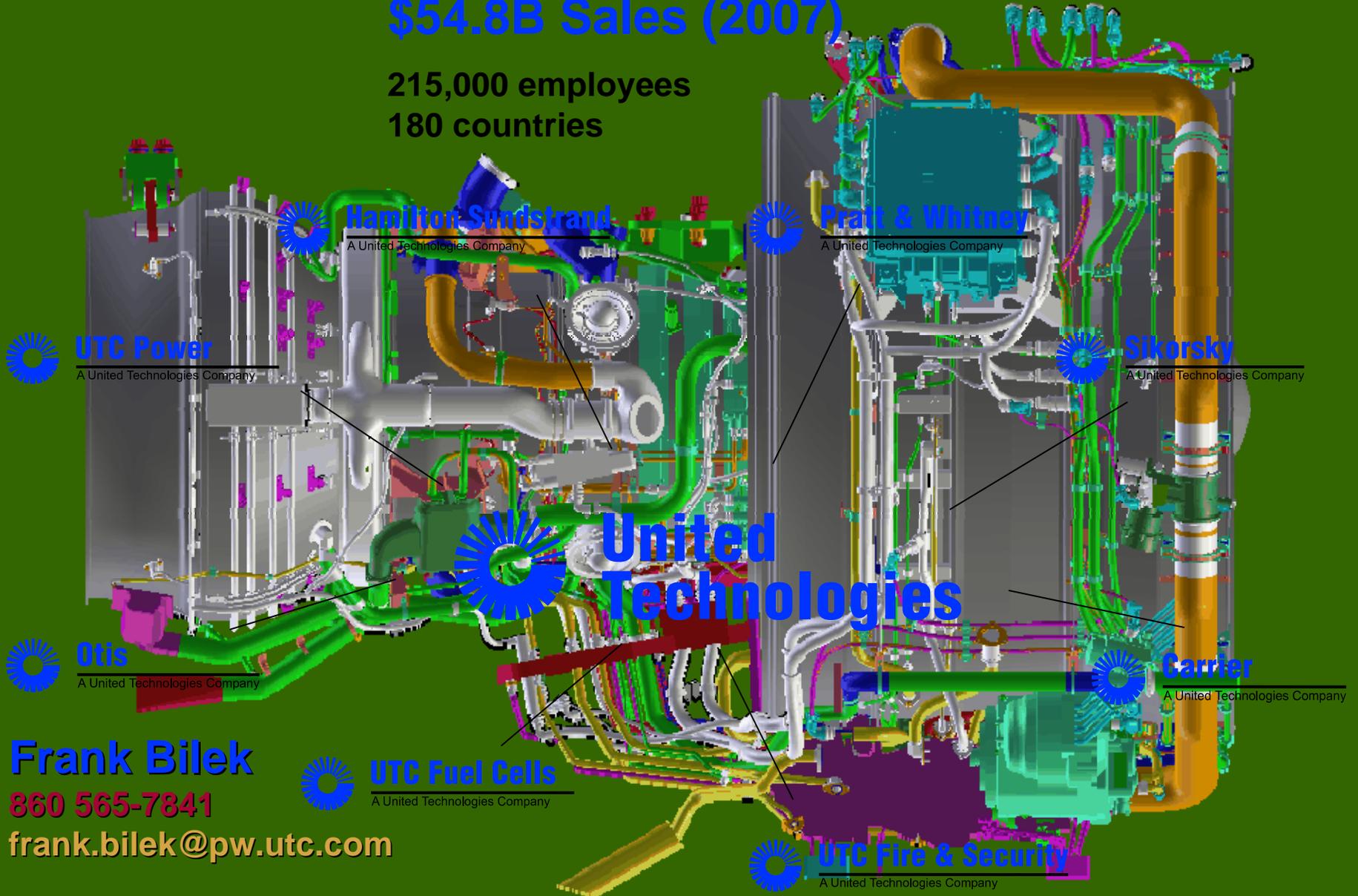


Implementation of NX
Routing Electrical at
Hamilton Sundstrand
and
Pratt & Whitney

\$54.8B Sales (2007)

