PTC® Live Global

CUST 107 - Leveraging Harness Models through the Manufacturing Processes

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Agenda

- Overview of Caterpillar Harness Design Process

- Overview of the Software Development Process

- Applied Use Cases
  - Specifics regarding OEM/Supplier process
    - Auto Flattening automation
    - Custom report Generator
    - Manufacturing Drawing detailing - interactions between supplier and OEM
  - Software development process
    - Requirements Gathering
    - Refinement of VOC
    - Coding with the tool/kit
    - Software validation

- Q&A

Caterpillar Harness Design Process

- **PTC Creo/Schematics**
  - Central Catalog of symbols
  - Standard Work and formats for Block/Circuit/Wiring Diagrams
  - Custom application
    - Design Rule Checks (DRCs)
    - Automation

- **3-D Harness Design**
  - Standard Work using Creo/Cabling
  - Custom application
    - Auto population of data
    - DRCs
    - Title block Data

- **PTC Creo/Manufacturing for Flattening**

- **Engineering Drawing**
  - Custom Application
    - Creates the drawing using standard layouts
    - Populates all Tables (non repeat region)

- **Manufacturing Drawing**
  - Custom Application
    - Data Extraction
    - Drawing aids for assembly

PTC Creo/Schematics

ELD uses the Java API

- **Design Rule Checks**

- **Auto Data Population**

- **Simulation**

- **Reports/tables**

PTC Creo/Cabling
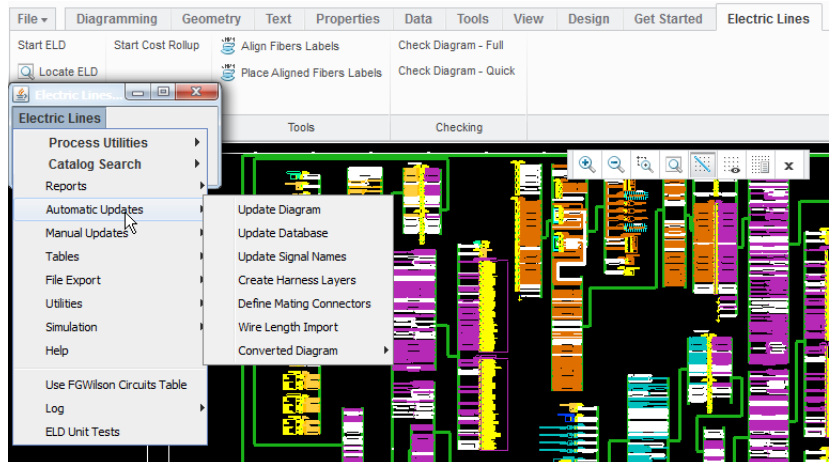
PTC Creo/Toolkit is used for this functionality

- Additional Design Rule Checks

- Creation/modification of bundles
  - Copy/Paste of wires

- Conductor creation

- AutoPack of wires

PTC Creo/Harness Manufacturing
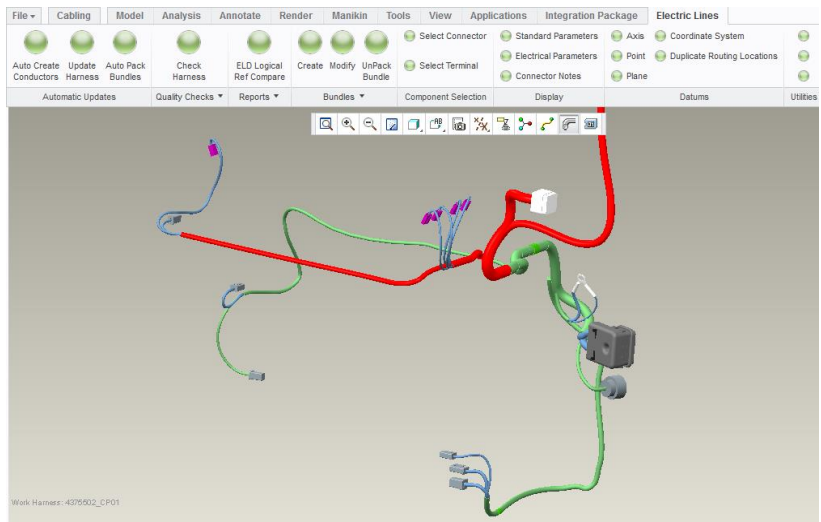
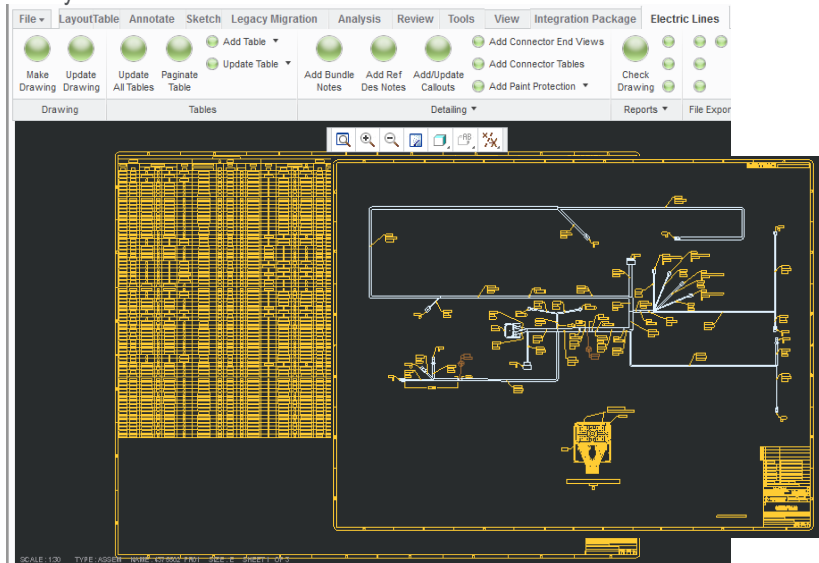PTC Creo/Toolkit is used for this functionality

