Siemens PLM Software

Design Automation with solid edge
Automation Target Audience

This session is for the Solid Edge users interested to automate without knowledge of Programming Language.
Automation Basics

Agenda

- What is Automation.
- Why Automation is required.
- Cost of Automation.
- Methods of Automation.
- Automation using Add on tools.
- New features of SolidEdge ST8 helpful in Automation.
- Q & A
What is Automation

The dictionary defines automation as “the technique of making an apparatus, a process, or a system operate automatically.”

Automation of 3D models has opened new horizon when parametric design is introduced for the first time.

Synchronous technology has induced new ideas to the users interested in automation.

Engineers have always had a passion for Automation based on design parameters provided.
Why Automation Required

- Automation saves time, increase productivity. Accuracy and quality is maintained.

- Design time is reduced, Engineers get time to do real designing instead of drawing checking.

- Automation naturally does the knowledge management.

- Dependency on human resource will be reduced.
Cost of Automation

- Automation are mainly of two types
  1. A module (Macro) automation
  2. Product Automation {Engineer-to-order (ETO) }

- Normally module (Macro) automation the financially feasibility is already calculated.

- In Product automation Cost of automation may not be financially feasible if we try to achieve 100% automation.

- We should restrict automation for following dimensions.
  1. Product automation &
  2. Per product automation
Cost of Automation

Product Automation

![Bar Chart showing Type of Products vs. Number of Products]

- P.1
- P.2
- P.3
- P.4
- P.5

Time / cost

Number of Products

Type of Products

0 %  100 %
Cost of Automation

Per Product Automation

Time / cost

0%  % of automation  100%
Methods of Automation

2D Automation

- Only changing dimension texts & removing a portion of drawing in 2D draft file.

- Changing both dimension and text in 2D Draft file.

3D Automation using Peer Variables

- Steps for Automation

- Changing dimension in Part or Assembly through peer variable.

- Changing dimension in Part or Assembly by linking between part variables.

- Linking peer variables through Excel sheet.
Methods of Automation

Automation using Synchronous Technology

- Automation using Synchronous Technology.
- Automation using hybrid of Synchronous and Ordered modeling.

Other Automation Methods

- By linking part with associative copy.
- Linking Part/Sketch using include sketch command.
2D Automation
By changing dimension texts.

1. This automation is possible with free 2D also,
2. It will produce only NTS drawing.

Example-1 *
We can use show/Hide for more control.

Dimensions and size will change accordingly.
Methods of Automation
3D Automation using Peer Variables

Steps for Automation

• Parts to be designed as per design intent.

• Parts are assembled in assembly keeping in view how model will change.

• Preparing draft according to design intent.

• Using PMI for fixed dimensioning.

• Linking of variables using different methods.

• Testing.

*
3D Automation using Peer Variables
Precautions while making Part for Automation

Change in thought while making Part for Automation.
It is important to consider design variation of part while making it.

Before

After

In order to achieve result we have to change approach

Before

After
3D Automation using Peer Variables
Precautions while making Part for Automation

While working in Synchronous environment Engineer should

1) Consider locking of all dimensions.

2) And direction of dimension should be take care of.
3D Automation using Peer Variables
Precautions while making Assembly for Automation

• Always use fully constraint parts (Assembly relationship/ground) and sub assemblies.

• Keeping one part fixed or grounded all other parts should be placed accordingly with reference to that part.

• One can use assembly options like Rigid set to take care many constraints at a time
3D Automation using Peer Variables
Precautions while making Draft for Automation

• Similarly prepare draft file keeping in view design intent. With all views, BOM, Format placed properly

• All Balloons should be on the parts that are not going to hide.
3D Automation using Peer Variables
Using PMI

- Use PMI method to take care of dangling dimensions in case part is removed in main assembly.

Assembly

Dim placed in draft

Hanging dim when middle support is removed from Assy.
3D Automation using Peer Variables
Using PMI

- PMI view of same is created and used in draft.

Assembly

PMI view in Assy.

Dim automatically removes with Part.
Methods of Automation
3D Automation using Peer Variables

Changing dimension in Part or Assembly through peer variable.

This is most popular method of automation using peer variable in 3D model.

Before going for this method some thought process needs to be done for making 3D model.
Methods of Automation
3D Automation using Peer Variables

Changing dimension in Part or Assembly by linking between part variables.

In this methods Parts are inter linked by using formulas with in assembly.

* Example-4
Linking peer variables through Excel sheet.

In this methods peer variables are linked using excel Sheet. This link can be vice versa.
Linking peer variables through Excel sheet.

In this methods peer variables are linked using excel Sheet. This link can be vice versa.
Methods of Automation

Automation using Synchronous Technology

- Automation using Synchronous Technology we can easily customize our frame model with ease.
- Using power of ST we can directly edit our Model and associated drafting and BOM will be updated.

