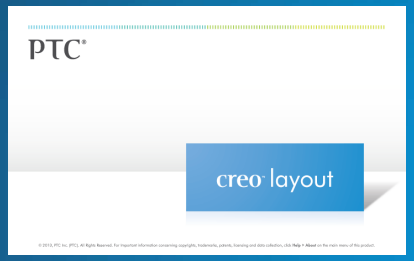
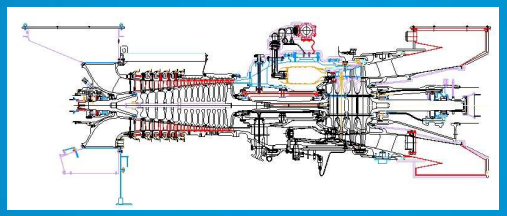
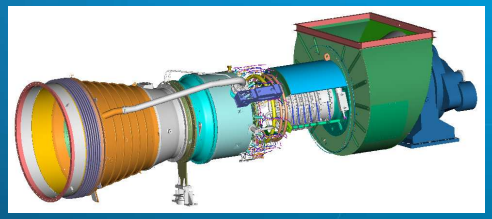
PTC® Live Global

PTC Creo Layout to the Rescue!

Who Says PTC Software Can't Manage 2D Design Data?







Matt Burr

Solar Turbines
CAD Support Analyst
6 Sigma Black Belt

About Solar Turbines Incorporated

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- Headquartered in San Diego, California, USA, Solar Turbines Incorporated
- Subsidiary of Caterpillar Inc.
  - One of the world's leading manufacturers of industrial gas turbines, with more than 14,500 units and over 2 billion operating hours in 100 countries.
- Solar Turbines' products include gas turbine engines
  - Rated from 1590 to 30,000 horsepower
- Gas compressors, and gas turbine-powered compressor sets mechanical-drive packages and generator sets
  - Ranging from 1.1 to 22 megawatts

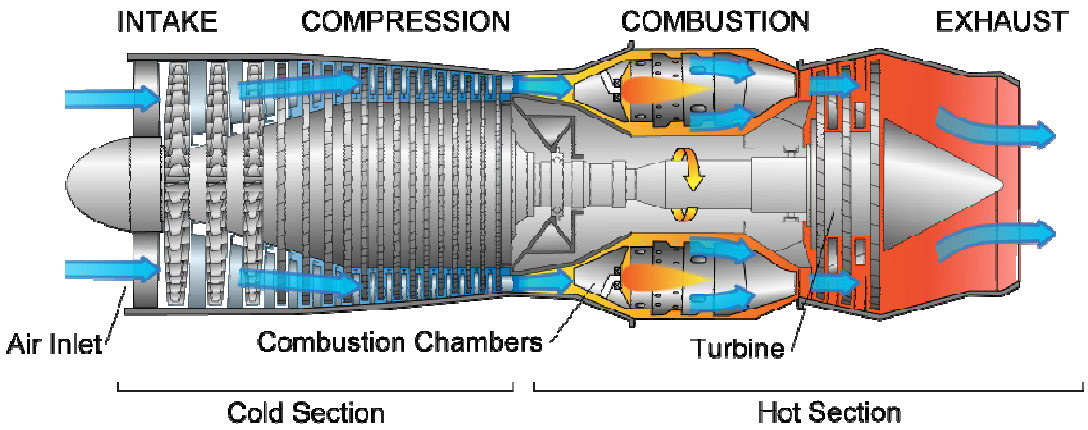
- Solar's customers put the company's products to work in many areas
  - Production
  - Processing and pipeline transmission of natural gas and crude oil
  - Generation of electricity
- Solar Turbines employs more than 7,000 employees

Current PTC Creo Environment:

- *PTC Windchill 10.1 M020*
- *PTC Creo 2.0 M120*
- *PTC Creo View 3.0*

What is a Gas Turbine Engine?