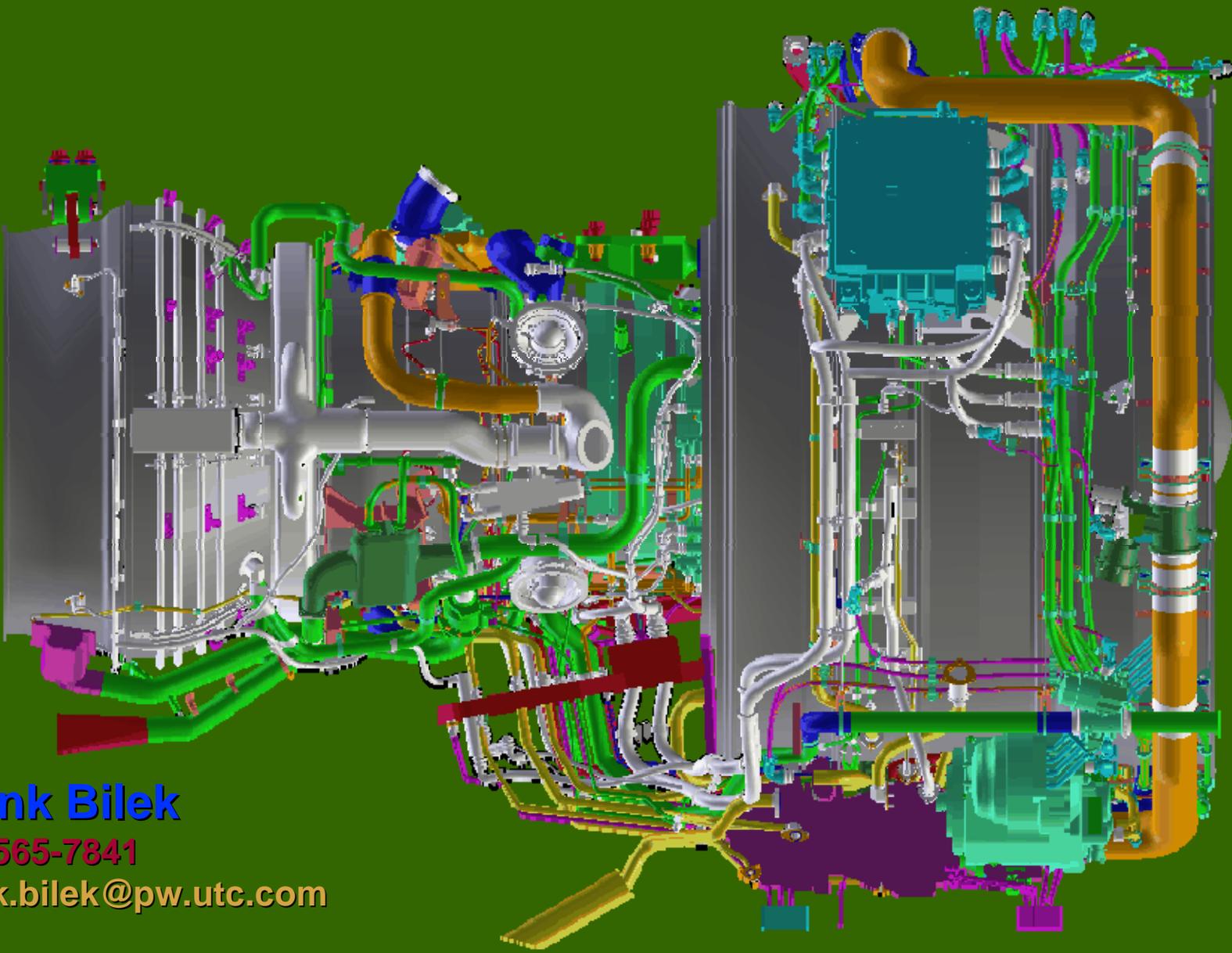
**215,000 employees
180 countries**



Frank Bilek

860 565-7841

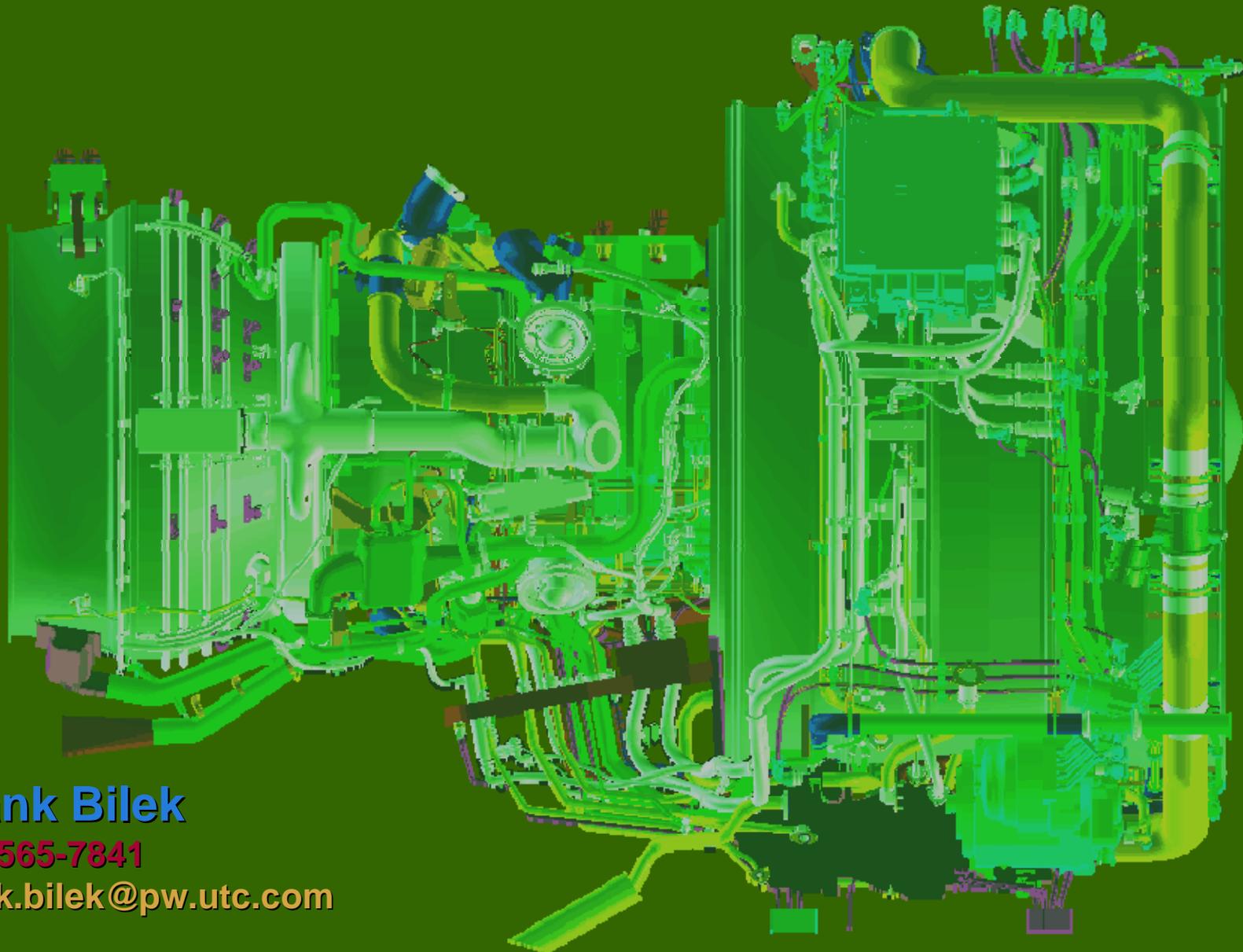
frank.bilek@pw.utc.com



Frank Bilek

860 565-7841

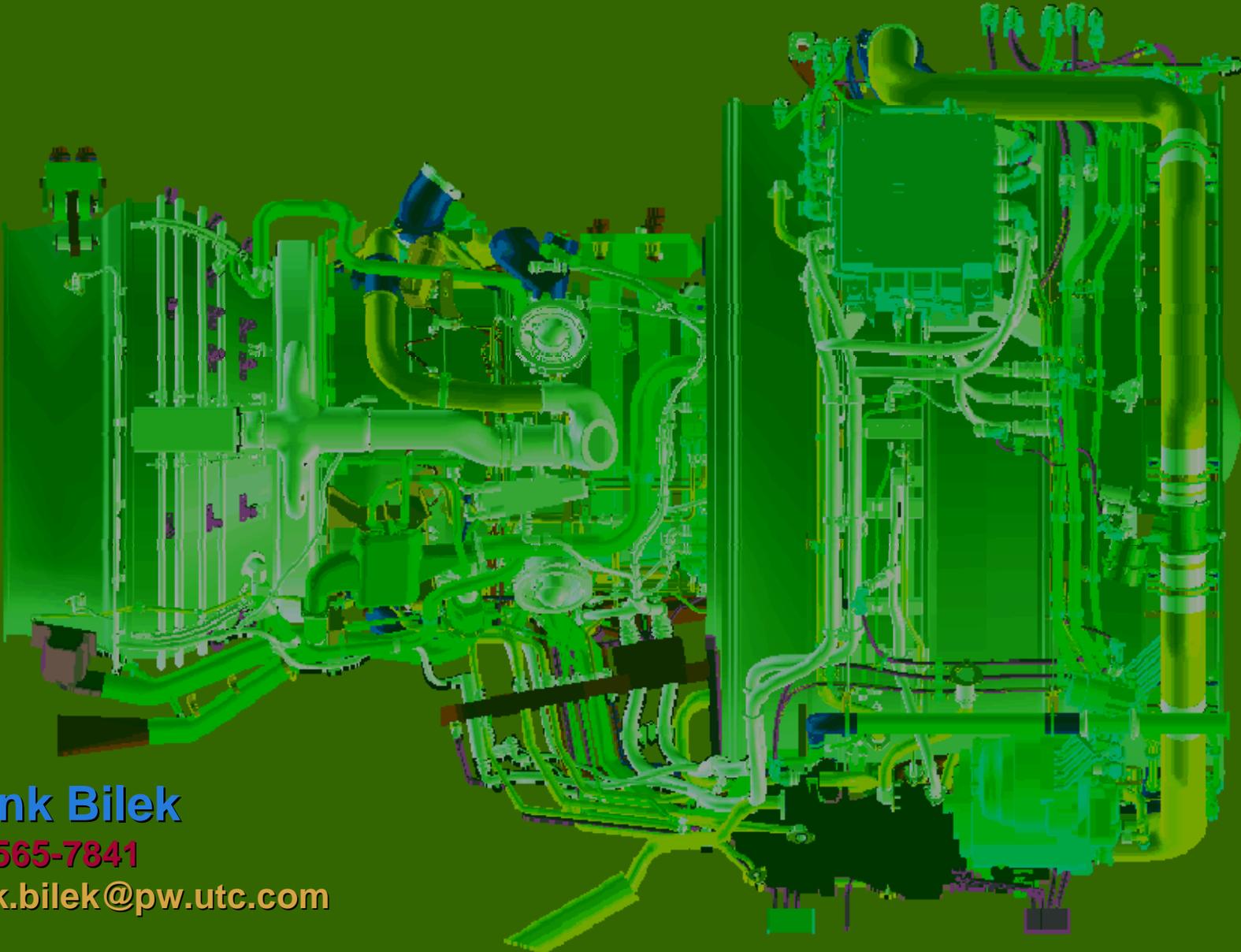
frank.bilek@pw.utc.com



Frank Bilek

860 565-7841

frank.bilek@pw.utc.com



Frank Bilek

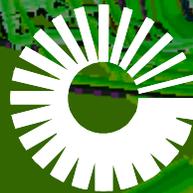
860 565-7841

frank.bilek@pw.utc.com



Hamilton Sundstrand

A United Technologies Company



Pratt & Whitney

A United Technologies Company

Frank Bilek

860 565-7841

frank.bilek@pw.utc.com

Tools

Teamcenter Engineering with NXManager

custom NX 4.0.3.3

Teamcenter Engineering with NXManager

out of the box NX 4.0.4.2

NX Unigraphics with out Teamcenter Engineering

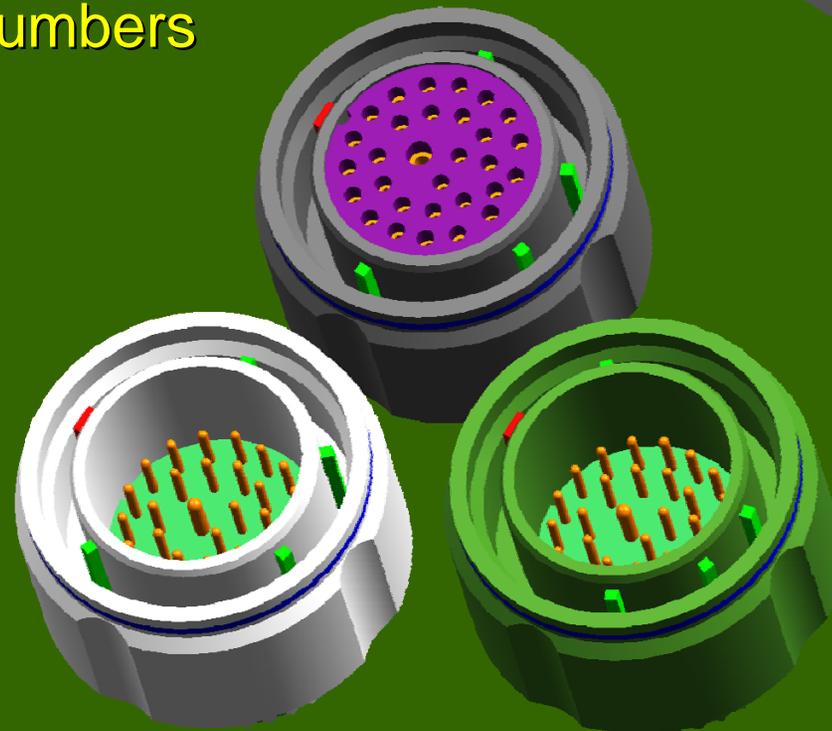
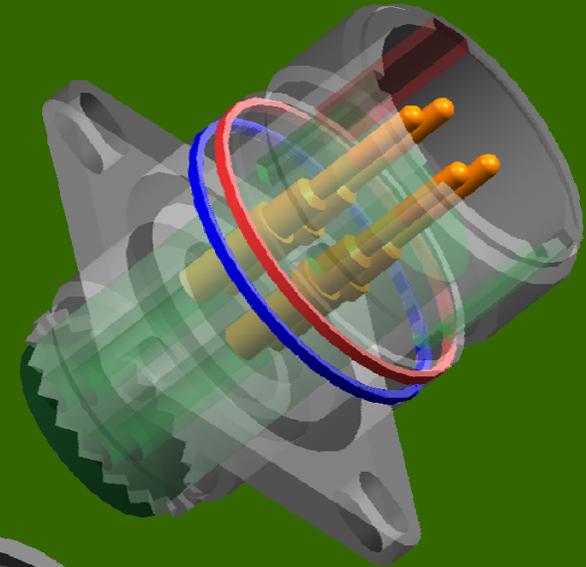
for legacy programs NX 4.0.3.3

Opportunities in old system

- Time and manpower
- Keeping three files for one harness
- Weight
- Bundle Diameter Calculation
- Break-Out
- Connector & Backshell index
- Mating Connectors
- Backshell Back Extension
- Review supplier Drawings.
- *Clamp point change and model does not change or long time to fix model*

Models

- 75 Part Family
 - 4,500+ NX Models
- 7 Part Tables
 - 25,000+ Part Numbers



Thank you
Amphenol

Part Family

Microsoft Excel - Book1

File Edit View Insert Format Tools Data Window Help

100% 10 B I

INB

	IQ	IR	IS	IT	IU	IV
1	251	252	253	254	255	256
2						
3						
4						
5						
6						
7						
8						
9						
10						

Sheet1 Sheet2 Sheet3

Ready NUM

- D38999/26KF30PN
 - 38999-26KF-N
 - MS-20054-30-P
 - PIN 01
 - PIN 02
 - PIN 03
 - PIN 04
 - PIN 05
 - PIN 06
 - PIN 07
 - PIN 08
 - PIN 09
 - PIN 10
 - PIN 11
 - PIN 12
 - PIN 13
 - PIN 14
 - PIN 15
 - PIN 16
 - PIN 17
 - PIN 18
 - PIN 19
 - PIN 20
 - PIN 21
 - PIN 22
 - PIN 23
 - PIN 24
 - PIN 25
 - PIN 26
 - PIN 27
 - PIN 28
 - PIN 29
 - PIN 30
 - BACKSHELL-INDEX-19

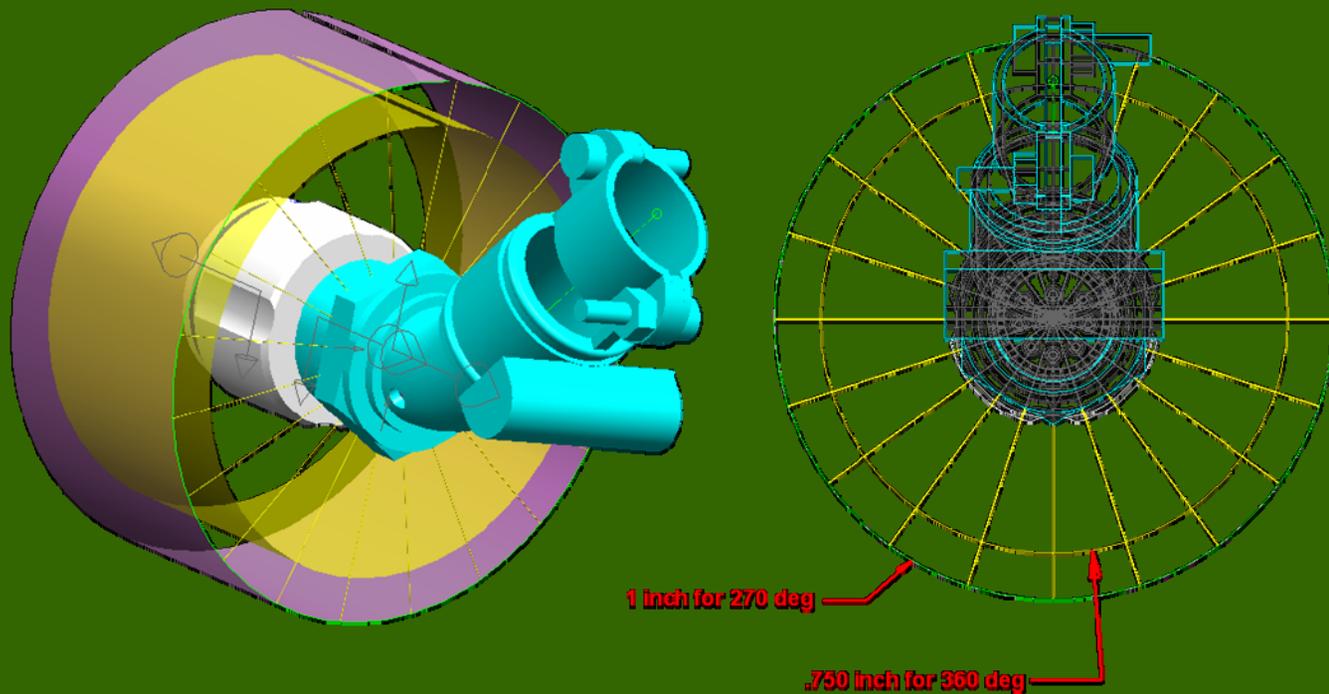
Connector & Backshell index

- By using NX routing we inshore
 - Clocking angle
 - Extension
 - Mating Conditions
 - Proper engagement
 - Can not rotate
 - Can rotate Backshell to Connectors (angle set per shell size)

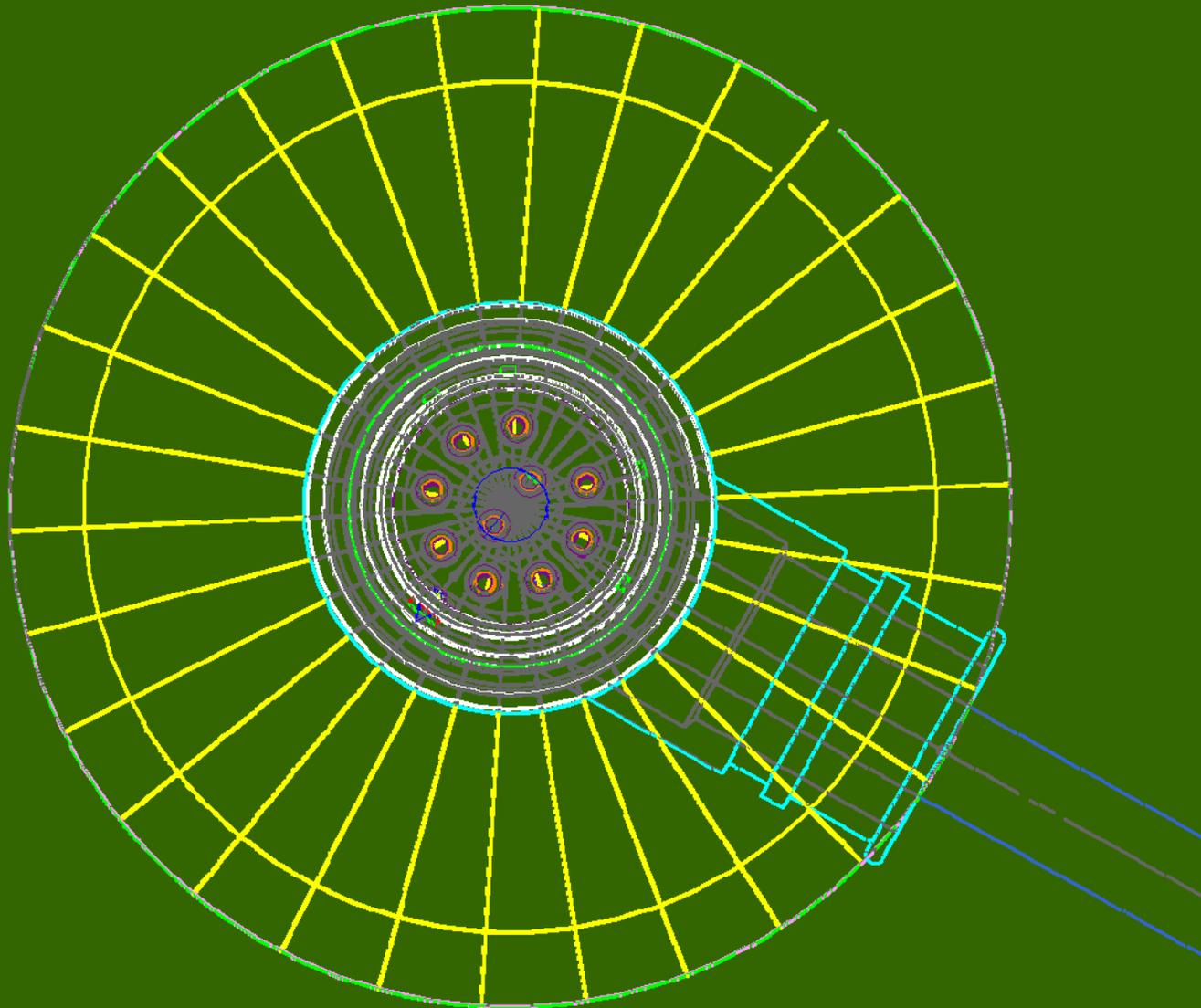
Number of teeth- Shell Size				
	shell size		number of teeth	tooth peak in(degrees)
MIL-C 83723	8		12	30
MIL-C 38999	9	A	12	30
MIL-C 83723	10		15	24
MIL-C 38999	11	B	16	22.50
MIL-C 83723	12		21	17.14
MIL-C 38999	13	C	20	18
MIL-C 83723	14		24	15
MIL-C 38999	15	D	24	15
MIL-C 83723	16		30	12
MIL-C 38999	17	E	28	12.86
MIL-C 83723	18		33	10.91
MIL-C 38999	19	F	32	11.25
MIL-C 83723	20		36	10
MIL-C 38999	21	G	36	10
MIL-C 83723	22		39	9.23
MIL-C 38999	23	H	40	9
MIL-C 83723	24		42	8.57
MIL-C 38999	25	J	44	8.18

Maintainability

- **Reference set called “MIL-STD-1472F”.**
 - (see par 5.9.14.7 of spec MIL-STD-1472F)
- **Visual check of clocking angle**