* Example-6  Draft  AVI

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Cut Length</th>
<th>Mass (kg)</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Square Tubing 20x20</td>
<td>286.300</td>
<td>0.986</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Square Tubing 20x20</td>
<td>270.000</td>
<td>0.438</td>
<td>4</td>
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<td>5</td>
<td>Square Tubing 20x20</td>
<td>265.000</td>
<td>0.423</td>
<td>4</td>
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<td>6</td>
<td>Square Tubing 20x20</td>
<td>233.200</td>
<td>0.468</td>
<td>2</td>
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<td>7</td>
<td>Square Tubing 20x20</td>
<td>202.700</td>
<td>0.416</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Square Tubing 20x20</td>
<td>124.325</td>
<td>0.571</td>
<td>4</td>
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<table>
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<th>S. No.</th>
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</tr>
</thead>
<tbody>
<tr>
<td>23,4,5,6,7</td>
<td>Square Tubing 20x20x16</td>
<td>508.1999 mm</td>
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</table>
Methods of Automation

Automation using Synchronous Technology

- Automation using hybrid of Synchronous and Ordered we can easily customize our model with repetitive entities.

- Using power of ST we can directly edit our Model and associated drafting and BOM.
Methods of Automation
Other Automation Methods

• By linking part with associative copy,

• One of the example of associative copy is process sheet preparation.
Methods of Automation
Other Automation Methods

- By linking part with associative copy,

- By this method all associated parts get updated by changing single master part.

- Dimension change in Pin reflects in all associative parts.

Stage-1  Stage-2  Stage-3

Stage-1  Stage-2  Stage-3

Example-AVI  Example-#1 #2 #3
Methods of Automation
Other Automation Methods

- Linking Part/Sketch using include sketch command
- This method is quite useful when we need to drive all parts in an assembly through sketch.

* Example-Dye
Methods of Automation
Automation using Add on tools

• Automation using add on tools of Solid edge

  Rule Stream
  CadCustomization++
  Etc.

Automation using API

• C#
• VB .NET
Methods of Automation
Automation using Add on tools

Rulestream software for Engineer-to-Order

• Comprehensive solutions for engineer-to-order (ETO) process automation
Methods of Automation
Automation using Add on tools

- CadCustomization++ glues the power of Solid Edge with MS Excel.
Methods of Automation
Automation using Add on tools

Input Data

3D Model

Drawing

Customize Reports/Quotations

Bill Of Materials
Methods of Automation

Automation Steps

1. Define input variables

2. Data extracted to excel

3. Define The Design Rules
Methods of Automation

Define input variables
Methods of Automation

Automation Steps

1 Define input variables

2 Data extracted to excel

3 Define The Design Rules
Methods of Automation
Data extracted to excel

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Length of Hut</td>
<td>4000 N</td>
<td>3500</td>
<td></td>
<td>2500</td>
<td>6300</td>
<td></td>
<td></td>
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<tr>
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<td>1</td>
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<td>1500</td>
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<td>1500</td>
<td>3000</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Mid Support</td>
<td>Hide</td>
<td>L</td>
<td>Hide</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Mid Support Distance</td>
<td>2700 N</td>
<td>2700</td>
<td></td>
<td>1500</td>
<td>3000</td>
<td></td>
<td></td>
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</tbody>
</table>
Methods of Automation
Automation Steps

1 Define input variables

2 Data extracted to excel

3 Define The Design Rules
Methods of Automation
Define The Design Rules
New features of ST8 helpful in Automation

• pattern by table provides user better control over pattern.

• Costing for Weld feature.

• Use of Technical requirement text (Notes).
Methods of Automation
Automation using New features of ST8

- New features such as Pattern by table is helpful in creating automation.
Methods of Automation
Automation using New features of ST8

• New features such as using weld features which we can now place in part environment.

• This features enables accurate mass of weld extractable to BOM.
Methods of Automation
Automation using New features of ST8

• Links can be created in variable table for proper mass calculation.

Variable table

Part list properties

AVI

BOM
Methods of Automation
Automation using New features of ST8

• New command in ST8 is Technical Requirements.

• Technical Requirement command creates a text box to capture mechanical information about the drawing with a numbered list.

1. H14, h14, IT 14/2
2. ALL HIGHLIGHTED DIMENSIONS MUST BE CHECKED FOR TOLERANCE.
3. MARK WITH.....
4. STAMP ACCORDING TO SPECS
5. GLUE THESE AREAS
Methods of Automation
Automation using New features of ST8

• Technical Requirements can be linked to callouts to support information in a callout that points back to the technical requirement.

• If note 3 moves up to note 2 then the callout will change to “SEE NOTE 2”

1. All Highlight Dimensions must be checked.
2. Take care to tight fit assembly before welding.
3. Weld material to be as per the specification issued.
Contact

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