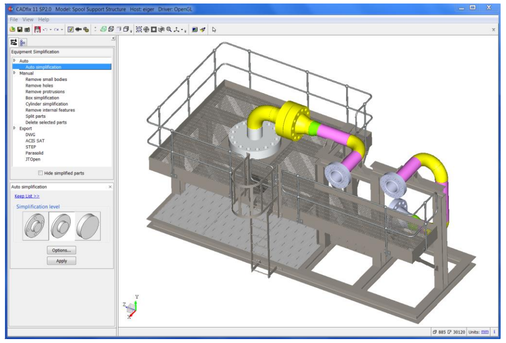
CADfix

- Simplification and de-featuring
- Complex geometry translation
- CAE model preparation



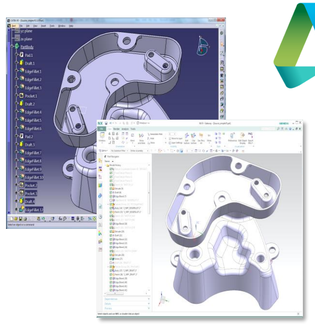
CADIQ

- Compare and validate CAD models
- Validate for MBD and PMI
- Identify quality defects
- Advanced reporting and analytics



CADfix PPS

- Reduce file size
- Protect intellectual property
- Quick integration for plant design



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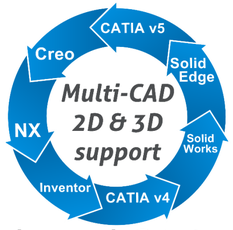
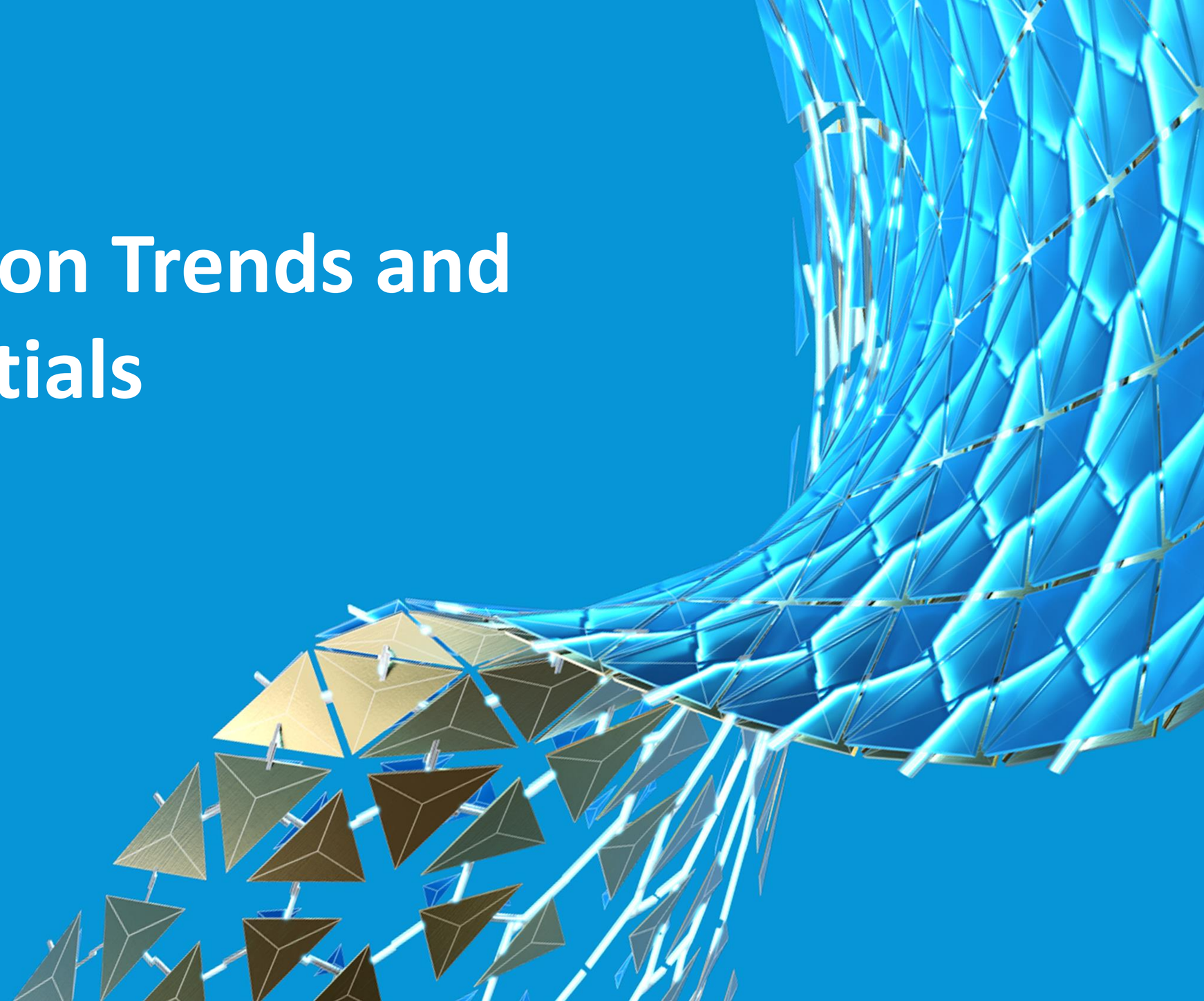
GoToINVENTOR