Visual check

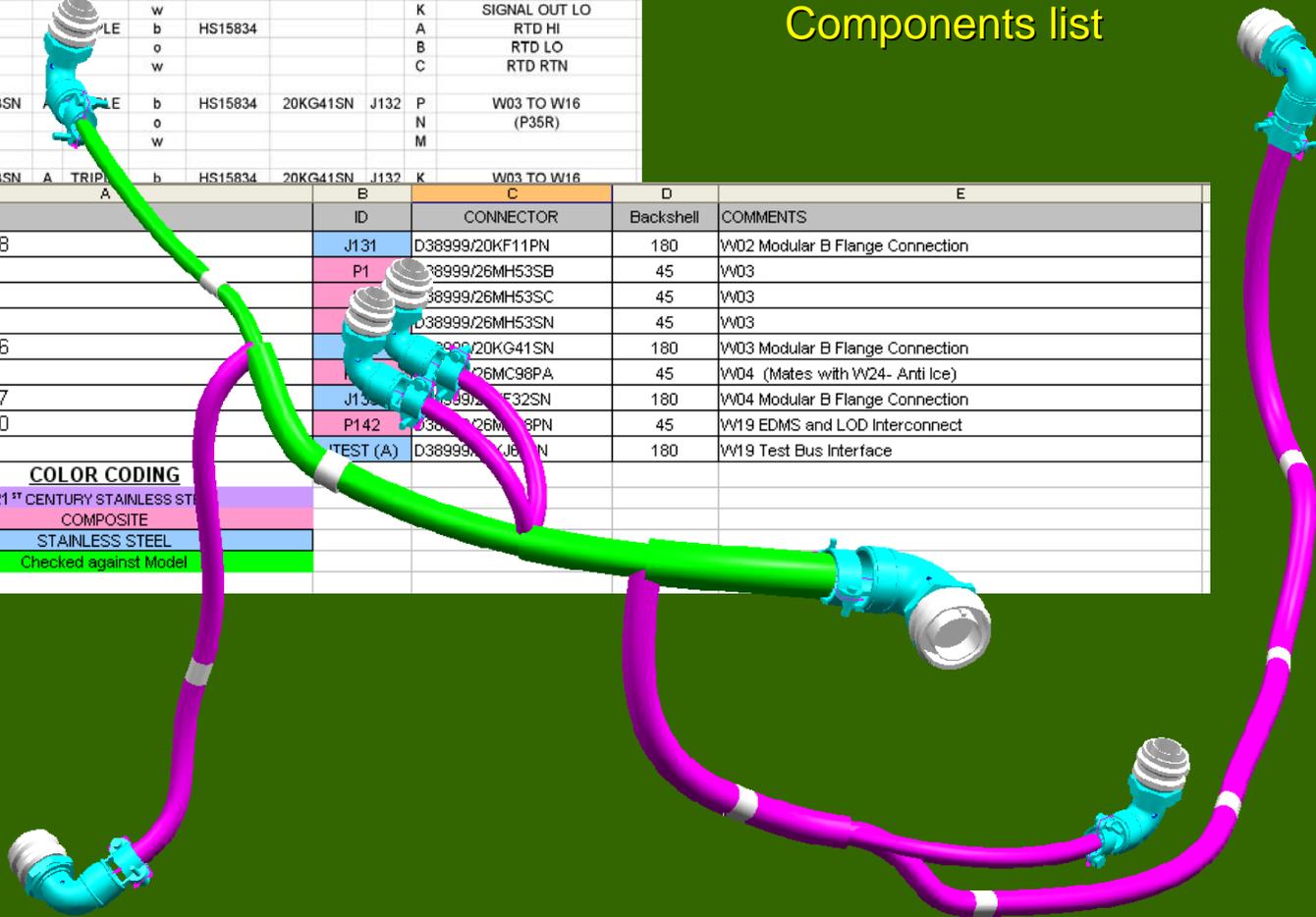


Keeping three files for one harness

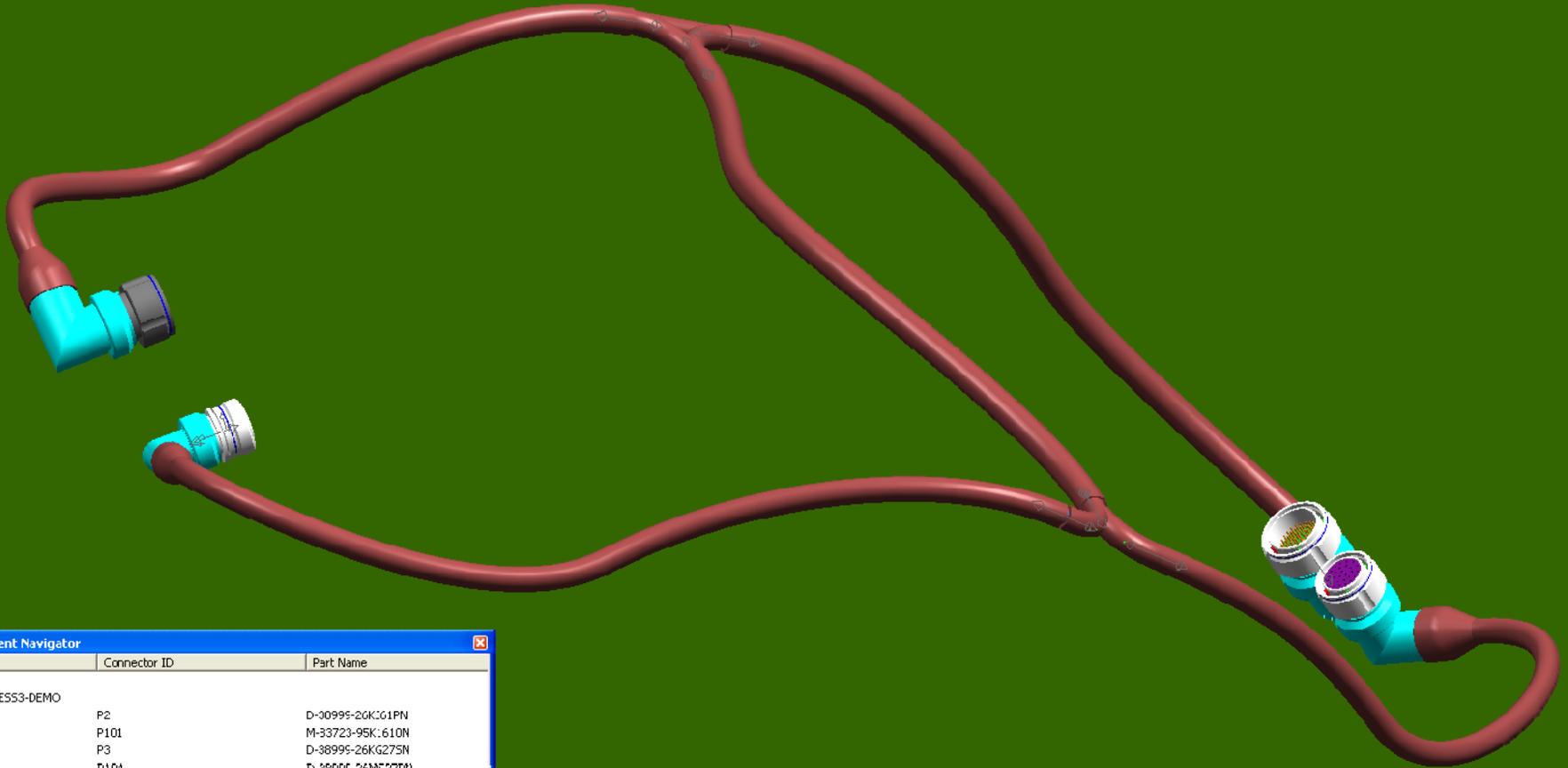
1	A	B	C	D	E	F	G	H	I	J	K	L
2	SYSTEM NAME	ID	PIN NO	CONNECTOR D38999/	CH No.	WIRE CONFIG.	WIRE COLOR	WIRE TYPE	CONNECTOR D38999/	ID	PIN NO.	SYSTEM PARAMETER
78												
79	ABFPPF EXC	P5	V	26MH53SN	A	PAIR	b	HS15832	26MC98SN	P81	G	EXCITATION
80	ABFPPF RTN		C				w				H	EXCITATION RTN
81	ABFPPF HI		FF			PAIR	b	HS15832			J	SIGNAL OUT HI
82	ABFPPF LO		EE				w				K	SIGNAL OUT LO
83	ABFPTF HI		M			PAIR	b	HS15834			A	RTD HI
84	ABFPTF LO		R				o				B	RTD LO
85	ABFPTF RTN		P				w				C	RTD RTN
86												
87	TT2R HI	P5	AA	26MH53SN	A	PAIR	b	HS15834	20KG41SN	J132	P	W03 TO W16
88	TT2R LO		P				o				N	(P35R)
89	TT2R RTN		GG				w				M	
90												
91	TT2L HI	P5	BB	26MH53SN	A	TRIP	b	HS15834	20KG41SN	J132	K	W03 TO W16
92	TT2L LO											
93	TT2L RTN											

Model
Pin out list
Components list

1	COMPONENT	ID	CONNECTOR	Backshell	COMMENTS
2	W02 to W18	J131	D38999/20KF11PN	180	W02 Modular B Flange Connection
3	FADEC - 1	P1	D38999/26MH53SB	45	W03
4	FADEC - 2		D38999/26MH53SC	45	W03
5	FADEC - 5		D38999/26MH53SN	45	W03
6	W03 to W16		D38999/20KG41SN	180	W03 Modular B Flange Connection
7	Anti-Ice		D38999/26MC98PA	45	W04 (Mates with W24- Anti Ice)
8	W04 to W17	J132	D38999/26MF32SN	180	W04 Modular B Flange Connection
9	W19 to W20	P142	D38999/26MC98PN	45	W19 EDMS and LOD Interconnect
10	Anti-Ice	TEST (A)	D38999/20KF11PN	180	W19 Test Bus Interface
11	COLOR CODING				
12	21 ST CENTURY STAINLESS STEEL				
13	COMPOSITE				
14	STAINLESS STEEL				
15	Checked against Model				
16					



Now all info is in one file



Device ID	Connector ID	Part Name
Work Part		
HARNESS3-DEMO		
	P2	D-38999-26KG275N
	P101	M-33723-95K1610N
	P3	D-38999-26KG275N
	P104	D-38999-26MG275N

Wire and Cable	R...	Leve	F..	Pin	To C...	Pin	Color	Type	Gauge	Diameter	Length
Work Part											
HARNESS3-DEMO											
Connection_2	A	P	P2	A	P3	A	Blue	JF	13.000000	0.031000	88.656136
Connection_1	M	C	P101	1	P104	A	Orange	JF	13.000000	0.031000	81.306794
CABLE_3	N	C	P101		P2				0.000000	0.236000	85.047836
cond4	N	C	P101	2	P2	F	Green	RE	13.000000	0.058000	85.047836
cond1	N	C	P101	4	P2	H	Blue	RE	13.000000	0.058000	85.047836
cond3	N	C	P101	5	P2	J	Orange	RE	13.000000	0.058000	85.047836
cond2	N	C	P101	3	P2	G	White	RE	13.000000	0.058000	85.047836
Connection_3	M	C	P104	B	P2	B	Green	JF	13.000000	0.031000	56.616529
cable_6	N	C	P2		P101				0.000000	0.171000	56.616529

Component Name	Part Name	Weight (lb)	comec...	NUM_OF_COV...	SHELL_SIZE
<TEST_WC09>	TEST_WC09				
D38999/26KG275N	D-38999-26KG275N	3.2181	P3	27.0000	21-G
D38999/26K361P4	D-38999-26K361P4	3.2626	P2	61.0000	25-G
D38999/26MG275N	D-38999-26MG275N	3.0742	P104	27.0000	21-G
M83723/95K1610N	M-83723-95K1610N	10.0000	P101	10.0000	16
M85043/84-16503	M85049-84-16503	3.2624			16
M85043/89-25503	M85049-89-25503	3.3891			
M85043/90-21503	M85049-90-21503	3.5190			
M85043/90-21503	M85049-90-21503	3.5190			
REF-M850490_16-06	REF-M850490_16-06				
REF-M850150_21_05	REF-M850150_21_05				
REF-M850150_21_05	REF-M850150_21_05				

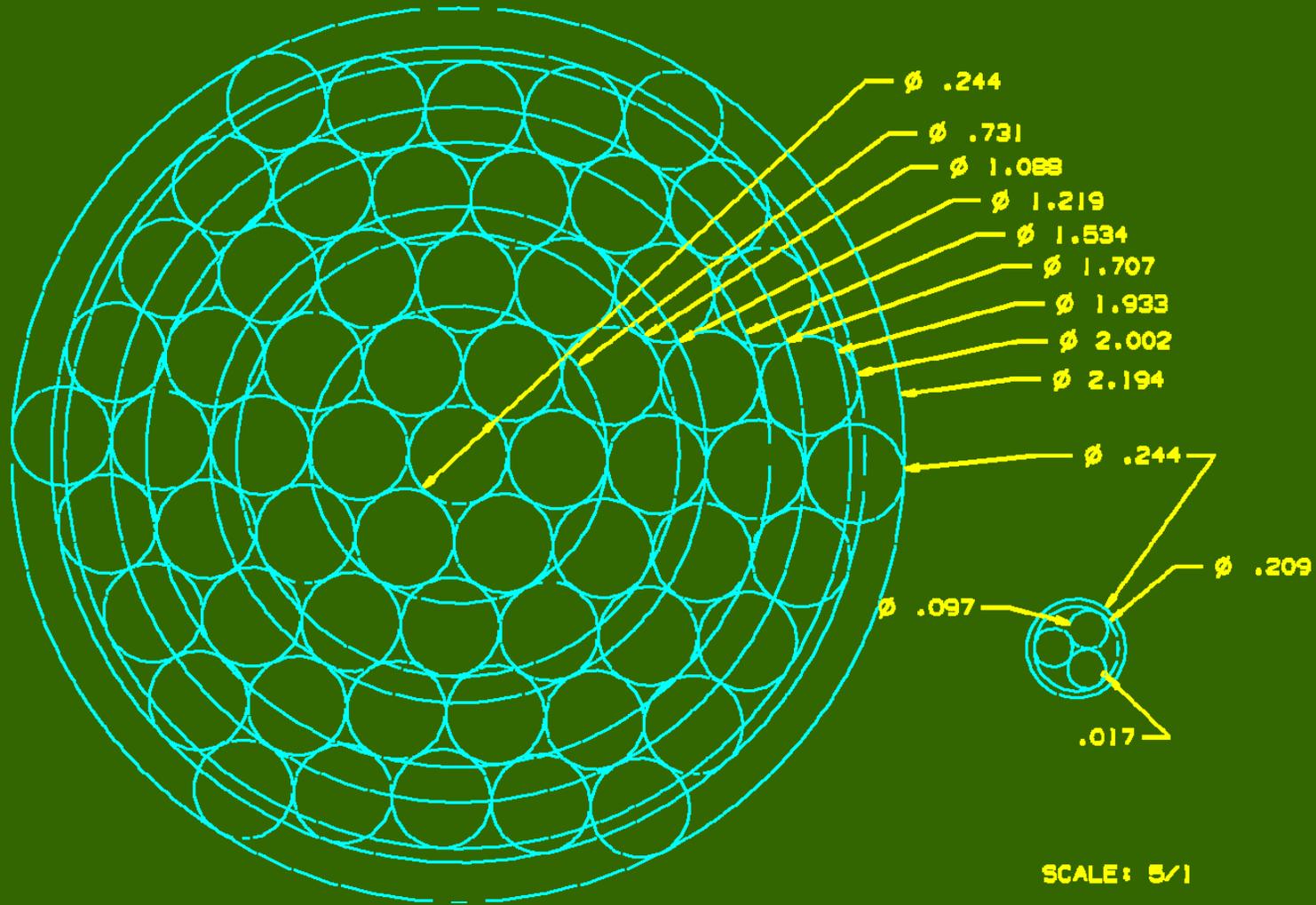
Weight

- All Weight come from Part Tables
- Knowing weight up front

Assembly Navigator

Component Name	Part Name	INSTALL	Weight (lb)	connector_id	NUM_OF_CONTACT	SHELL_SIZE	Refer
<TEST_WC09>	TEST_WC09		21.2392				
D38999/26KG275N	D-38999-26KG275N	WC09	0.2181	P3	27.0000	21-G	PORT
M85049/90-21503	M85049-90-21503	WC09	0.5190	P3		21-G	Model
D38999/26KJ61PN	D-38999-26KJ61PN	WC09	0.2626	P2	61.0000	25-J	PORT
M85049/89-25503	M85049-89-25503	WC09	0.3891	P2		25-J	Model
D38999/26MG27PN	D-38999-26MG27PN	WC09	0.0742	P104	27.0000	21-G	PORT
M85049/90-21503	M85049-90-21503	WC09	0.5190	P104		21-G	Model
M83723/95K1610N	M-83723-95K1610N	WC09	10.0000	P101	10.0000	16	PORT
M85049/84-16503	M85049-84-16503	WC09	0.2624	P101		16	Entire
REF-M850490_16-01	REF-M850490_16-01						Entire
REF-M850490_21-05	REF-M850490_21-05						REFS
REF-M850490_21-06	REF-M850490_21-06						REFS
REF-M850490_25-04	REF-M850490_25-04						REFS
REF-ST1478-04	REF-ST1478-04						Entire
REF-ST1478-04	REF-ST1478-04						Entire
REF-ST1478-05	REF-ST1478-05						Entire
REF-ST1478-06	REF-ST1478-06						Entire
REF-ST1478-06	REF-ST1478-06						Entire
REF-ST1478-06	REF-ST1478-06						Entire
REF-ST1478-06	REF-ST1478-06						Entire
REF-ST1478-06	REF-ST1478-06						Entire
T-20G	T-20G						Entire
T-20G	T-20G						Entire