- Auto Population of title block data

- Create the Harness manufacture drawing

Engineering Drawing
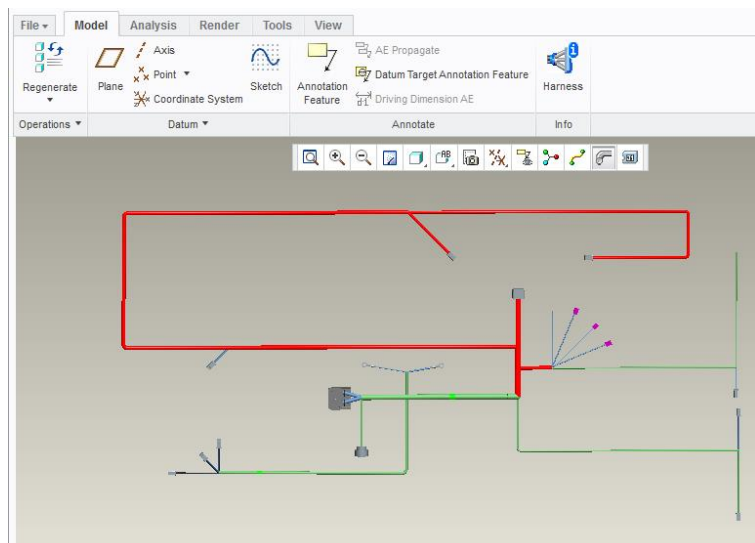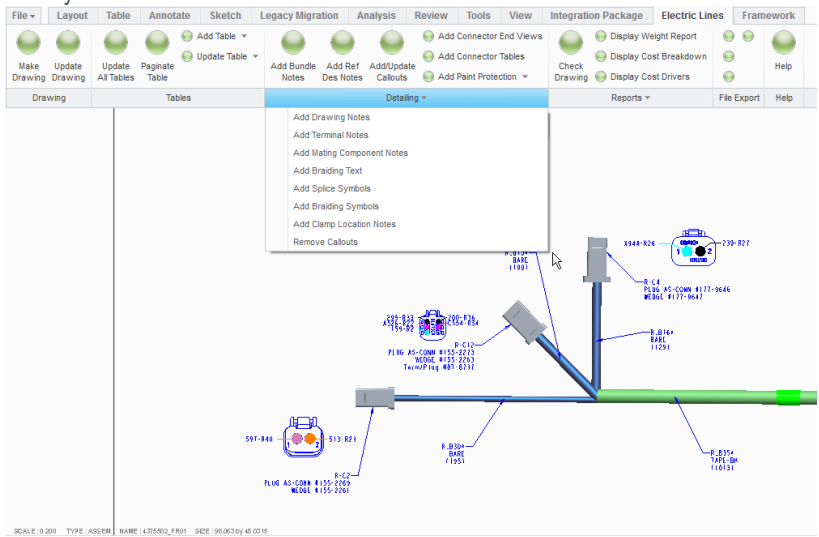
PTC Creo/Toolkit is used for this functionality

- Make Drawing (Easy Button)

- Auto Notes creation

- Final Design rule Checks

Manufacturing Drawing

PTC Creo/Toolkit is used for this functionality

- Auto Drawing note creation

- Color coded graphics of the connector insertion views

- Other Manufacturing aids added.