- A gas turbine engine is a type of internal combustion engine. Essentially, the engine can be viewed as an energy conversion device that converts energy stored in the fuel to useful mechanical energy in the form of rotational power. The term “gas” refers to the ambient air that is taken into the engine and used as the working medium in the energy conversion process.
- This air is first drawn into the engine where it is compressed, mixed with fuel and ignited. The resulting hot gas expands at high velocity through a series of airfoil-shaped blades transferring energy created from combustion to turn an output shaft. The residual thermal energy in the hot exhaust gas can be harnessed for a variety of industrial processes.



What is a typical design process?

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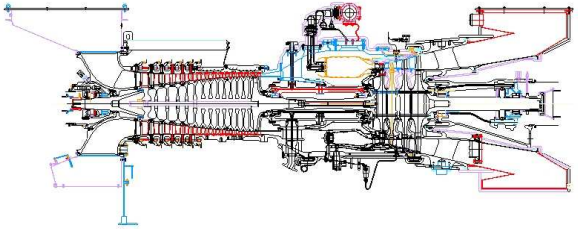
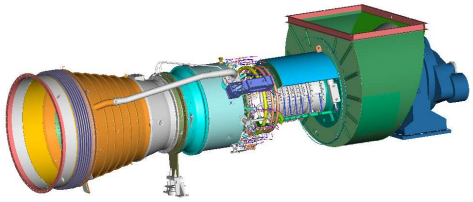
- Design starts in 2D
  - AutoCAD Drawing
  - CADDS5 2D Drawing



- 3D Models are created and analyzed from the 2D Design

IGES, STEP, …
2D to 3D Conversion



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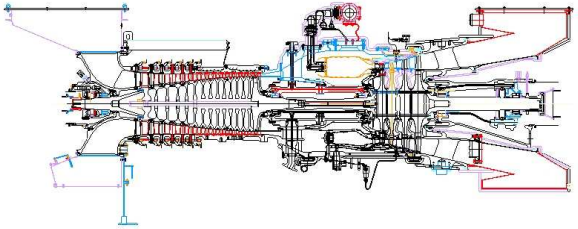

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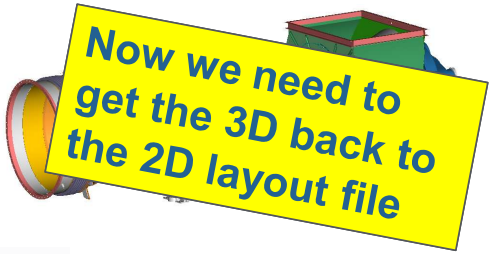

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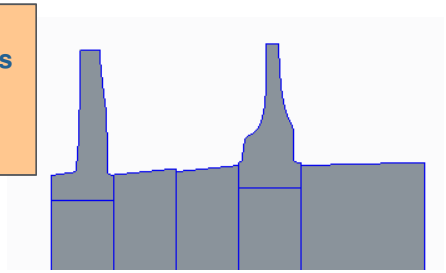
Because parts are out of plane and silhouette edges are required for certain shapes, 2D drawing cross section will not work



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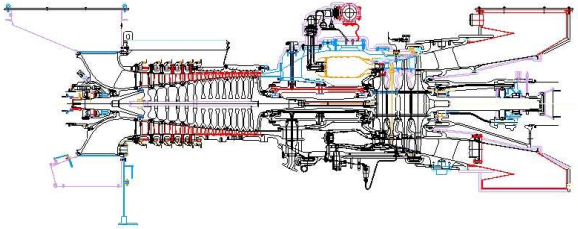

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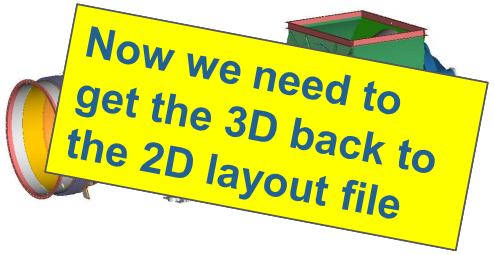