Powered by Proficiency



- 3D/2D Automated feature-based CAD conversion
- CAD migration for consolidation & standardization
- Preservation & re-use of your legacy CAD data

CAD Conversion Trends and Project Essentials



Market Trends For CAD Conversion

- Global PLM Migration
  - A new PLM solution implementation or system change driven by corporate standardization
  - CAD conversion requirement driven by standardization on the CAD format associated with the new PLM system
- Global CAD Harmonization/Consolidation
  - Corporate standardization on a single CAD format
  - Departure from a multi-CAD environment

- Corporate Acquisitions/Mergers
  - Acquisition of a company utilizing a CAD system that does not align with the corporate CAD solution
  - Converting and preserving the design intellect to align with corporate CAD standard
- Supplier Delivery or Design Acquisition
  - Parametric CAD data delivery requirement to a customer or supplier
  - Purchase of design data that is required to align with a company's corporate CAD solution

Project Essentials

Common Project Requirements:

- **RE-USE** of design data in the new CAD format *(feature content, parametric, modifiable data)*
- Preservation of design investment that was made in the legacy system
- Preservation of intellectual property
- Defining what CAD data will be converted with features *(what data is candidate for design reuse?)*
- Defining what CAD conversion methods will be used in the conversion process
- Identification of any conversion functionality/technology gaps in the conversion process
- Determining and defining any post-conversion processing requirements
- Ensuring the conversion will support any PLM requirements
- Establishing the project time-line
- Calculating the cost of conversion

CAD Conversion Options

Common conversion methodologies

BREP Conversion

Pros	Cons
• Economical • Fast & effective • Ease of use	• Loss of a company's investment in design intellect • Promotes internal re-mastering of previously created designs • Provides little to no data reuse in new system

Manual Re-Mastering *(internal or off-shore)*

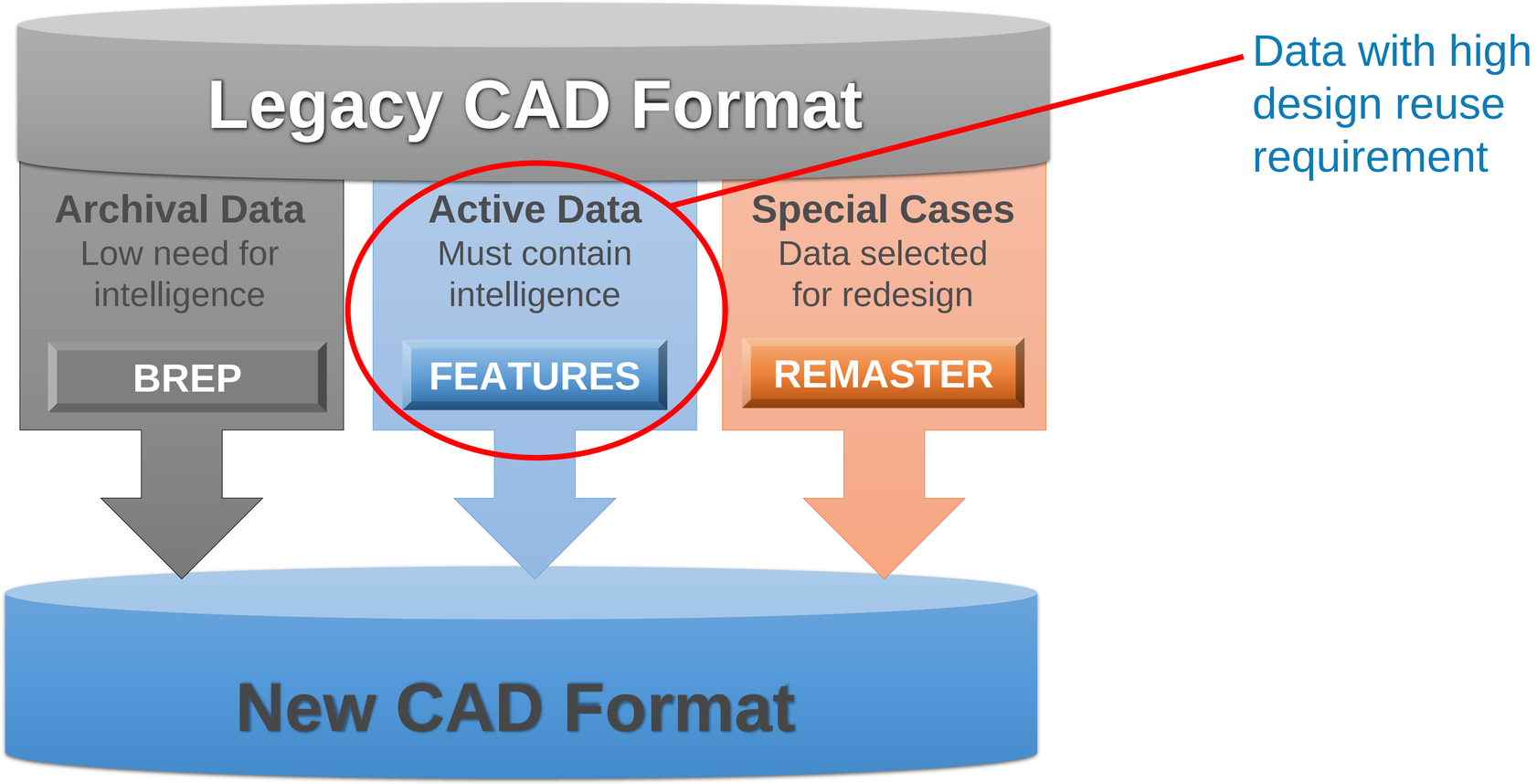
Pros	Cons
• Preservation data intelligence • Creation of new design methodology • Use of new systems functionality	• Slow process • Labor costs = **Expensive** • Model quality control