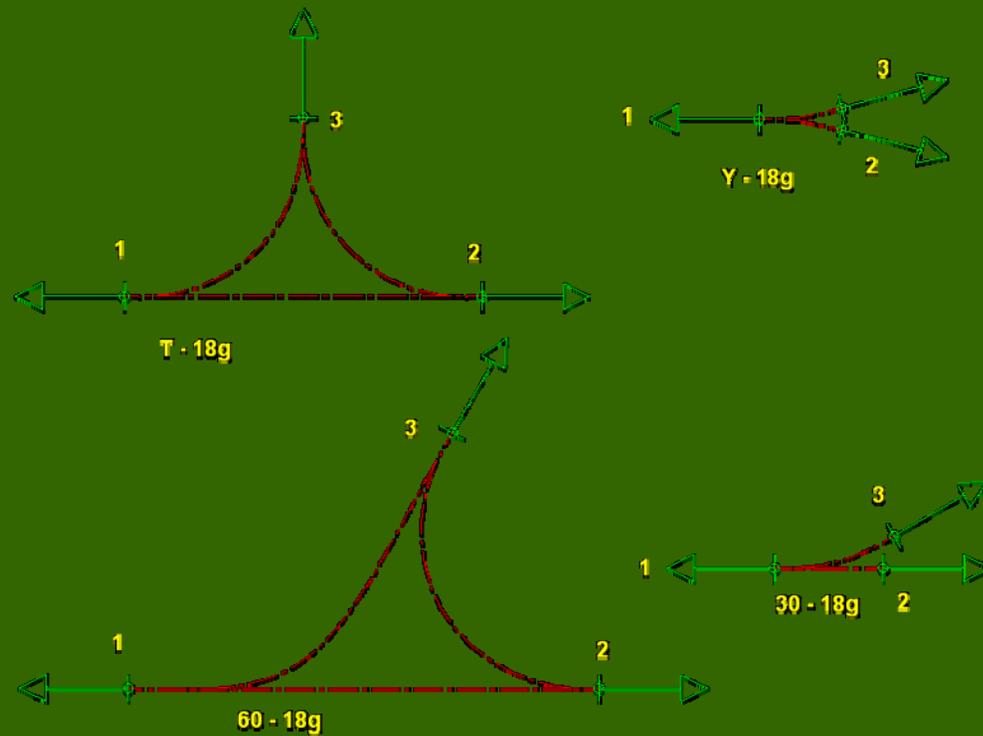
Bundle Diameter Calculation



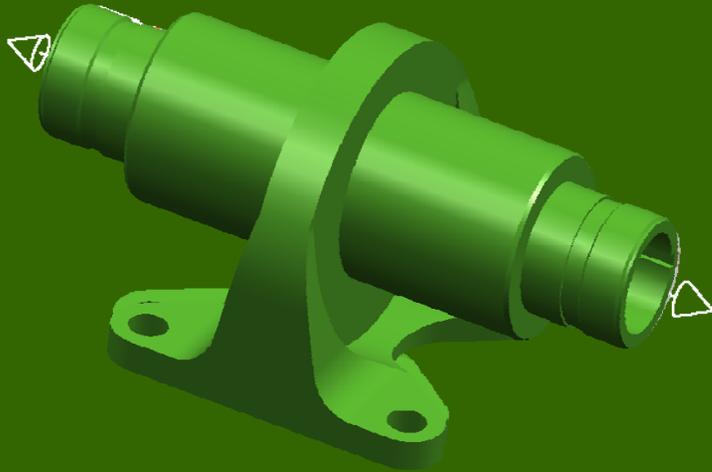
Break-Out

Standardize

There are 8 breakout to pick from, 2 gauges 18 & 20



Mating Connectors helper



Specify item

Items

- Externals Engine Systems
 - Connectors
 - D38999/25KC85N
 - D38999/25KC8PN
 - D38999/23KC85N
 - D38999/23KC8PN
 - D38999/25KC85N
 - D38999/25KC8PN
 - Backshell
 - Symbolic Clamps
 - Break-out

Selection Characteristics

Specification

Destination

MATERIAL: SST

SHELL_SIZE: 13 C

NUM_OF_CONTACT: 8.000000

KEYWAY: N

21FIRST_CENTURY: no

Descriptor

CONNECTOR: Plug

CONTACT_TYPE: Receptacle

MATES_WITH: Receptacle-Solder-Mov

female

male

Item Name

File Select

Clear Characteristics

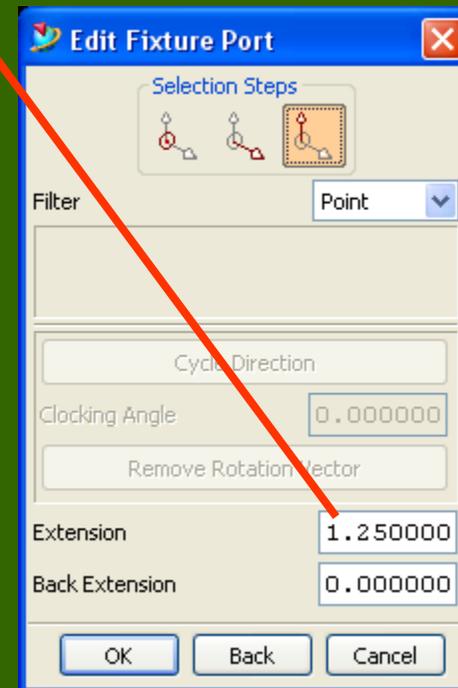
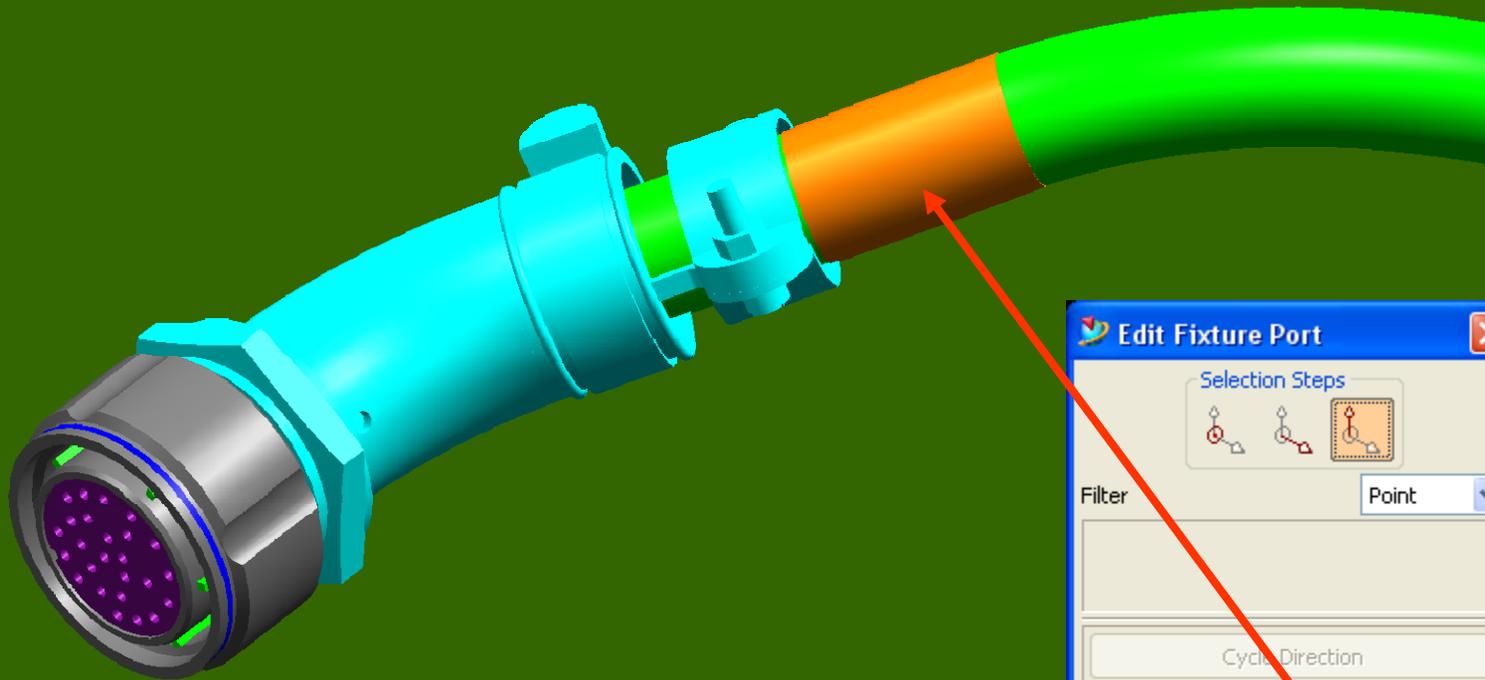
Preview

No preview available

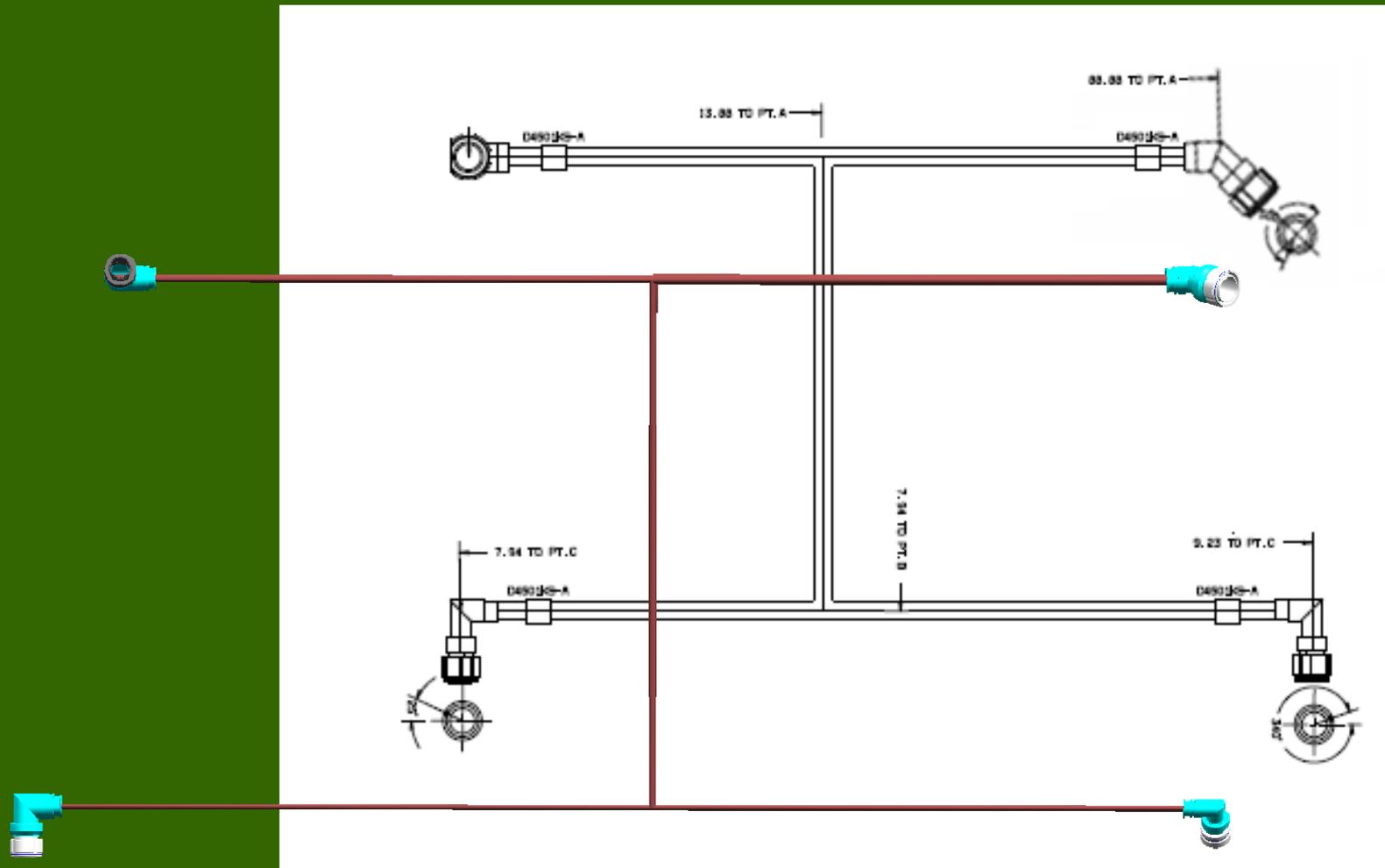
OK Back Cancel

From a list of 20,000 it give you 6 to pick from

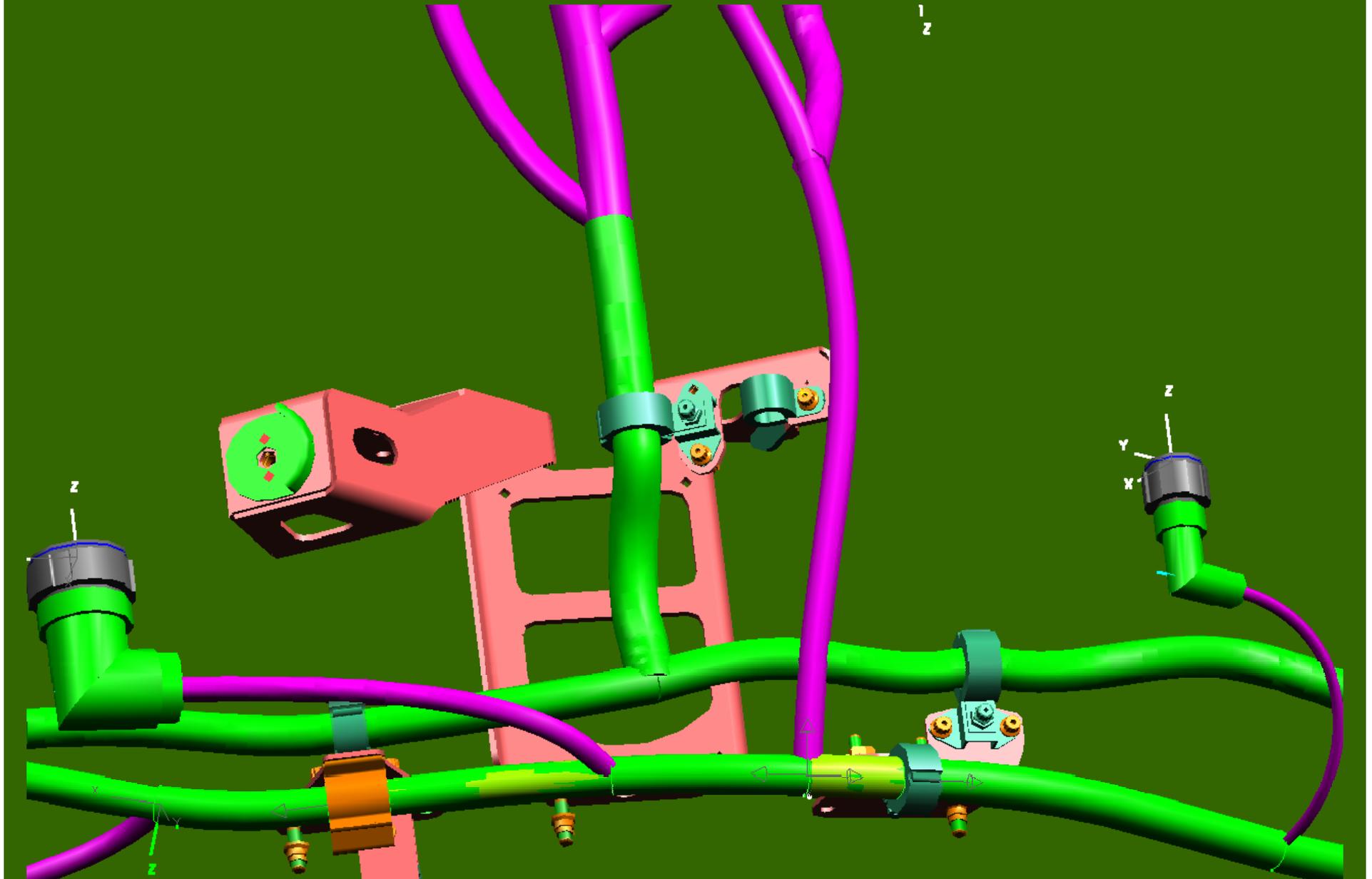
Backshell Back Extension



Review supplier Drawings



Clamp point change



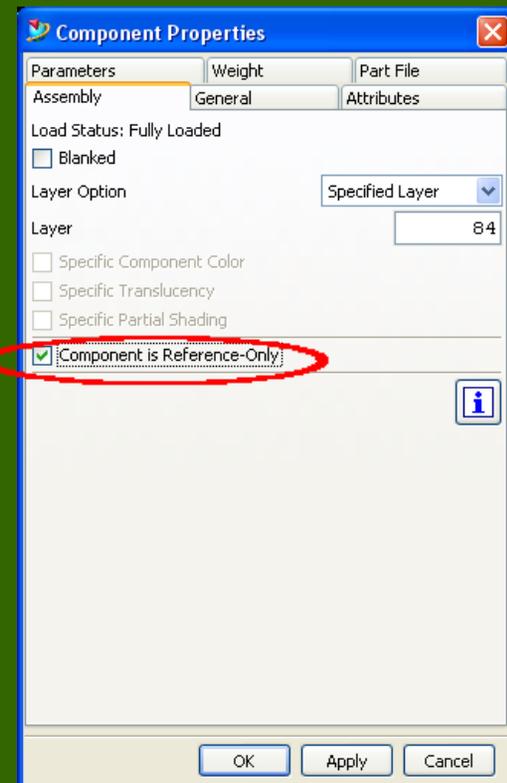
Symbolic Clamp

Symbolic clamp is a stick figure that will be part of the harness model *Reference only*