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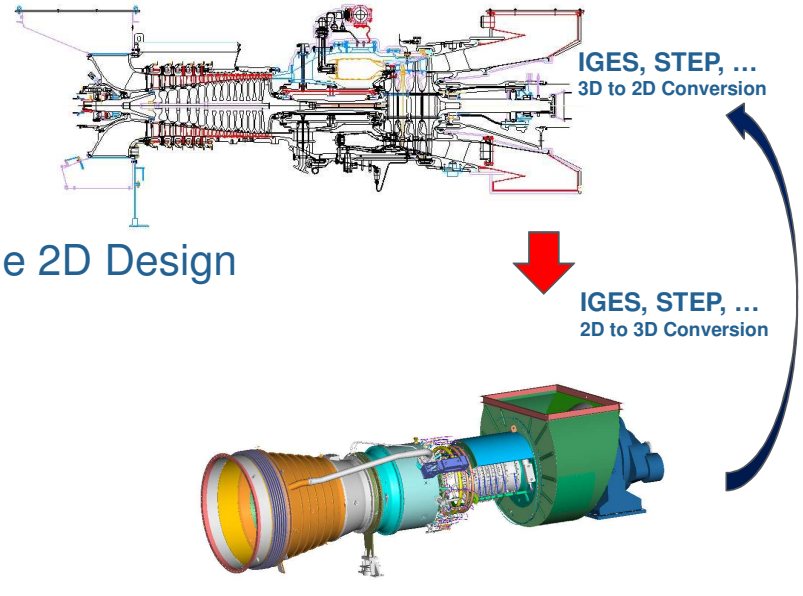

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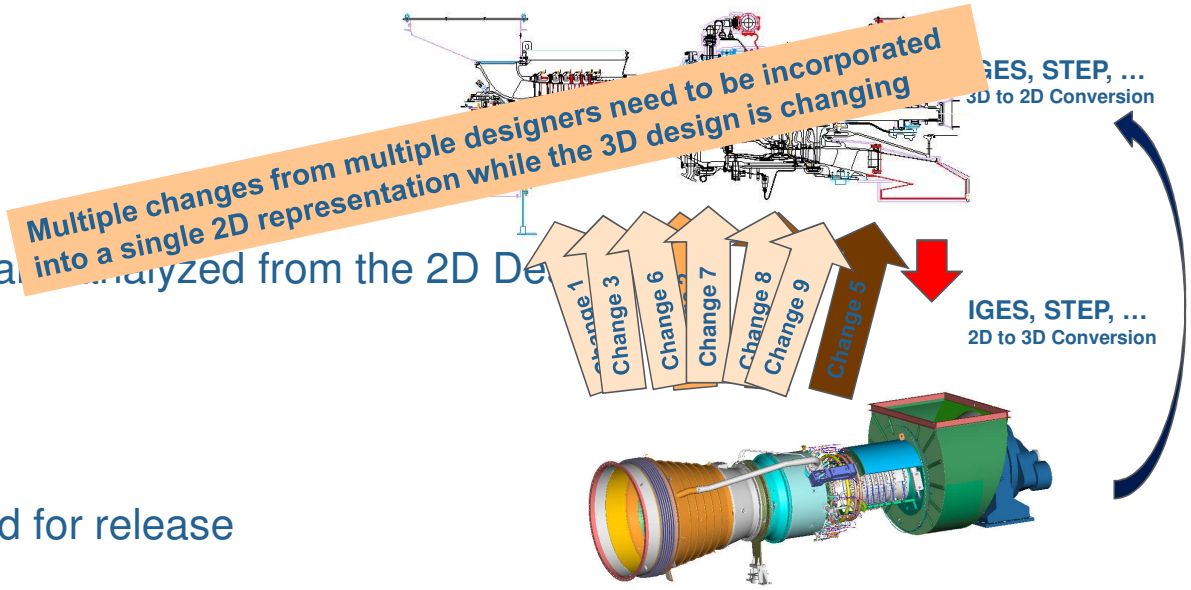