Feature Based Conversion

Pros	Cons
• Economical vs. Manual • Shorter migration/conversion period • Preservation of model intelligence	• Non-support of unique methods • CAD system API incompatibility • Model structure and function vs. newly created model

Project Conversion Methods

A CAD conversion project often utilizes a combination of methods based on the reuse requirement



Proven Project Strategy

Path to a successful mass conversion project

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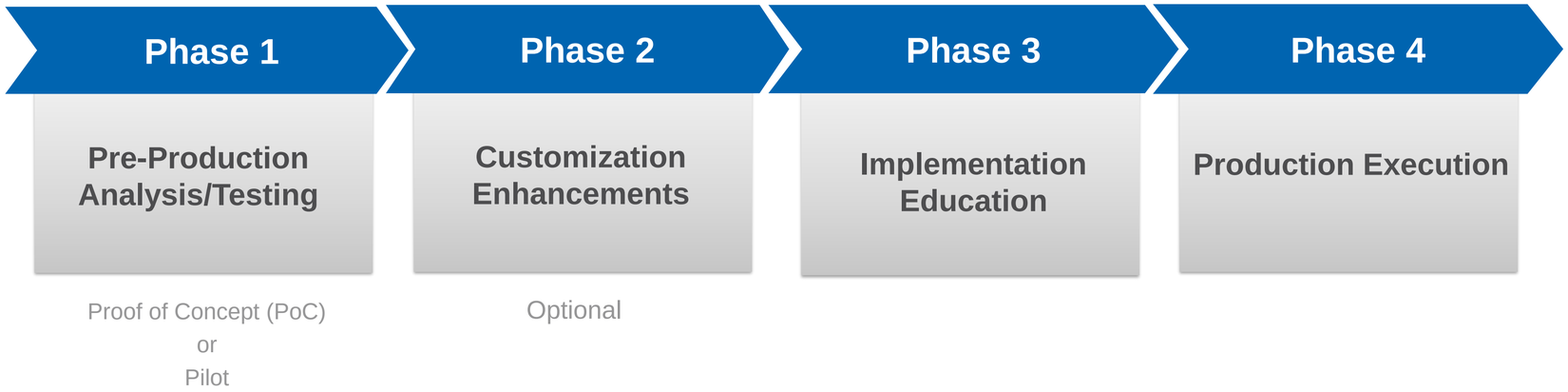