Teamcenter Engineering with NXManager
custom Item Model

Teamcenter Engineering with NXManager
out of the box

NX Unigraphics with out Teamcenter Engineering
Model name REF-MS1234-16.prt

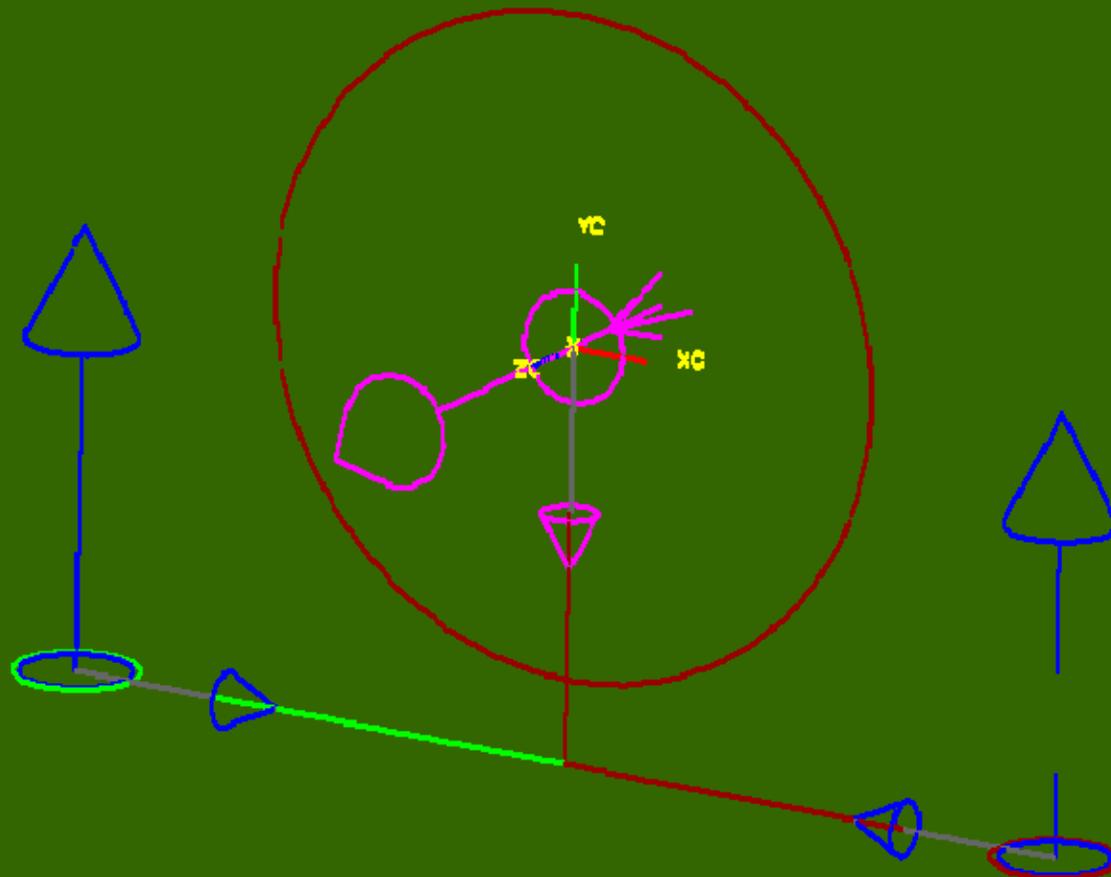


Symbolic Clamp

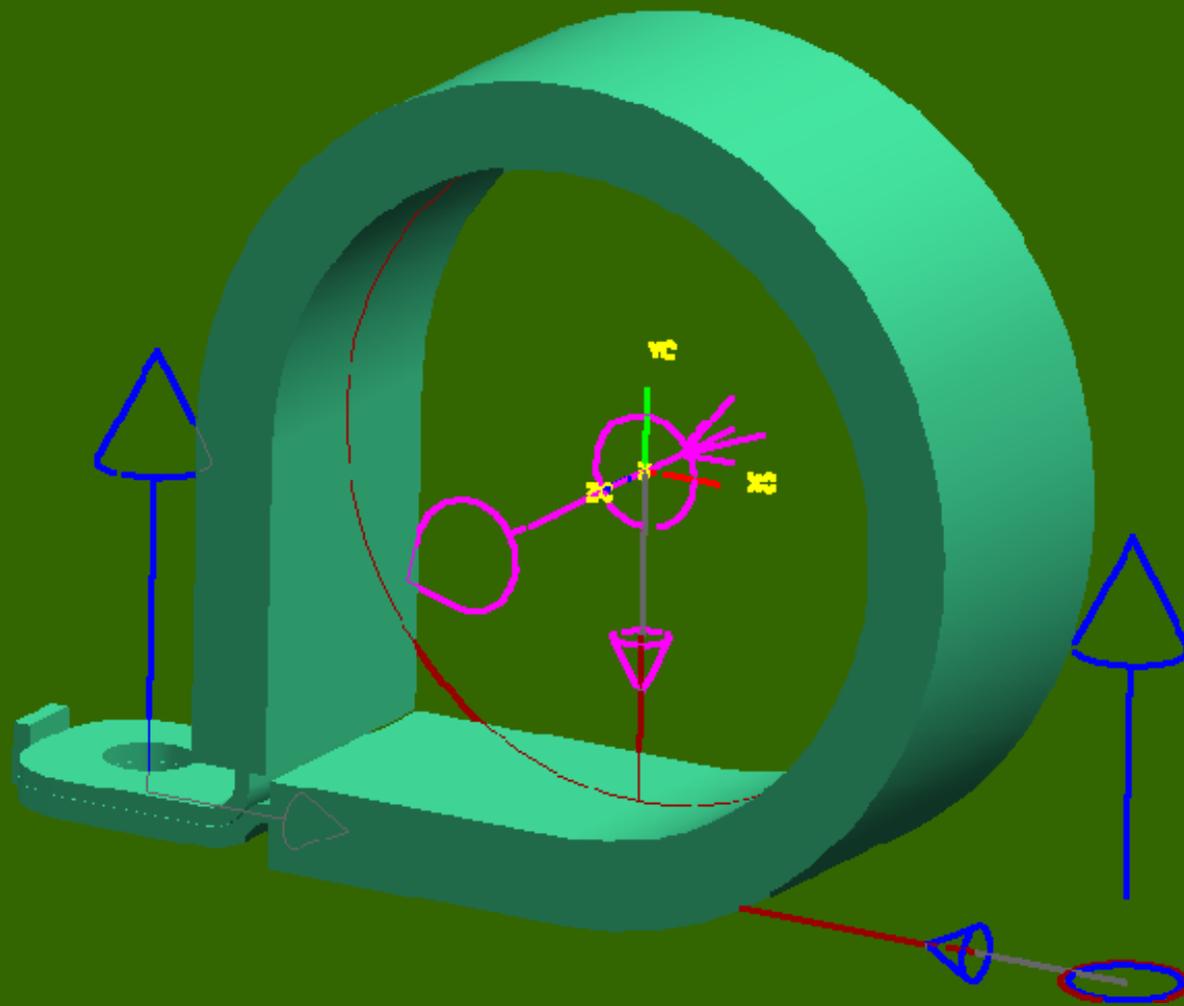
Why not.