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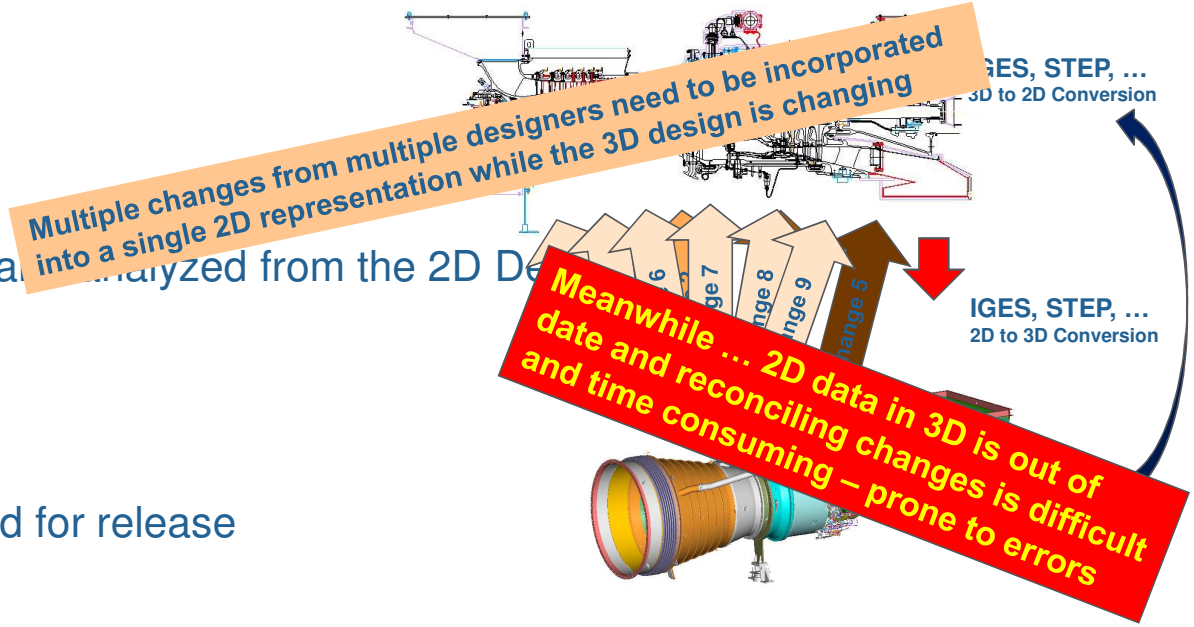