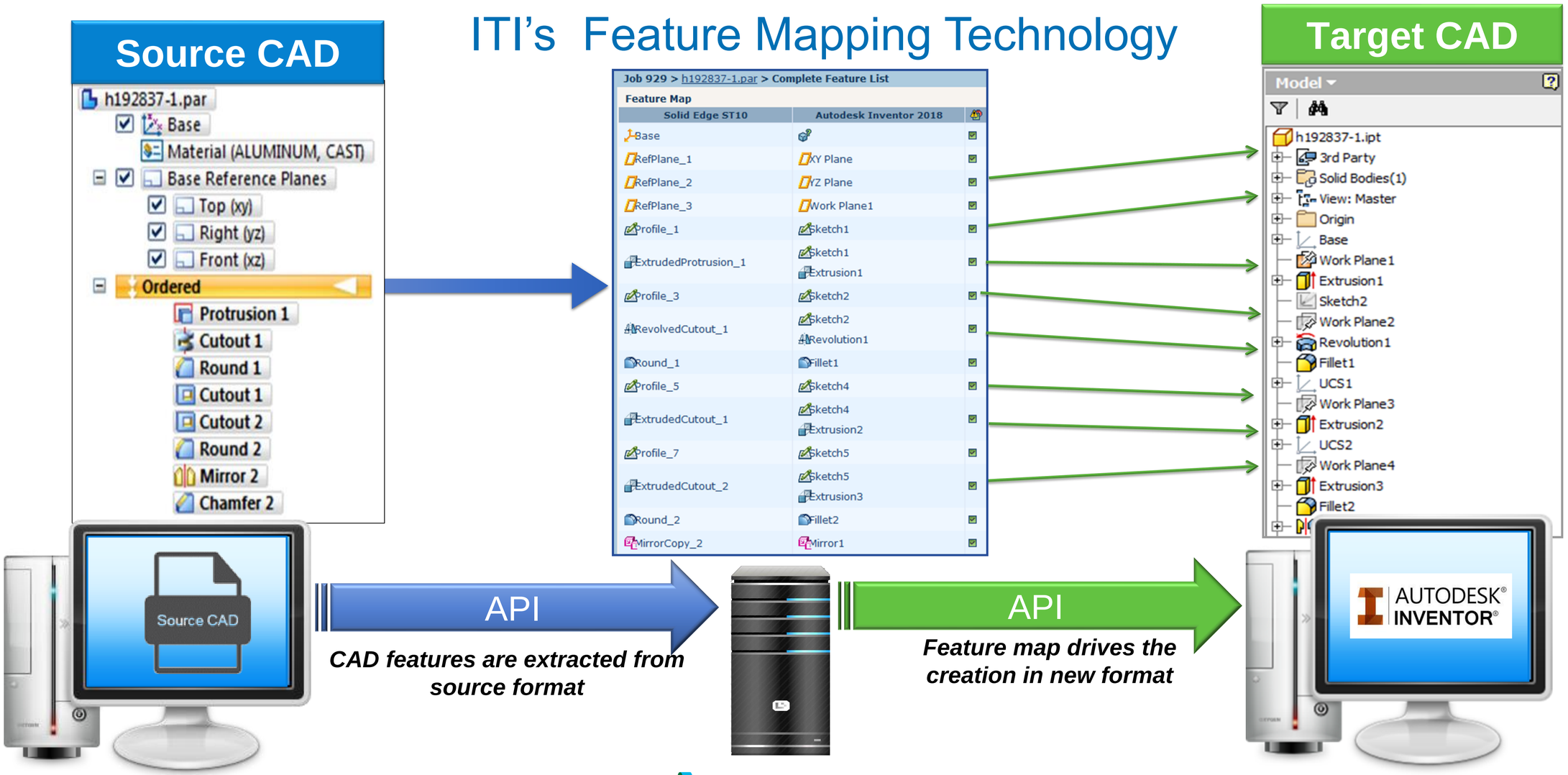
ITI has developed a proven methodology to identify and support a company's specific requirements to ensure a successful migration.

The Conversion Automation Technology

AUTODESK®

GoToINVENTOR

Understanding The Technology



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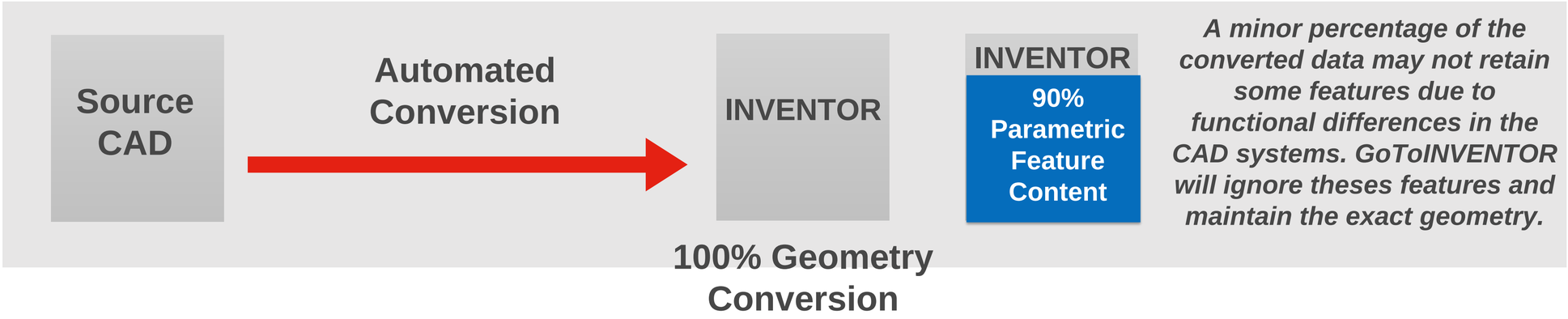
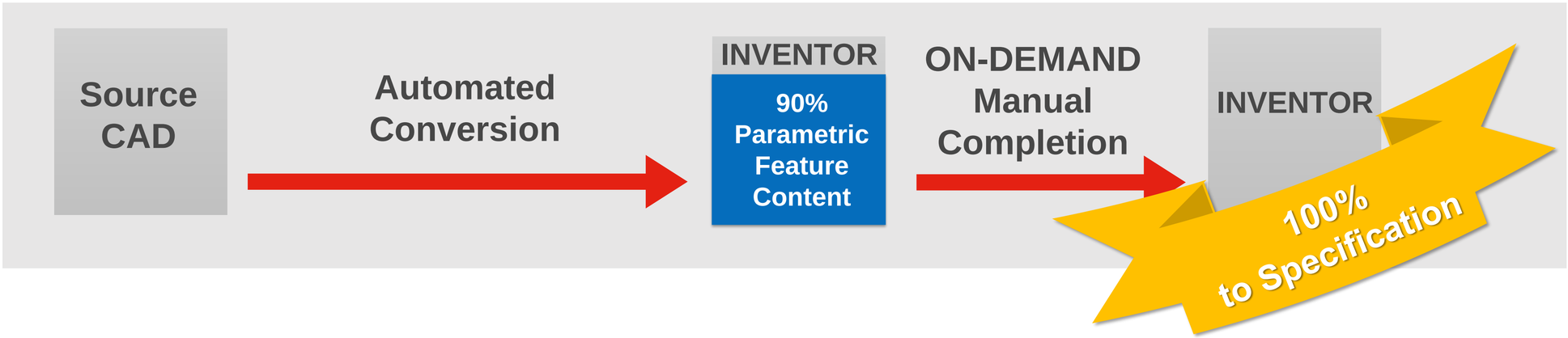
The Common Conversion Process