WAVE linker and/or Deformable Part

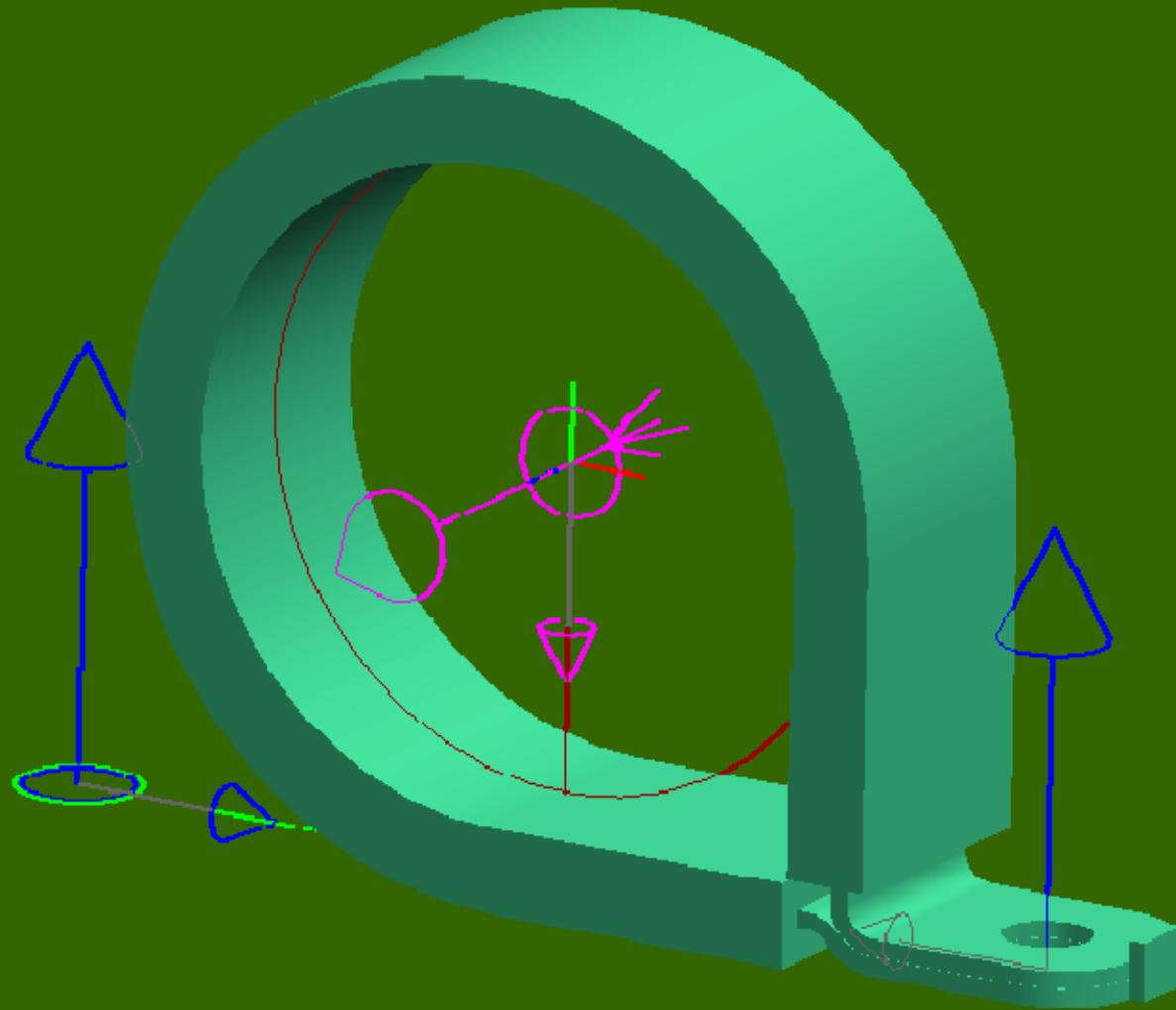
Symbolic Clamp



Symbolic Clamp



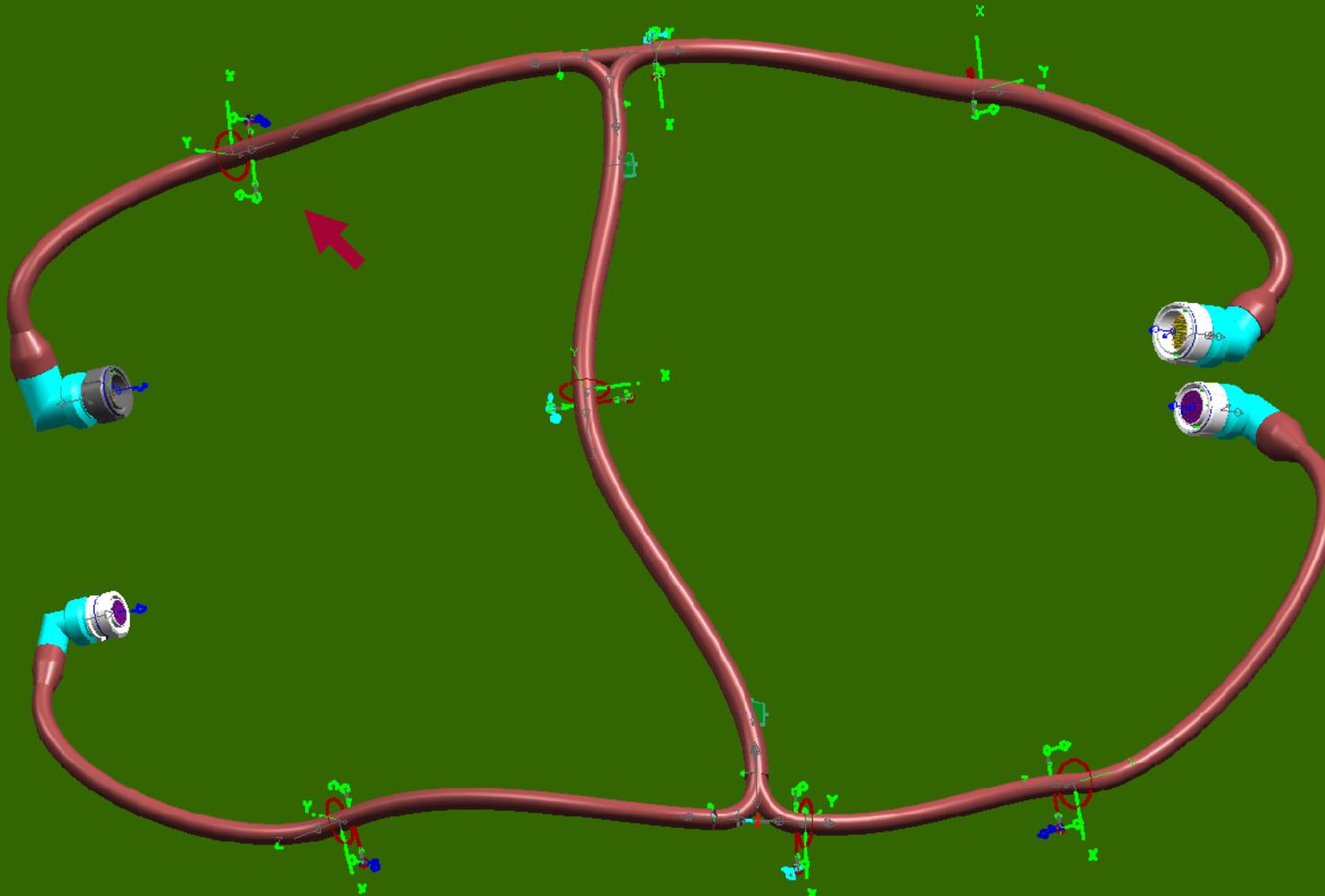
Symbolic Clamp



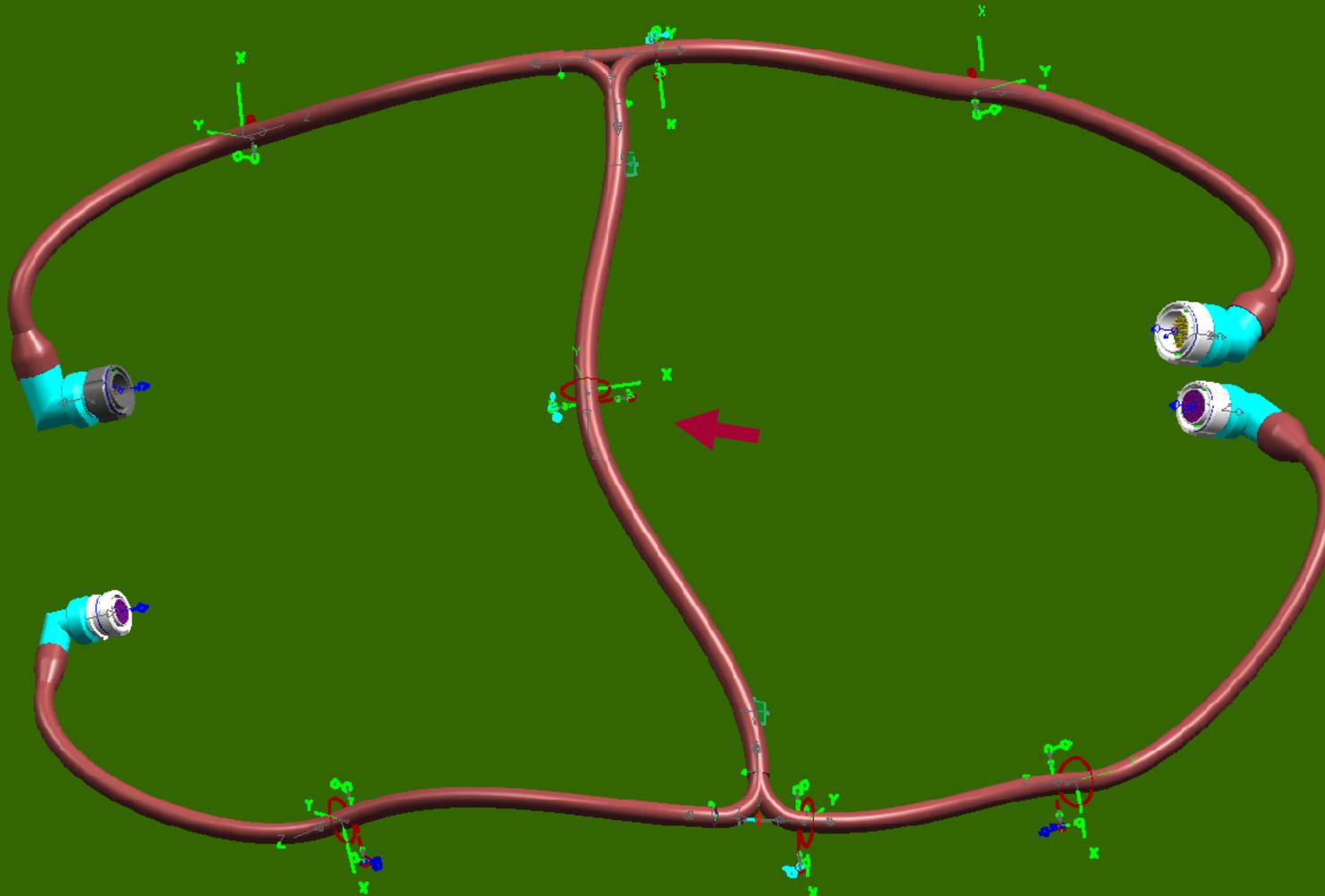
Symbolic Clamp Resizer

- *Change all Symbolic Clamp to fit Bundle Diameter in the harness*

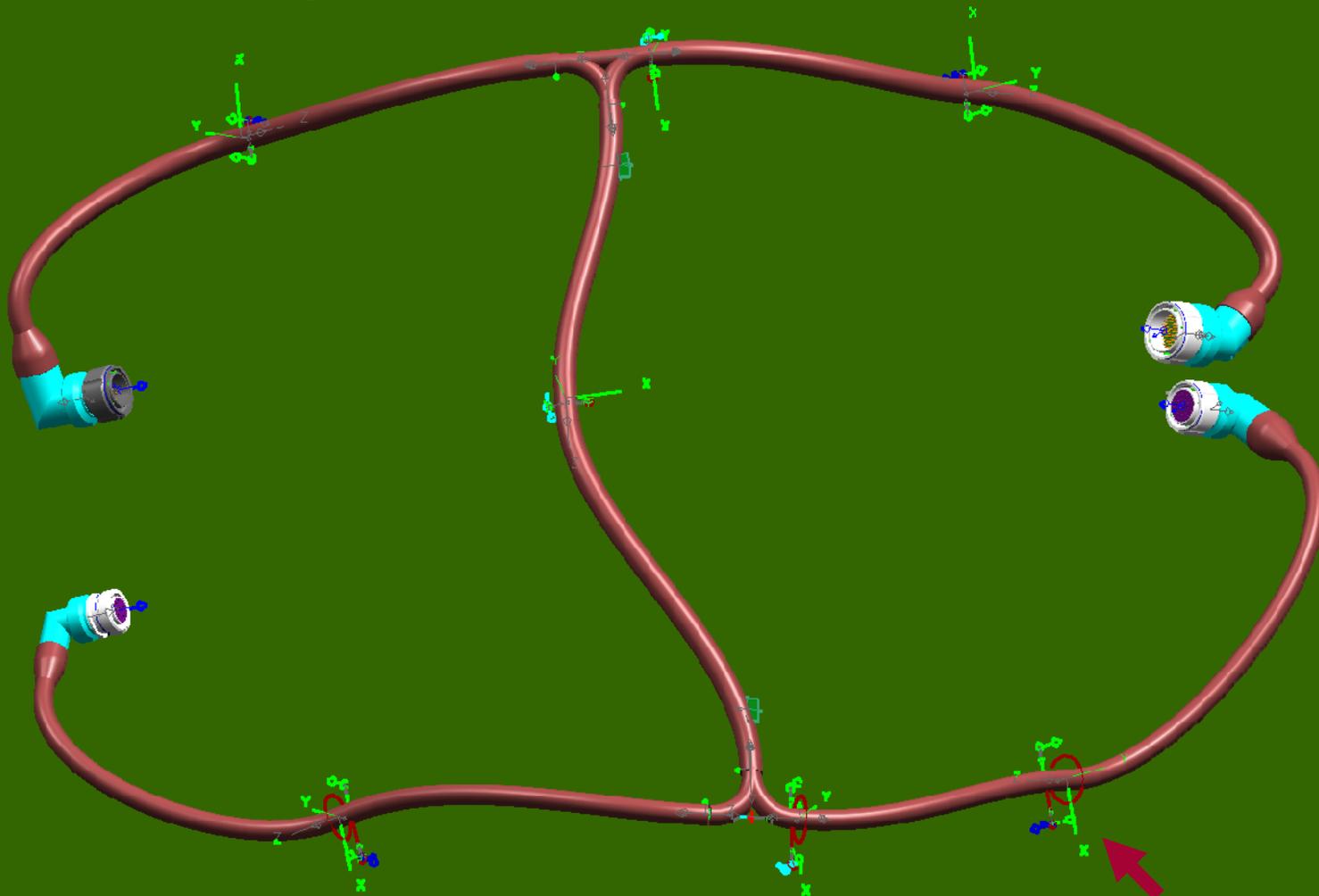
Symbolic Clamp Resizer



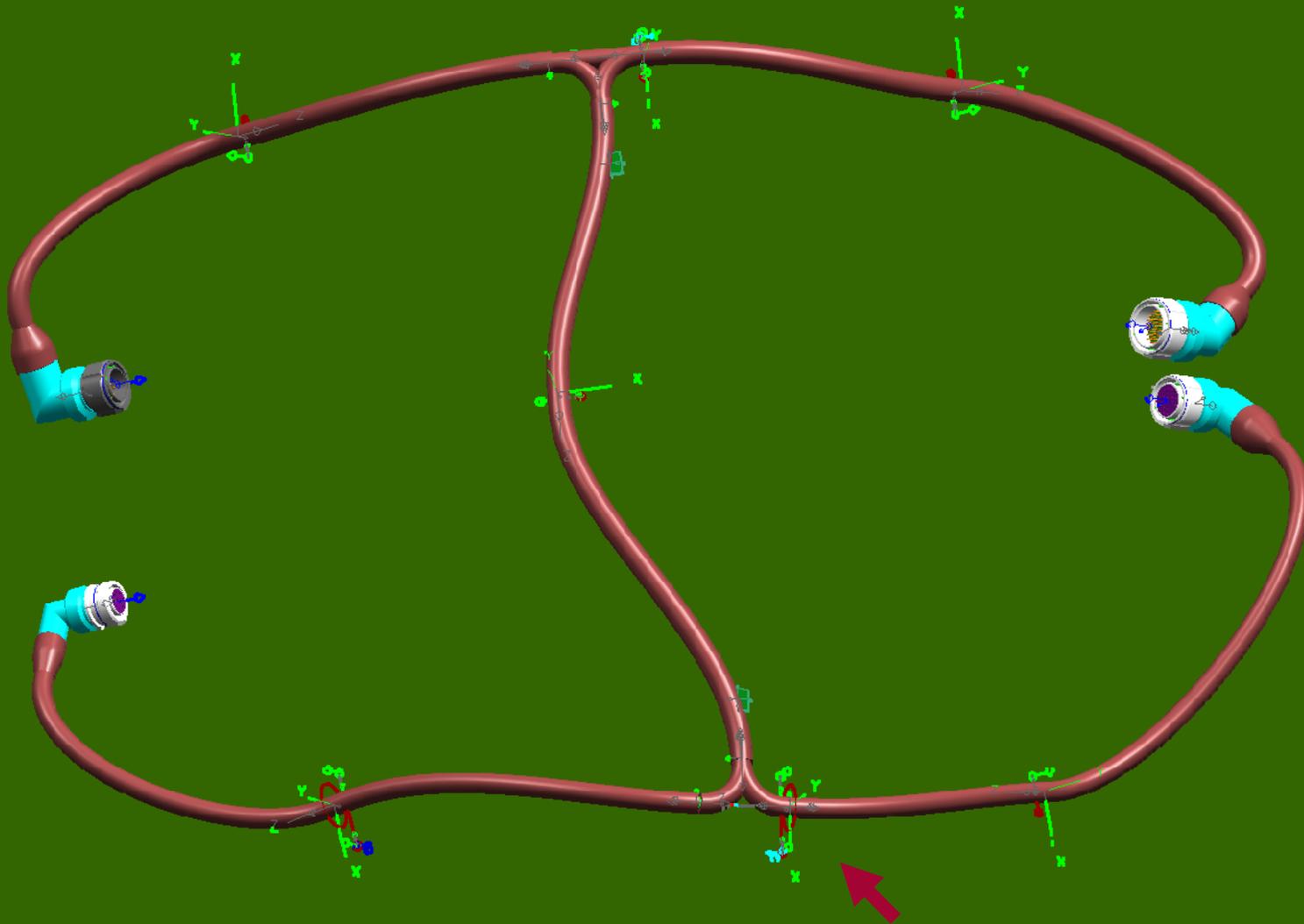
Symbolic Clamp Resizer



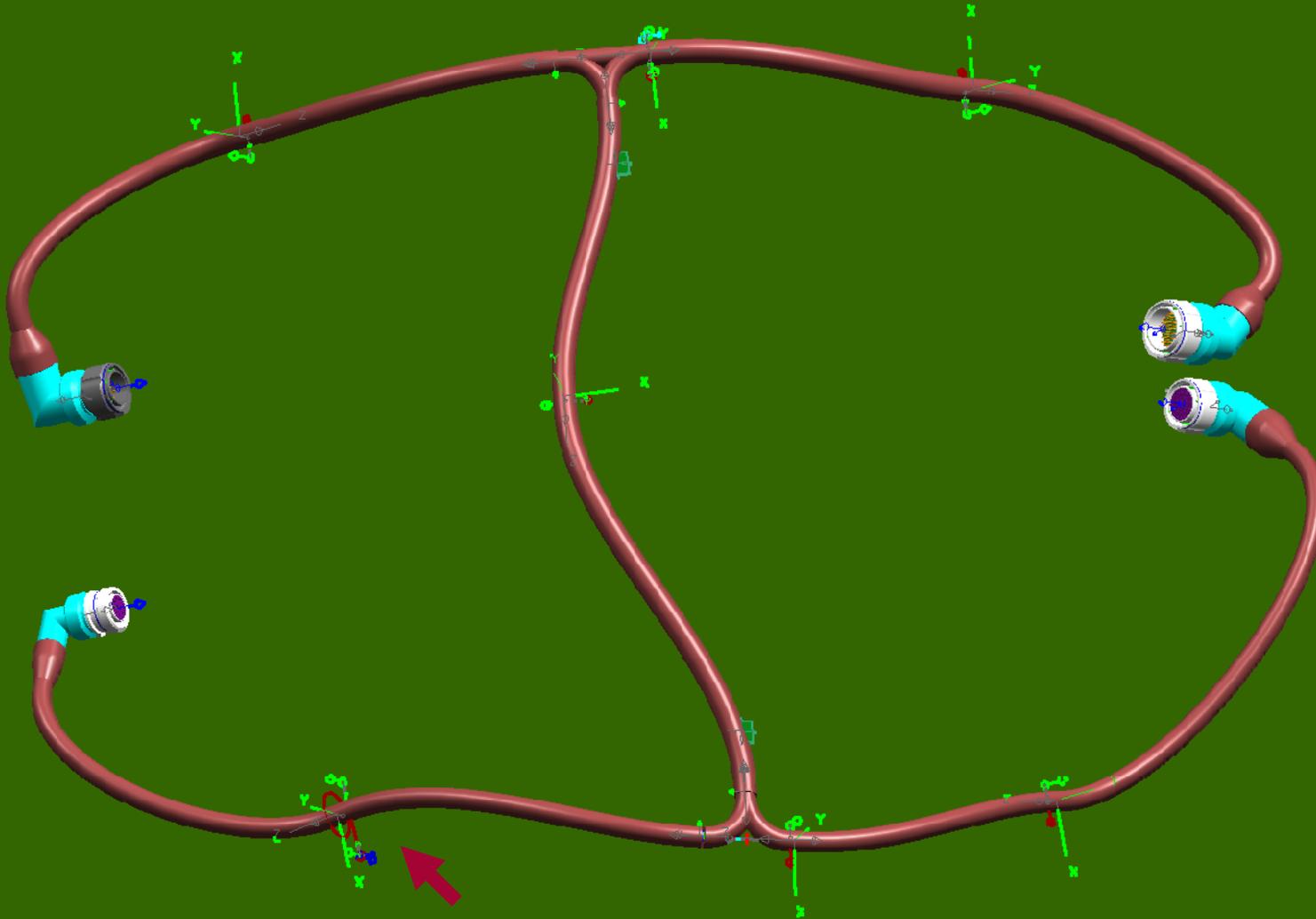
Symbolic Clamp Resizer



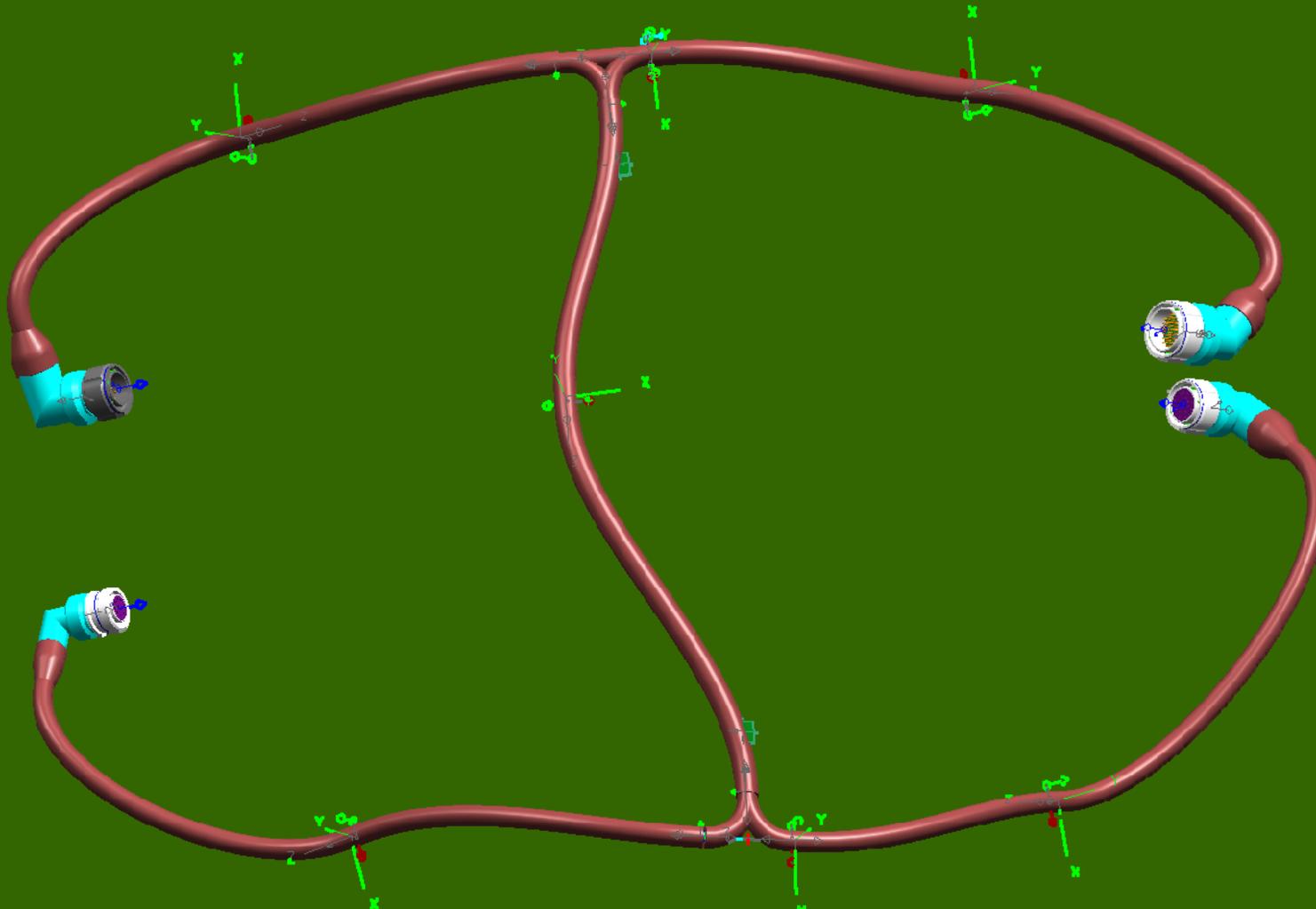
Symbolic Clamp Resizer



Symbolic Clamp Resizer



Symbolic Clamp Resizer

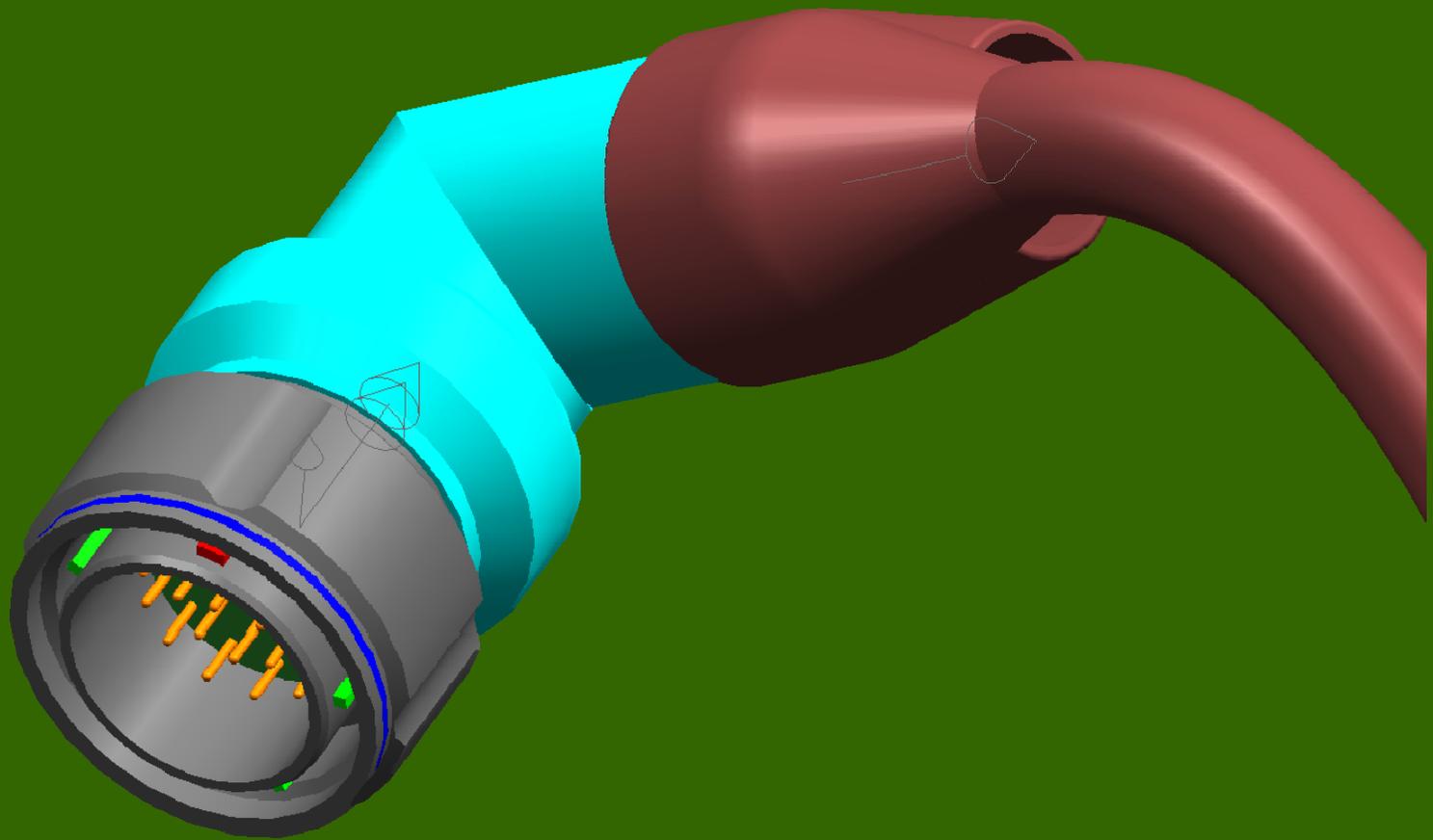


Assembly Navigator

Component Name

- <sys-test-clamp>
- + D38999/26KG275N
- + D38999/26K361PN
- + D00999/26MG27PN
- + M83723/95K1610N
- M85049/84-16503
- M85049/89-25503
- M85049/90-21503
- M85049/90-21503
- REF-M850490_16-36
- REF-M850490_21-36
- REF-M850490_25-34
- REF-ST1-78-C6
- REF-ST1-78-C6
- REF-ST1-78-C6
- REF-ST1-78-C7
- REF-ST1-78-C8
- REF-ST1-78-C8
- REF-ST1-78-C8
- T-205
- T-205

Over Braid on Backshell



I expect a over

98%

reduction in turn back by using
NX Routing Electrical

Question ?

INFO

ugroute_elec.plv

The 'Specify Item' dialog box shows a tree view of parts. The tree is expanded to show 'Wiring Parts Node' under 'Parts'. The tree structure is as follows:

- Externals Engine System
 - Connectors
 - Backshell
 - Symbolic Clamps
 - Break-out
- Air Management System
 - Connectors
 - Backshell
- Conduit Parts
 - Conduit Parts
 - Flex Conduit Parts
 - Junction Box
 - Terminal Board
 - Conduit Hardware
 - Conduit Support
 - PVC Conduit
- Raceway Parts
 - Inside Flanged Cable Tray
 - Outside Flanged Cable Tray