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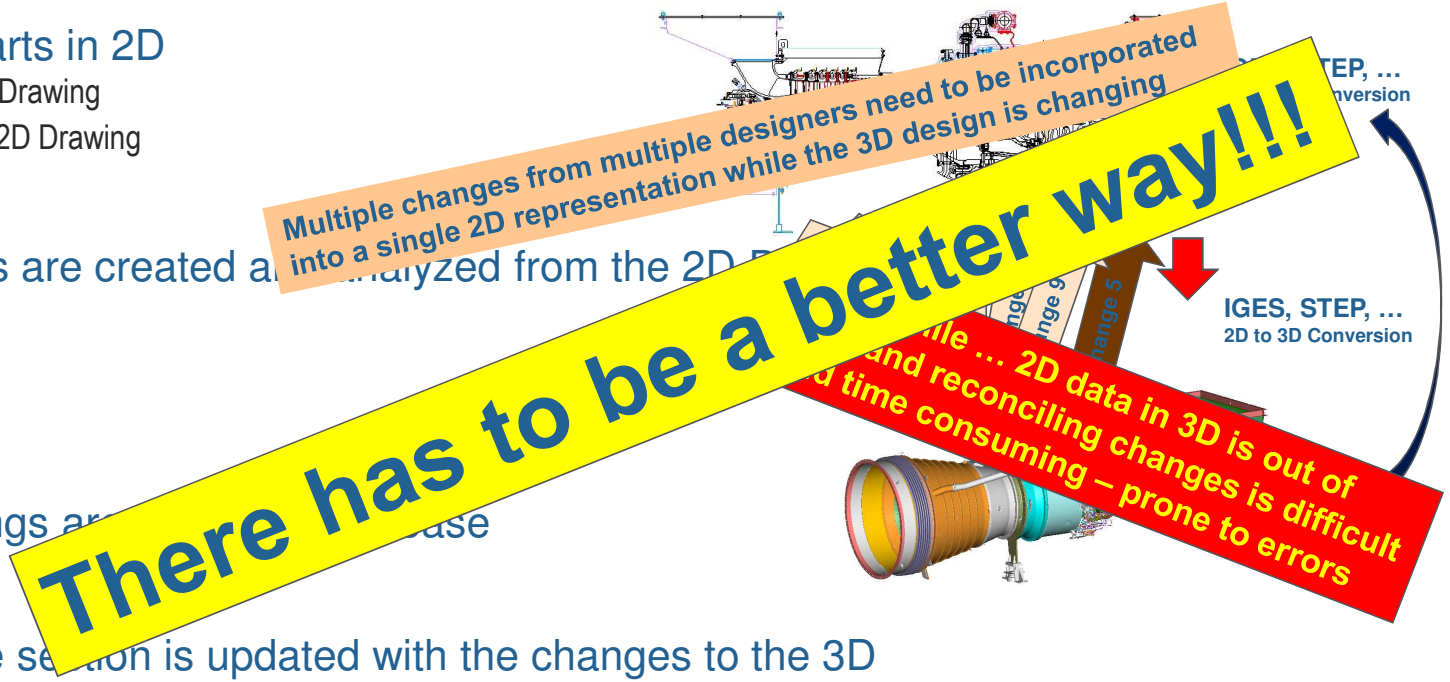

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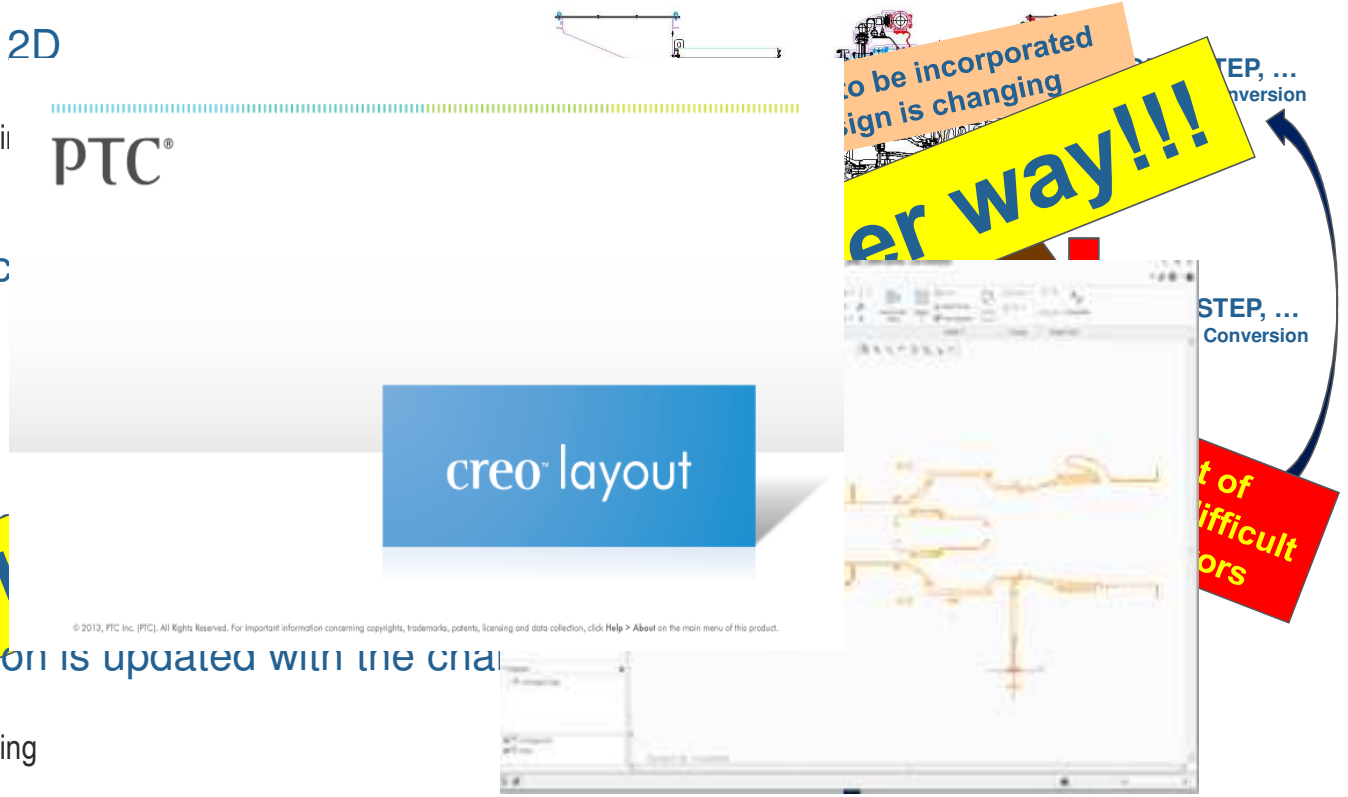