Fully Automated Process



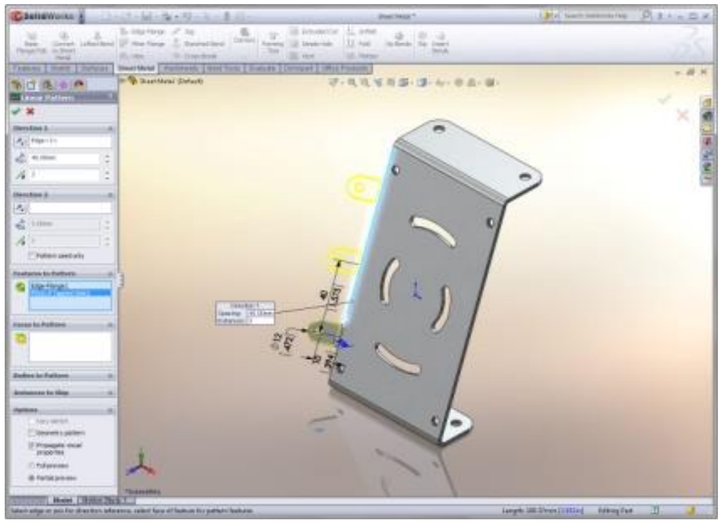
Automated Processing with Completion



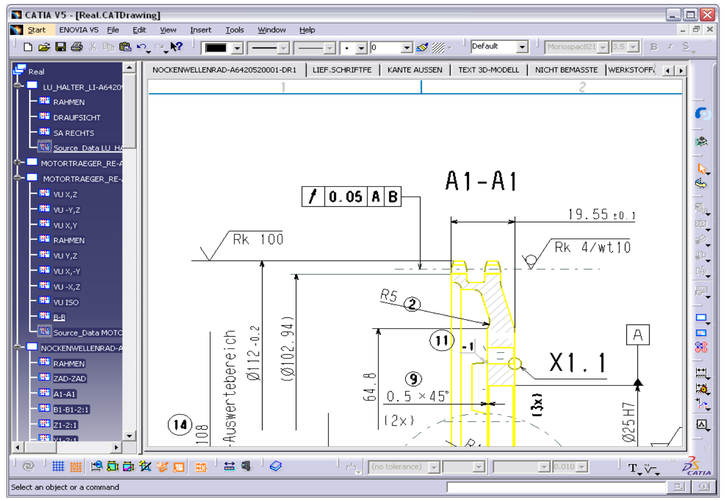
Technology Challenges

There are proprietary toolkits and design functions that are unique to CAD systems that present a challenge in the feature based conversion process