 - File Select

Red arrows point from the 'Connectors' and 'Air Management System' nodes in the tree to the corresponding sections in the Notepad window.

```
ugroute_elec.plv - Notepad
File Edit Format View Help

NODE ELECTRICAL
NAME Electrical
SUBNODES PARTS STOCK WIRES CABLES SHIELDS
END_OF_NODE

NODE PARTS
NAME Parts
SUBNODES WIRING_PARTS_EES WIRING_PARTS_AMS CONDUIT_STOCK
SUBNODES FILE_SELECT
END_OF_NODE

NODE STOCK
NAME Stock
SUBNODES WIRING_STOCK CONDUIT_STOCK RACEWAY_STOCK
SUBNODES FILE_SELECT
END_OF_NODE

!-----
!----- WIRING PARTS NODE -----
!-----

! Connectors (or other parts) accessed via Place Part
NODE WIRING_PARTS_EES
NAME Externals Engine Systems
SUBNODES CONNECTORS BACKSHELLS SYMBOLIC_CLAMP
END_OF_NODE

NODE WIRING_PARTS_AMS
NAME Air Management System
SUBNODES CONNECTORS1 BACKSHELLS1
END_OF_NODE

NODE CONNECTORS
NAME Connectors
TABLE connector.ptb
END_OF_NODE

NODE CONNECTORS1
NAME Connectors
TABLE connector1.ptb
END_OF_NODE
```

The XML Marker window shows the XML code for the 'Wiring Parts Node'. The code is as follows:

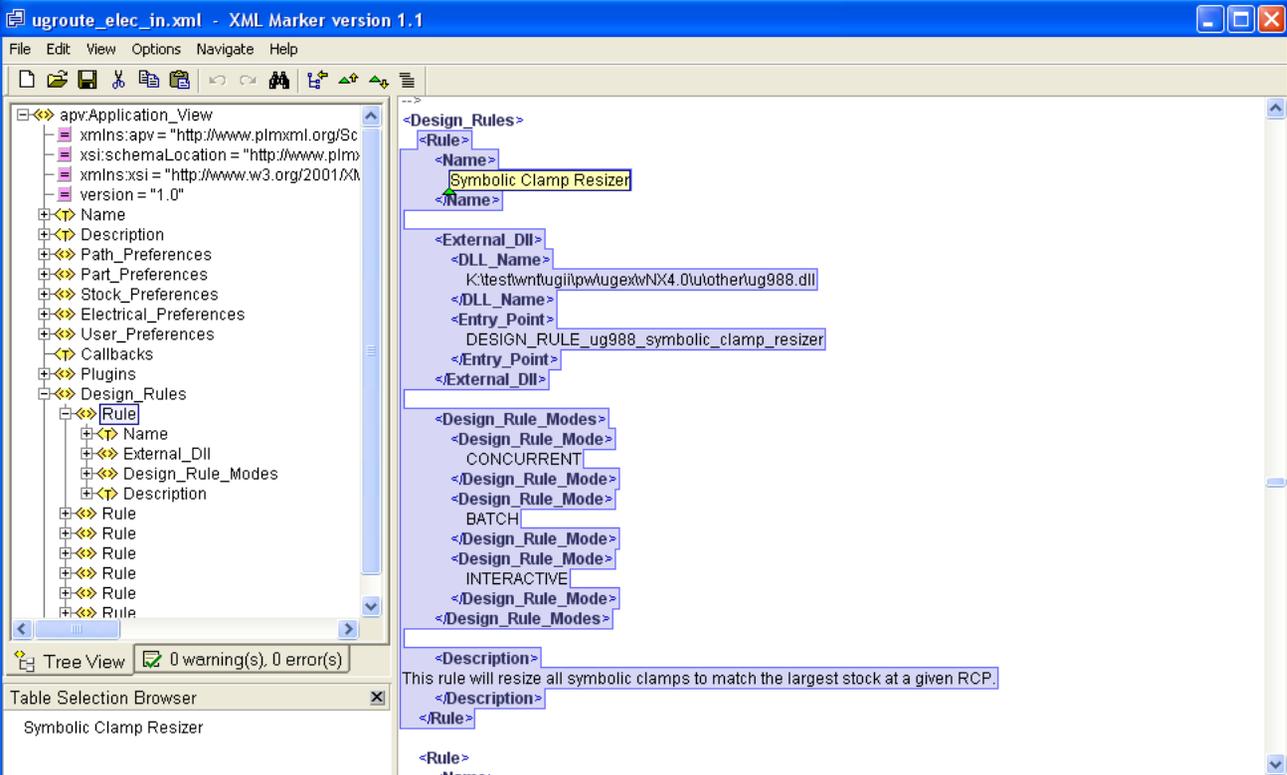
```
<Disciplines>
  <Discipline>
    <Name>
      Wiring_EES
    </Name>
    <Start_Fitting_Node>
      WIRING_PARTS_EES
    </Start_Fitting_Node>
    <Start_Stock_Node>
      WIRING_STOCK
    </Start_Stock_Node>
    <Allowed_Run_Types>
    </Allowed_Run_Types>
    <Synonym_Characteristics>
      <Synonym>
        <Synonym_Name>
          OD
        </Synonym_Name>
        </Synonym_Name>
      </Synonym>
    </Synonym_Characteristics>
  </Discipline>
</Disciplines>
```

Red arrows point from the 'change' and 'Add' labels to the 'Wiring_EES' and 'Wiring_AMS' rows in the table below.