What is PTC Creo Layout?

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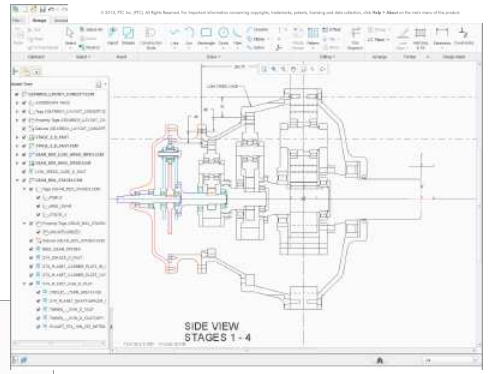
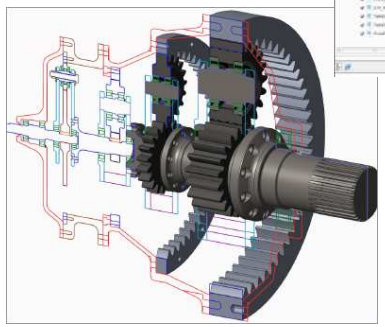
- PTC Creo Layout is an easy-to-use 2D CAD app that lets your product design team create detailed concepts in 2D, complete with information such as dimensions and annotations, then easily produce equally detailed 3D models from the same 2D data.
- PTC Creo Layout generates 2D designs to build 3D models in PTC Creo Parametric
- Gain flexibility and iterate design concepts easily by creating 2D designs that are fully or partially constrained, or completely unconstrained
- Leverage existing 2D data such as DWG, DXF and IGES files, as well as cross-sections of 3D models created with PTC Creo Parametric software
- Leverage 2D drawings for downstream design of structures and assemblies