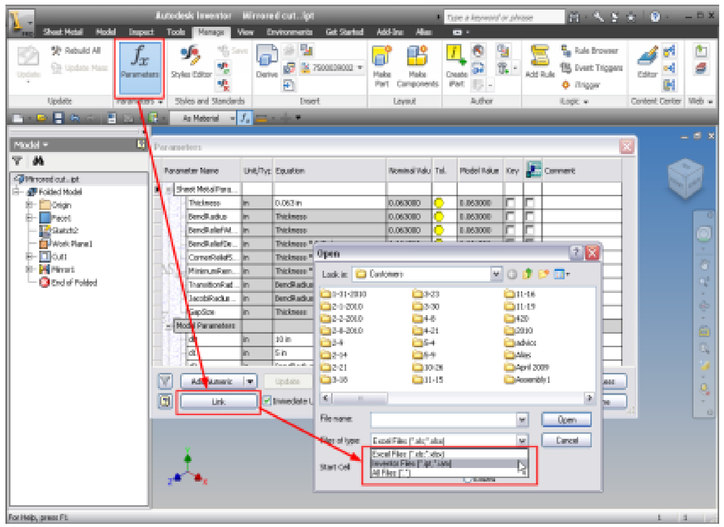
Sheetmetal



Associative Drawings



Family Tables



There are several options and methods to address these common challenges

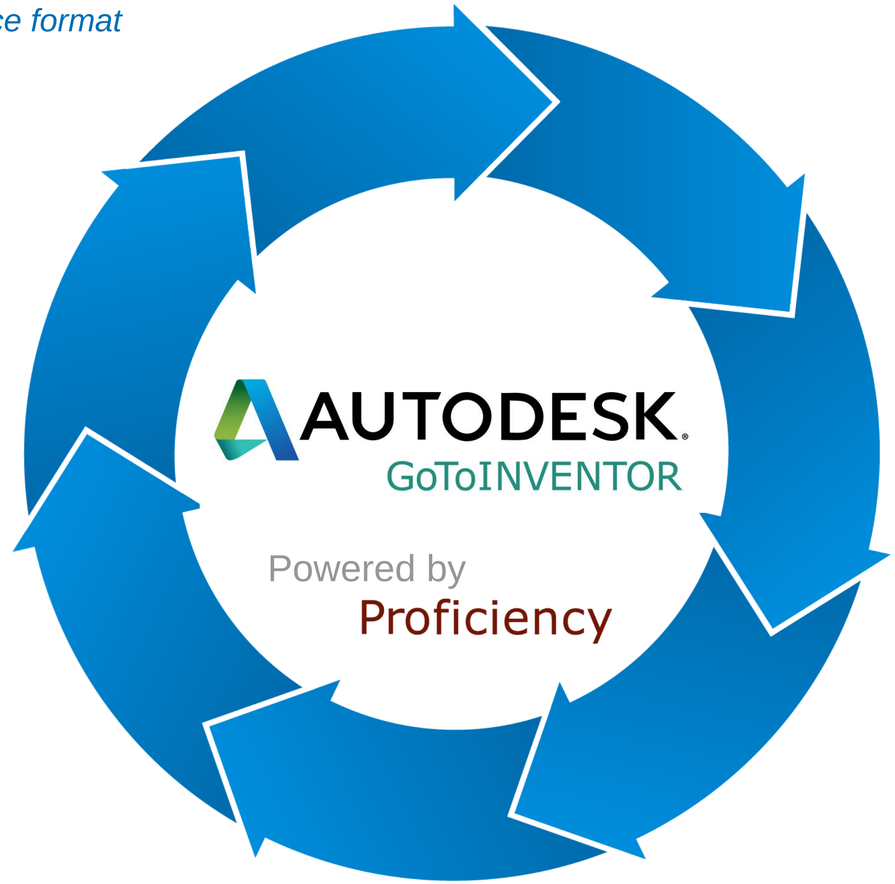
These are supported by GoToINVENTOR, with some limitations

GoToINVENTOR Migration Solution

GoToINVENTOR

GoToINVENTOR IS the only feature based conversion software that supports Solid Edge as a source format

- Solid Edge
- CATIA V5
- NX
- Creo
- SOLIDWORKS



- INVENTOR

Partnership History

AUTODESK. GoToINVENTOR

- November 2017: Engaged by Autodesk to assess ITI's feature based conversion technology as part of a competitive technology assessment of feature based software tools available in the marketplace
- January 2018: Autodesk determines that ITI's technology is most technologically advanced commercially available software solution for automated feature based conversion
- 2018: ITI participates at AU Darmstadt and AU Vegas premiering GoToINVENTOR

  ITI partners with Autodesk in advancing the functionality of the GoToINVENTOR
- 2019-2020 ITI successfully executes multiple software sales and conversion service projects for GoToINVENTOR

  ITI partners with multiple Platinum/Gold reseller to market GoToINVENTOR to their customers

  ITI and Autodesk develop a joint marketing plan including the creation of collateral to support Autodesk's CAD harmonization and competitive displacement strategy

  ITI will participated at AU London, AU Darmstadt and AU Vegas Now AU Virtual Event

  Now competed many successful conversion projects

ITI

GoToINVENTOR Advanced Tools For Migration

Conversion Project Analytics

AUTODESK. GoToINVENTOR

GoToINVENTOR Legacy Database Auditor

EXAMPLE:

~94% of part features supported

=

~89% of models converted fully parametric

Supported Feature Type

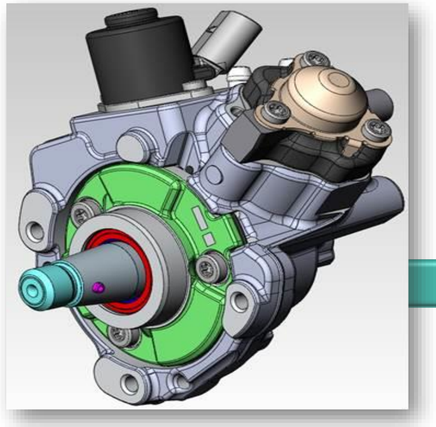
Unsupported Feature Type

An audit can provided valuable information for the portion of the legacy volume that is being processed with GoToINVENTOR.

