Agenda

- Target markets / customers
- General process
- Command set
- Open Platform
- Workflow overview
- Creating Net List files from Excel
- Solid Edge Wire Harness Highlights
- Demonstration
Targets

- Solid Edge Wire Harness Design is targeted at
  - A design process where the 2D electrical schematic is developed first, and the 3D model is derived from that
  - A design process where there is no 2D schematic or is not used in conjunction with the 3D model
  - No specific industry is targeted, any assembly where electric conductors are needed is fair game
  - No limits on the number of conductors
  - Designed for round conductors only, not ribbon cables
The General Process

- Two Classic workflows
  - Automatic
    - Starts from a 2D electrical schematic
    - Import of “net list” files to generate 3D straight line connections
    - Routing and organization of wires
    - Solid creation
    - Drawings, reports, export back to ECAD for manufacturing
The General Process

- Manual
  - User creation of paths/wires
  - Routing and organization of wires
  - Export back to electrical system for manufacturing

Solid Edge Wire Harness Supports Both
Solid Edge Command Set

- Dedicated environment
  - License controlled
  - Assembly centric
- Harness Wizard
- Dedicated wire creation
- Dedicated cable creation
- Dedicated bundle
- Dedicated 3D path creation
- BlueDots for path connection
- Assembly commands for placing and positioning
- Geometry reference tools
- Organized tree for harness management
- Wire Harness reports and export tools for manufacturing
Harness Wizard (Automatic rats nest)

- Import ready-to-use net list files from
  - Cimteam Vesys, Promis-e, Zuken
  - Others being considered
  - Expandable to read ANY net list file (minimal data needed)
- Automatically adds missing components as listed in the net list file
- Users can re-assign occurrences (light:1 to light:2)
- Automatic tangency on from / to connections
- Dedicated commands in Part for component attributing—can be done on the fly.
- Preview capability
- Created straight line connections can be directly edited—no data recreation
Tip

Set the edit points to 0 for super simple curve, easier to edit initially, and edit points can always be added later for refining the shape of the curve.
Wire Creation

- Choose an existing path or create one
- All wires include a minimum bend radius, color, linear density, and many other popular attributes
- Wires created automatically can be modified
- Wire attributes include the most common solid or stranded wires
- Edit Path / Edit Definition
- Slack compensation
Cable Creation

- Choose existing wires, or create a simplified cable
- All cables include a minimum bend radius, color, linear density, and many other popular attributes
- Cables created automatically can be modified
- Cable attributes include several multi-conductor cables
- Edit Path / Edit Definition
- Slack compensation
Bundle Creation

- Bundle cables, wires, even other bundles for easy routing
- All bundles include a minimum bend radius, color, linear density, and many other popular attributes
- Bundle attributes include some common plastic and metal casings. “None” can be used for cable tie simulation
- Edit Path / Edit Definition
- Slack compensation
Control the direction of a route (Bundle) by selecting the “start” points of:

- Start of the Wire/Cable/Bundle
- Start of the route point
Conductor Table

- SEConductors.txt file lists some common Wires, Cables, Bundles
- Modify the table to include your standards, sizes and colors
3D Path Creation

- Wires, cables, bundles are based on a Path
- Paths can use
  - Key Points
  - Points in space
- Dynamically edit points and adjust tangent magnitudes for quick live changes
- Alt + Click to add/remove points for quick routing
- Use the familiar Orient XPress to control free space edits
3D Path Editing

Tip

- Make edits to the shape of a wire/cable/bundle by double clicking it from the graphic (even other paths)
- Paths locate and select first!
BlueDot Connectivity

- Patent Pending technology for path connectivity
  - Edits to curve position is order-free
  - Familiar Orient XPress to control free space edits
  - Locate order will find BlueDots first for super quick edits
  - Patented Dynamic Edit will update paths in real-time
  - While editing, jump from BlueDot to BlueDot for fast editing
Assembly Commands Available

- Parts Library is available for adding last-minute components
- Assemble and Move are available for positioning
- Connected conductors update automatically after each move
- The Harness Wizard will add missing components automatically
EdgeBar Icons and messages for warnings
- Minimum bend violations
- Hole clearance violations (even without a solid)
- Bundle clearance violations (even without a solid)
- User can set a required clearances globally or on each conductor
- Users can set the minimum bend radius in the conductor library as well as individual override

EdgeBar Icons and messages for Failures
- Failed path creation
- Failed Physical Conductor creation

Graphic Icon
- Minimum bend violation
Physical Conductor Creation

Users can create the solid body “Physical Conductor” when appropriate

- Creating the body last improves design performance during harness development
- On a per wire/cable/bundle need
- Automatic update is used to keep the model up to date
Physical Conductor Creation