PTC

creo layout





Source: http://www.ptc.com/product/creo/2d-cad/layout

Creo Layout History at Solar Turbines

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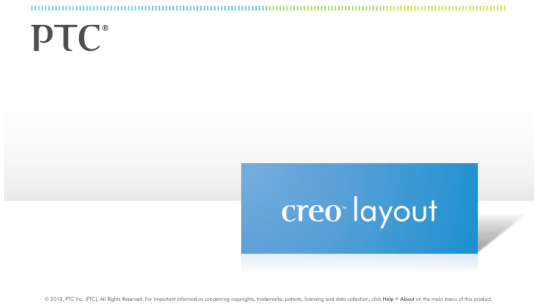
- 2012
  - Initial software evaluation
  - User evaluations without training
- 2013
  - Continued evaluation and demonstrations of PTC Creo Layout
- 2014
  - Approached by design engineers asking to look at PTC Creo Layout
  - Demonstrated the software based on reported issues with the current process
  - Began initial user training of PTC Creo Layout
- 2015
  - Continued training classes
    - Intro and advanced classes
  - Define final process map



Training Observations & Lessons Learned

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- Non PTC Creo Parametric users have an easier time learning PTC Creo Layout
- The terminology is confusing
  - PTC Creo Layout vs. PTC Creo Notebook (the old Pro/Layout)
  - Constraints
  - Structure
  - Tags
  - …
- Go over the basics first
  - It will be compared to every other tool used by users (CADDS5, AutoCAD, NX, …)
- Learn to walk before you run
  - Transition will be slow
- Use imported data whenever possible
  - Remember to import structure whenever possible

Initially Identified Use Cases

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- AutoCAD (DWG & DXF)/CADDS5 (via DXF) to PTC Creo Layout (2D to 2D)
  - Translation for 2D information into 3D
- PTC Creo Parametric to PTC Creo Layout (3D to 2D)
  - In lieu of IGES or STEP, use PTC Creo Layout to import sections to share
- PTC Creo Layout to AutoCAD (2D to 2D)
  - Take the 3D sections imported and share with AutoCAD users
- PTC Creo Layout to PTC Creo Parametric (2D to 3D)
  - Dynamically see changes between 2D and 3D while designing

High Level Design Process

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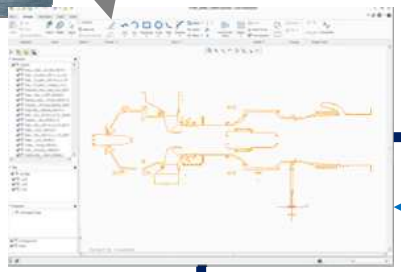
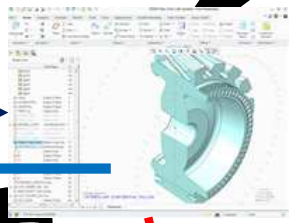
AutoCAD 2D Drawing/CADDS5 DXF

(Import)



PTC Creo Layout

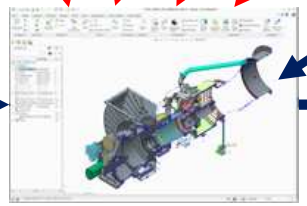
Creo Parametric:
Part and Assembly Files



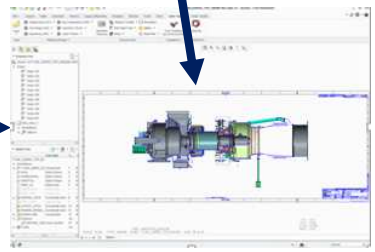
Design Process

PTC Creo Tools:
- Parametric
- Direct
- Simulate
- Notebook
- Layout

Dynamic inspection of 2D to 3D



PTC Creo Parametric:
Top Engine Assembly



PTC Creo Parametric:
Top Engine Drawing

Final Thoughts

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- Creo 3.0 offers additional functionality
  - Sub-Layouts for easier file management
  - Improved performance
  - New Layout feature in PTC Creo Parametric
    - Integration with Design Exploration Extension for improved update control
- It is new software …
  - Expect user questions
  - Expect some user pushback
- Have plans in place ….
  - Implementation
  - Training
  - Be flexible
- 2D Design is still an integral part of axisymmetric machinery
  - Does not impact any Model Based projects

Questions/Comments/Feedback

PTC Live Global