ITI

Re-Use Functionality

Source CAD Assembly



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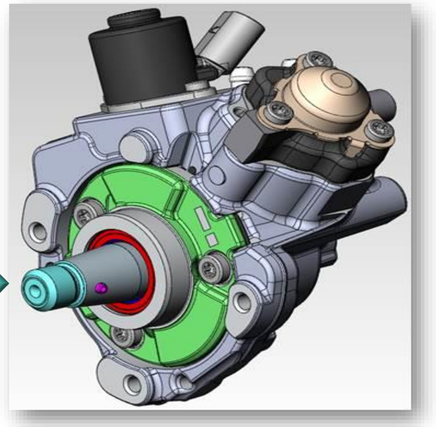
Previously Converted Part Library

Converted CAD Assembly



Example:

- 25 Parts in Assembly
- 10 Part Previously Converted
- 15 Unique Parts

Result:

- 10 Parts Used from library
- 15 Unique Parts Converted
- Assembly created

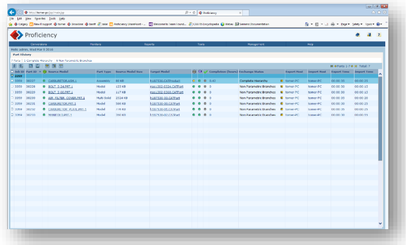
Conversion Reuse – system keeps track of converted parts.
Parts that are used in multiple instances are ONLY converted once!

Existing Inventor standard parts can be added to the GoToINVENTOR re-use library of mapping table instead of converting old standard parts

Advanced Migration Support

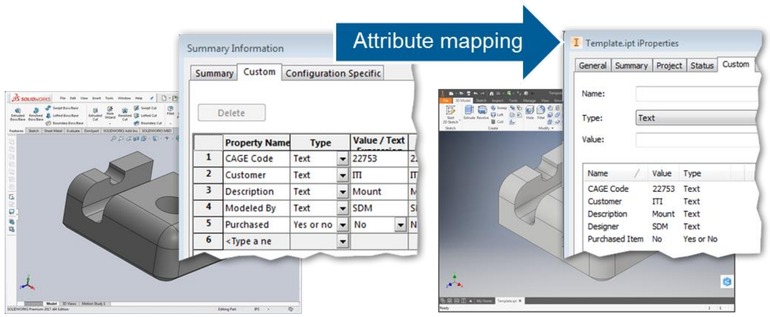
File Naming/Renaming

- In the conversion process the technology can rename the converted files
  - PLM migrations
  - New part naming standards



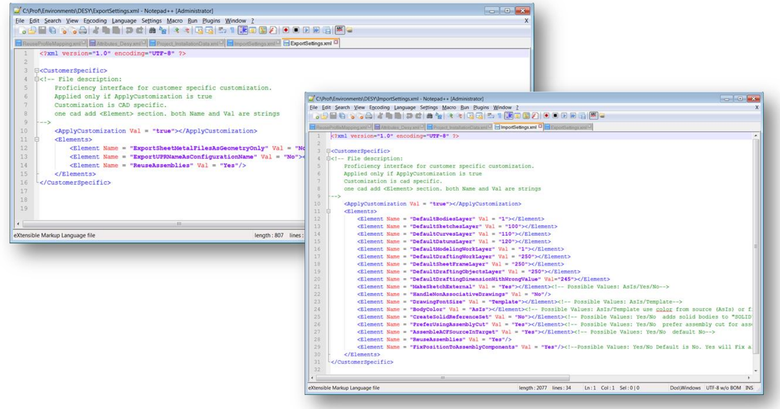
Attribute Mapping

- Attributes be mapped via property mapping table
- Properties can be deleted, renamed and concatenated
- Properties can be loaded from external XML file