Create a Physical Conductor only when

- a rendering is needed
- a detailed drawing is needed
- Physical Properties are needed
- Interference between conductors and other parts
Organized Tree Structure

- Dedicate placeholder in the Assembly Pathfinder for
  - Bundles, Cables, Wires, Paths
- Wire Harness Objects
  - Show, Hide, Show only, Show Connected Components
    - Remove – preserves child objects
    - Delete - deletes
    - Independent show/hide for objects and Physical Conductors
- Occurrences
  - Show Connected Conductors (new)
Display Tricks

- Make use of...
  - Show Only
  - Show Connected Conductors
  - Show Connected Components

Tip

- Show Only
- Show Connected...
- Ready To Bundle

Initial Display
Suggested Assembly Structure

- Keep Separate Wire Harnesses in their own sub-assemblies
  - Key for tracking part numbers
  - Key for display management
Reports

- Harness Reports
  - Bundles
  - Cables
  - Wires
  - Cut lengths
  - All attributes

- Quick Element reports via properties

- Get a conductor's cut length or mass without creating a Physical Conductor
Manufacturing Support

- Export to ready-to-use net list files for
  - Cimteam, Vesys, Promis-e, Zuken
  - Others being considered

- Expandable to export to ANY net list file provided columnar positions are known
Component and Terminal Attribution

- Attributing is essential for automatic straight line connections from a net list import, but is done once.
- User can open each electrical component and assign pins (terminals) and the component name.
- Attributes can be applied to the Design Model, the Simplified Model for part and sheet metal.
Open system

- Direct integration with:
  - Cimteam
  - ECT
  - Vesys
  - Zuken
  - Others being considered
- Configurable for any net list
- Wire library is easily expandable
- Public interface document for future integrations
- Works with Excel
Workflow #1

- Creation of a wire harness from a net list file
  - First attribute all required electrical components (one-time)
  - Generate the 2D electrical schematic with appropriate tools, export the net list file
  - Import the net list file in Solid Edge
    - Adjust the from/to for any instances
    - The wizard will create from/to connections automatically
    - Verify wire type assignment
  - Adjust the position of any automatically placed components
  - Bundle and route wires and cables as needed
  - Add any wires or cables that were not included in the net-list
  - Verify all conductors exceed the minimum bend radius, have the proper slack and cut back lengths
  - Create manufacturing reports and build a Solid if needed
Workflow #2

- Creation of a wire harness manually
  - Build the assembly with all required components (component placement can be done in the Wire Harness Environment)
  - Create Wires and or cables to suite the electrical needs
  - Bundle and route wires and cables as needed
  - Verify all conductors exceed the minimum bend radius, have the proper slack and cut back lengths
  - Create manufacturing reports and build a Solid if needed
Creating Net List Files With Excel

- Fast easy way to create automatic connections when no ECAD is available
  - Create schematic in Draft, Visio, PSP, etc
  - Create Net List in Excel
- Supply 2 CSV files
  - Component List
  - Connection List
  - Use “Sample” field lists
    - See SEHarness.txt
  - Save as DOS based CSV file
Creating Net List Files With Excel

- Component List
  - .CMP
- SEHarness.txt field lists
  - Components fields
    - ComponentID=1
    - ComponentName=2
    - ComponentDescription=3
Creating Net List Files With Excel

- Connection List
- .CON
- SEHarness.txt
  - WireID=1
  - FromComponentID=2
  - FromComponentTerminal=3
  - ToComponentID=4
  - ToComponentTerminal=5
  - CableID=6
  - WireDiameter=7
  - WireGage=8
  - WireColor=9
  - WireMaterial=10
  - WireType=11
  - WireDescription=12
  - CutLength=13
Solid Edge Wire Harness Highlights

- Automatic or manual from / to connectivity
- Super easy bundling and routing
- Smart paths through cylinders and automatic tangency
- Patented (pending) BlueDot technology for path connectivity
- Patented (pending) Dynamic Edit for real time feedback of path edits
- Automatic path color based on conductor type
- Graphical identification of minimum bend violations
- Display management tools for show, hide, show only, show connecting components
- Complete harness design with no solid geometry (work in 3D wire frame)
  - Interference check for conductors and bundles— with no solid body
  - Harness mass— with no solid body
  - Work in 3D wire for improved performance
- Quick edit tools Edit definition, edit path, detach, delete
- Cut lengths can accommodate additional lengths for slack and strip backs
Demonstration

- Automatic wire harness generation
- Bundling
- Display management
- Edit conductor attributes
- Edit Parts position
- Component attributing
- Physical Conductor Creation
- Reports