- **Define the problem**
  - This phase of the project focuses ONLY on the problem, not the solution
    - Include subject matter experts (end-users) in order to capture all pain-points
    - Take the time to understand and document the current process flow

- **Measure the As-Is process**
  - This phase is critical to understanding the value potential at each step of the process
    - Additionally, this phase is critical to determine the net value of the finished product
    - In many cases this phase reveals hidden process waste which can be eliminated in the solution

- **Explore the solutions**
  - "There's more than one way to skin a cat"
    - Identify the merits of each potential solution objectively
    - Create Proof-of-Concepts in order to visualize pros and cons

- **Present solution and Proof of Concept**
  - "Test Drive" or "Try before you buy"
    - Project sponsors care about cost, value, and timeline
    - Ensure subject matter experts are onboard!

- **Develop the Software**
  - Finally!
    - Let the end-user's choose (don't assume which method they would prefer)

- **Test the Solution**
  - Don't cut corners here…remember, project sponsors are expecting this to save them money
    - Measure the new process against the as-is process. Does it provide the expected value?
    - Beta test for bugs and end-user pain-points

- **Implement the Solution and Measure Results**
  - This phase is when the solution becomes the new as-is process
    - Often referred to as the "control" phase, this is where you'll need to track value savings in the "real world"
    - Document savings and verify results to project sponsors

Problem Statement #1

Over Burdened Users

- Creating a Flatten Harness model
  - 16 mouse clicks
  - 3 manual entries
  - Minus regeneration time, this takes 90 seconds per harness
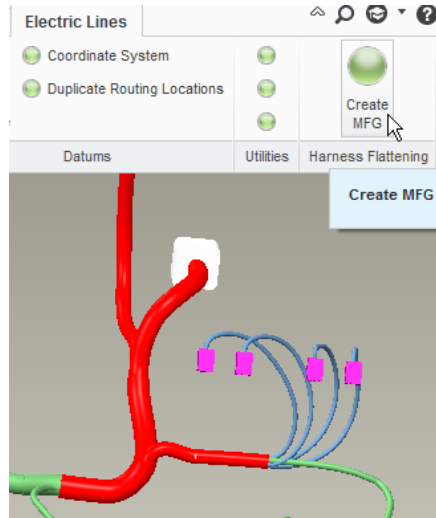
- Can something be done?

Automatic Harness Flattening

- Define the problem

- Measure the As-Is process

- Explore the solutions

- Present solution and Proof of Concept

- Develop the Software

- Test the Solution

- Implement the Solution and Measure Results

New Auto Flatten Harness

PTC Creo/Toolkit is used for this functionality

- All the creation steps were automated

- 125 Hours saved per year

Problem Statement #2

Harness Data Extraction

- Suppliers need the data from the drawing.
    - No easy way to extract data from PTC Creo/Cabling
    - Wait to create a drawing, then save the table to CSV
    - Manipulation of the data needed.

- Could a tool be create that would format the harness data and then extract it to a native spreadsheet format?

Custom Report Generator

- Define the problem

- Measure the As-Is process

- Explore the solutions

- Present solution and Proof of Concept

- Develop the Software

- Test the Solution

- Implement the Solution and Measure Results

Custom Report Generator

- Easy to use interface

- Each data table extracted to it's own spreadsheet file

- Template can be saved and reused
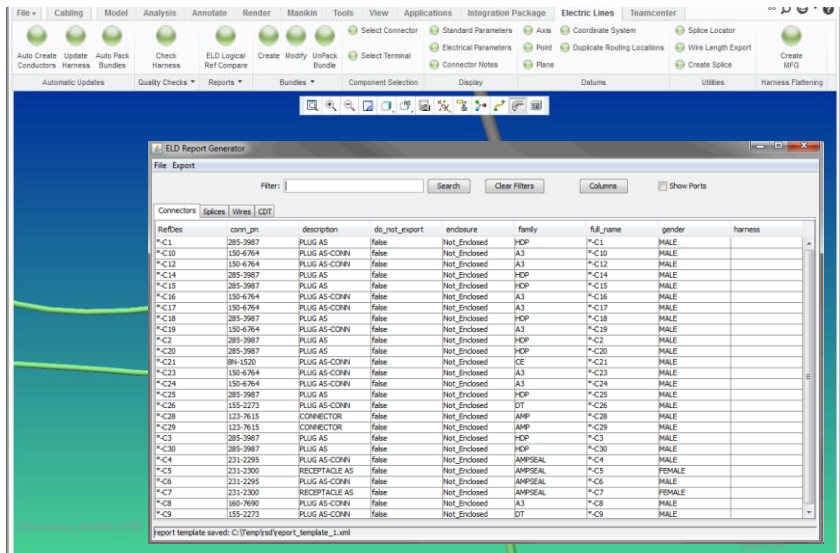
Questions?

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