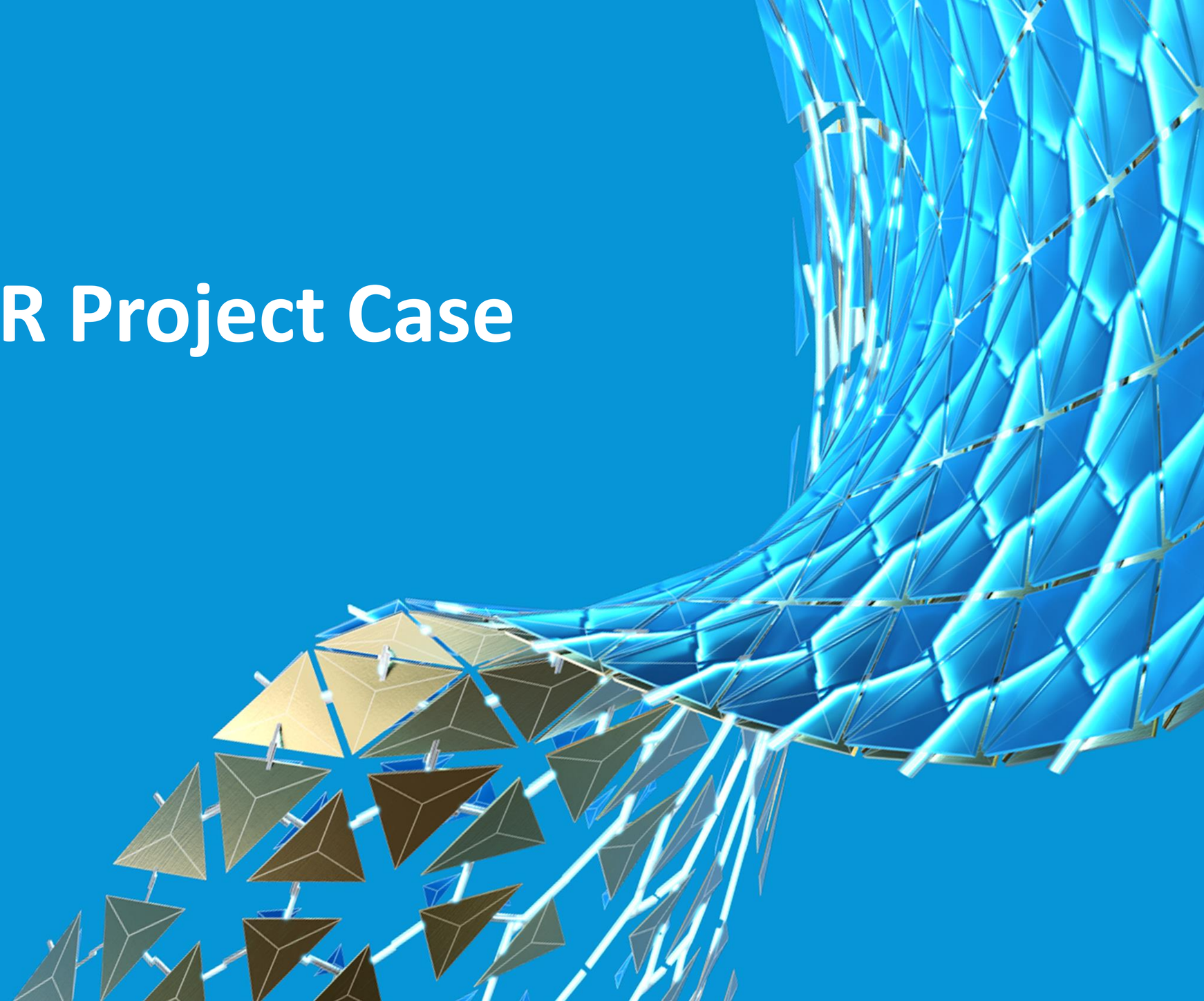


Customer Specific Environment Support

- Support customer environment files
- Support customer start part and drawing templates



GoToINVENTOR Project Case Studies



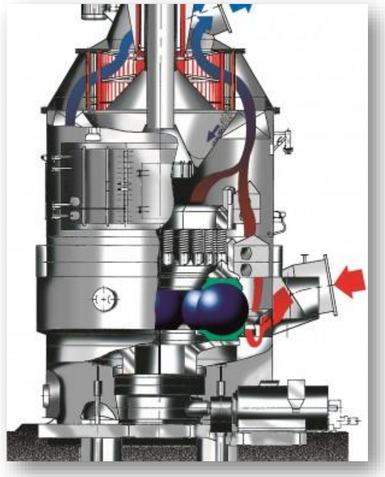
Conversion Service - Case Study

Project Summary:

- Business: Industrial Machinery
- Location: Germany
- Project Requirement: Customer acquired external equipment designs to add to their product line.
  Customer is standardized on Inventor. The acquired SolidWorks design data must be converted to INVENTOR.
- Legacy CAD format: SolidWorks
- Target CAD format: INVENTOR
- Source PLM system: File-based
- Target PLM system: VAULT
- Conversion volume: (1) project

Assemblies:	1,500
Parts:	4,000
Drawings:	6,000

- Success: Executed (3) projects with ITI in 2019



Conversion Service - Case Study

Project Summary:

- Business: High Precision Design Engineering
- Location: Switzerland
- Project Requirement: CAD harmonization project to support of their company's standardization on INVENTOR and VAULT
- Legacy CAD format: SolidWorks
- Target CAD format: INVENTOR
- Source PLM system: File-based
- Target PLM system: VAULT
- Conversion volume:

Assemblies:	6,000
Parts:	25,000
Drawings:	19,000

- Success: Converted the entire legacy volume in 6 weeks, while the customer was working in an active CAD environment.

  Executed a delta conversion of any data that had been modified over a weekend, then the data was migrated into VAULT

Mass conversion summary

Mass conversion facts:

- No automated conversion methodology will provide 100% functionality of the legacy data.
- A successful migration should seek to preserve much of the legacy data's intellectual property and provide the highest level of reuse in the new system.
- In a mass migration project, methods and processes must be implemented to support any critical functionality gaps.
- The value proposition in this process is to use automation to minimize internal or off-shore remastering of data.
- An assessment of the legacy database helps to determine what data has the requirement for reuse, what data has limited reuse value and what data that should be relegated to an archival status.

Conclusion

AUTODESK.
GoToINVENTOR

- Support for CAD system harmonization, consolidation and standardization
- Preservation of intellectual property
- Re-use of legacy designs in Inventor
- **Automation provides up to a 75% cost savings vs. manual remastering**
- Data quality assurance
- ITI project experience, expertise and success world-wide
- Millions of CAD objects converted with ITI‘s automation

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