Tag name/Text	Name	Start_Fitting_Node	Start_Stock_Node	Allowed_Run_Types
<>> Discipline	Wiring_EES	WIRING_PARTS_EES	WIRING_STOCK	
<>> Discipline	Conduit	CONDUIT_PARTS	CONDUIT_STOCK	
<>> Discipline	Raceway	RACEWAY_PARTS	RACEWAY_STOCK	
<>> Discipline	Wiring_AMS	WIRING_PARTS_AMS	WIRING_STOCK	

INFO

ugroute_elec_in.xml



XML Marker version 1.1

File Edit View Options Navigate Help

Tree View 0 warning(s), 0 error(s)

Table Selection Browser

Symbolic Clamp Resizer

```
<Design_Rules>
  <Rule>
    <Name>
      Symbolic Clamp Resizer
    </Name>
    <External_Dll>
      <Dll_Name>
        K:\test\wntugil\pw\ugex\wNX4.0\w\other\ug988.dll
      </Dll_Name>
      <Dll_Name>
      </Dll_Name>
      <Entry_Point>
        DESIGN_RULE_ug988_symbolic_clamp_resizer
      </Entry_Point>
    </External_Dll>
    <Design_Rule_Modes>
      <Design_Rule_Mode>
        CONCURRENT
      </Design_Rule_Mode>
      <Design_Rule_Mode>
        BATCH
      </Design_Rule_Mode>
      <Design_Rule_Mode>
        INTERACTIVE
      </Design_Rule_Mode>
    </Design_Rule_Modes>
    <Description>
      This rule will resize all symbolic clamps to match the largest stock at a given RCP.
    </Description>
  </Rule>
  ...
</Design_Rules>
```

Tree Selection Browser

Rule

(This tag has no attributes.)

4 Subtags:

Tag name/Text	Text	Unique Subtags
Name	Symbolic Clamp Resizer	
External_Dll		2 unique subtags
Design_Rule_Modes		Design_Rule_Mode (3 occurrences)
Description	This rule will resize all symbolic clamps to mat...	

Ready

INFO

ugroute_elec_in.xml

The image shows a software interface with two main windows. The left window is titled "Specify Item" and contains several panels:

- Items:** A list of item nodes, with "D38999/25KG27PN" selected.
- Selection Characteristics:** A panel with a "Specification" dropdown set to "D38999". Below it are fields for "Destination", "MATERIAL", "SST", "SHELL_SIZE" (set to "21-G"), "NUM_OF_CONTACT", "KEYWAY" (set to "N"), and "21FIRST_CENTURY" (set to "no").
- Required Characteristics:** A panel with "INSTALL" set to "WCO1".
- Optional Characteristics:** A panel with "connector_id" set to "P25".
- Descriptor:** A panel with "CONNECTOR" set to "Receptacle-Solder-", "CONTACT_TYPE" set to "male", and "MATES_WITH" set to "D38999/26KG27SN".

The right window is titled "ugroute_elec_in.xml - XML Marker version 1.1" and shows an XML tree view. A red arrow points from the "Destination" field in the "Specify Item" dialog to the "Destination_Characteristics" section in the XML tree. The XML tree shows a hierarchy of elements, with "Destination_Characteristics" expanded to show its subtags:

```
<Destination_Characteristics>  
  <Characteristic>  
    <Name>  
      MATERIAL  
    <Name>  
    <String_Value xsi:nil="true"/>  
  </Characteristic>  
  <Characteristic>  
    <Name>  
      SHELL_SIZE  
    <Name>  
    <String_Value xsi:nil="true"/>  
  </Characteristic>  
  <Characteristic>  
    <Name>  
      NUM_OF_CONTACT  
    <Name>  
    <Real_Value xsi:nil="true"/>  
  </Characteristic>  
  <Characteristic>  
    <Name>  
      KEYWAY  
    <Name>  
    <String_Value xsi:nil="true"/>  
  </Characteristic>  
  <Characteristic>  
    <Name>  
      21FIRST_CENTURY
```

Below the XML tree, there is a "Table Selection Browser" which is empty, and a "Tree Selection Browser" showing the "Destination_Characteristics" tag and its 5 subtags:

Tag name/Text	Name	String_Value	Real_Value
Characteristic	MATERIAL	true	
Characteristic	SHELL_SIZE	true	
Characteristic	NUM_OF_CONTACT		true
Characteristic	KEYWAY	true	
Characteristic	21FIRST_CENTURY	true	

INFO

ugroute_elec_in.xml

The image displays two overlapping windows from a software application. The 'Specify Item' window on the left shows a list of items and various configuration options. The 'ugroute_elec_in.xml' window on the right shows an XML tree view and a corresponding XML code view. Red arrows indicate the mapping between the 'INSTALL' and 'MCO1' values in the 'Specify Item' dialog and the 'INSTALL' and 'MCO1' elements in the XML code.

Specify Item Dialog:

- Item Node: D38999/25KG24PC, D38999/25KG24PD, D38999/25KG24PE, D38999/25KG24PN, D38999/25KG25PA, D38999/25KG25PB, D38999/25KG25PC, D38999/25KG25PD, D38999/25KG25PE, D38999/25KG25PN, D38999/25KG27PA, D38999/25KG27PB, D38999/25KG27PC, D38999/25KG27PD, D38999/25KG27PE, **D38999/25KG27PN**, D38999/25KG39PA, D38999/25KG39PB, D38999/25KG39PC, D38999/25KG39PD, D38999/25KG39PE, D38999/25KG39PN, D38999/25KG41PA, D38999/25KG41PB, D38999/25KG41PC, D38999/25KG41PD, D38999/25KG41PE, D38999/25KG41PN, D38999/25KH21PA, D38999/25KH21PB, D38999/25KH21PC, D38999/25KH21PD, D38999/25KH21PE, D38999/25KH21PN, D38999/25KH32PA
- Specification: D38999
- Destination: (empty)
- MATERIAL: SST
- SHELL_SIZE: 21-G
- NUM_OF_CONTACT: 27.000000
- KEYWAY: N
- 21FIRST_CENTURY: no
- CONNECTOR: Receptacle-Solder
- CONTACT_TYPE: male
- MATES_WITH: D38999/26KG27SN

ugroute_elec_in.xml - XML Marker version 1.1:

```
<!-- Stock_Preferences -->
<!-- Electrical_Preferences -->
<!-- User_Preferences -->
<!-- Callbacks -->
<!-- Plugins -->
<!-- Design_Rules -->
<!-- Disciplines -->
  <!-- Discipline -->
    <!-- Name -->
    <!-- Start_Fitting_Node -->
    <!-- Start_Stock_Node -->
    <!-- Allowed_Run_Types -->
    <!-- Synonym_Characteristics -->
    <!-- Destination_Characteristics -->
    <!-- Stationary_Characteristics -->
    <!-- Fabrication_Characteristics -->
    <!-- Stock_Applied_Characteristics -->
    <!-- Part_Applied_Characteristics -->
      <!-- Required -->
      <!-- Characteristic -->
        <Name>
          INSTALL
        </Name>
        <String_Value xsi:nil="TRUE"/>
      </Characteristic>
    </Optional>
  </Optional>
</Part_Applied_Characteristics>
<!-- Specification -->
  <Name>
    M83723
  </Name>
  <Characteristic -->
    <Name>
      SHELL_SIZE
    </Name>
```

INFO

ugroute_elec_in.xml

Specify Item

Item Node

- D38999/25KG24PC
- D38999/25KG24PD
- D38999/25KG24PE
- D38999/25KG24PN
- D38999/25KG25PA
- D38999/25KG25PB
- D38999/25KG25PC
- D38999/25KG25PD
- D38999/25KG25PE
- D38999/25KG25PN
- D38999/25KG27PA
- D38999/25KG27PB
- D38999/25KG27PC
- D38999/25KG27PD
- D38999/25KG27PE
- D38999/25KG27PN**
- D38999/25KG39PA
- D38999/25KG39PB
- D38999/25KG39PC
- D38999/25KG39PD
- D38999/25KG39PE
- D38999/25KG39PN
- D38999/25KG41PA
- D38999/25KG41PB
- D38999/25KG41PC
- D38999/25KG41PD
- D38999/25KG41PE
- D38999/25KG41PN
- D38999/25KH21PA
- D38999/25KH21PB
- D38999/25KH21PC
- D38999/25KH21PD
- D38999/25KH21PE
- D38999/25KH21PN
- D38999/25KH32PA

Selection Characteristics

Specification: D38999

Destination: MATERIAL

SST: SST

SHELL_SIZE: 21-G

NUM_OF_CONTACT: 27.000000

KEYWAY: N

21FIRST_CENTURY: no

Descriptor

CONNECTOR: Receptacle-Solder-

CONTACT_TYPE: male

MATES_WITH: D38999/26KG27SN

Item Name: D38999/25KG27PN

Clear Characteristics

File Select

Preview

OK Back

ugroute_elec_in.xml - XML Marker version 1.1

File Edit View Options Navigate Help

Tree View 0 warning(s), 0 error(s)

Table Selection Browser

This Table Selection Browser is empty

```
<Specification>
  <Specification>
    <Name>
      D38999
    </Name>
    <Characteristic>
      <Name>
        SHELL_SIZE
      </Name>
      <String_Value>
        9-A
      </String_Value>
      <String_Value>
        11-B
      </String_Value>
      <String_Value>
        13-C
      </String_Value>
      <String_Value>
        15-D
      </String_Value>
      <String_Value>
        17-E
      </String_Value>
      <String_Value>
        19-F
      </String_Value>
      <String_Value>
        21-G
      </String_Value>
      <String_Value>
        23-H
      </String_Value>
      <String_Value>
        25-J
      </String_Value>
    </Characteristic>
    <Characteristic>
      <Name>
        CONNECTION_TYPE
      </Name>
      <String_Value>
        D38999
      </String_Value>
      <String_Value>
        na
      </String_Value>
    </Characteristic>
  </Specification>
</Specification>
```

Tree Selection Browser

Specification

(This tag has no attributes.)

3 Subtags:

Tag name/Text	T	Text	Name	String_Value
Name		D38999		
Characteristic		SHELL_SIZE		String_Value (9 occurrences)
Characteristic		CONNECTION_TYPE		String_Value (2 occurrences)

Ready

Pos 54536, Ln 1662, Col 22

INFO route_elec_connections.tcl

```
route_elec_connections.tcl - WordPad
File Edit View Insert Format Help
[Icons]

#####
# Function Name : ROUTE_ELEC_check_connection_compatibility
#
# Description
# Test the compatibility of a connection in the
# Routing Electrical application. Works on the assumption that
# not all types of parts have all characteristics tested for.
#
# Tested characteristics and their compatibility rules are
# specified below:
#
# - DIAMETER/SIZE must be equal [if they exist] shell-size
# - MATERIAL must be equal [if it exists]
# - GENDER must not be equal [if it exists] plug to receptacle
# - CONNECTION_TYPE must be equal [if it exists]
# the next 4 add by F.Bilek
# -NUM_OF_CONTACT must be equal [if they exist]
# -CONTACT_TYPE must not be equal [if it exists] pin to socket
# -KEYWAY must be equal [if they exist]
# -21FIRST_CENTURY must be equal [if they exist] yes or no
#
# Characteristics correspond to parts from the old [pre HX2]
# Wiring/Raceway/Conduit part libraries.
#
# Input
# connection - Tag of a connection
#
# Returns
# Violation in the form {short description} {long description}
#
#####
proc ROUTE_ELEC_check_connection_compatibility { connection } {
# Get the two objects in the connection
set cports [ROUTE_ask_connection_ports $connection]
set slist ""
set llist ""

```

```
route_elec_connections.tcl - WordPad
File Edit View Insert Format Help
[Icons]

}
}
# 21FIRST_CENTURY must be equal [if it exists]
if { [string length $21FIRST_CENTURY(0)] && [string length $21FIRST_CENTURY(1)] } {
if { $21FIRST_CENTURY(0) != $21FIRST_CENTURY(1) } {
lappend slist "21FIRST_CENTURY"
lappend llist "Incompatible 21First Century $21FIRST_CENTURY(0) and $21FIRST_CENTURY(1) can not mix"
}
}
# MATERIAL must be equal [if it exists]
if { [string length $MATERIAL(0)] && [string length $MATERIAL(1)] } {
if { $MATERIAL(0) != $MATERIAL(1) } {
lappend slist "MATERIAL"
lappend llist "Incompatible materials $MATERIAL(0) and $MATERIAL(1) can not mix"
}
}
# GENDER must not be equal [if it exists]
if { [string length $GENDER(0)] && [string length $GENDER(1)] } {
if { $GENDER(0) == $GENDER(1) } {
lappend slist "GENDER"
lappend llist "Incompatible genders \"$GENDER(0)\" and \"$GENDER(1)\""
}
}
# CONTACT_TYPE must not be equal [if it exists]
if { [string length $CONTACT_TYPE(0)] && [string length $CONTACT_TYPE(1)] } {
if { $CONTACT_TYPE(0) == $CONTACT_TYPE(1) } {
lappend slist "CONTACT_TYPE"
lappend llist "Incompatible Contact_Type \"$CONTACT_TYPE(0)\" and \"$CONTACT_TYPE(1)\""
}
}
# CONNECTION_TYPE must be equal [if it exists]
if { [string length $CONNECTION_TYPE(0)] && [string length $CONNECTION_TYPE(1)] } {
if { $CONNECTION_TYPE(0) != $CONNECTION_TYPE(1) } {
lappend slist "CONNECTION_TYPE"
lappend llist "Incompatible connection types \"$CONNECTION_TYPE(0)\" and \"$CONNECTION_TYPE(1)\""
}
}
}
}
# Concatenate all incompatibilities

```

INFO Part Table

```

connector.ptb - WordPad
File Edit View Insert Format Help
!
VERSION 160
!
COLUMNS
REAL GAUGE
STRING TYPE
STRING No_WIRES
STRING Jacketed_type
STRING/HIDE COLOR
STRING Shield
REAL/HIDE OD
STRING/HIDE WEIGHT

STRING/HIDE PART_NUMBER
STRING/HIDE STOCK_KEY
STRING/HIDE PART_NAME
END_OF_COLUMNS

APPLIED
NAME WEIGHT_UNITS
FORMAT LB-INCHES
END_OF_APPLIED

DATA
!
!GAUGE, TYPE, No_WIRES, Jacketed_type, COLOR,Shield, outerDiameter, WEIGHT,
!
18 "JF" "1" "White PTFE tape" "White" "Nickel Plated Copper braid" 0.131 0.001525
18 "JF" "2" "White PTFE tape" "White" "Nickel Plated Copper braid" 0.218 0.002858
18 "JF" "3" "White PTFE tape" "White" "Nickel Plated Copper braid" 0.231 0.003867
18 "JF" "4" "White PTFE tape" "White" "Nickel Plated Copper braid" 0.253 0.00485

```

```

connector.ptb - WordPad
File Edit View Insert Format Help
!
VERSION 120
!
COLUMNS
STRING CONNECTOR
STRING MATERIAL
STRING SHELL_SIZE
REAL NUM_OF_CONTACT
STRING CONTACT_TYPE
STRING KEYWAY
STRING 21FIRST_CENTURY
STRING MATES_WITH

STRING/HIDE MEMBER_NAME
STRING/HIDE PART_NUMBER
STRING/HIDE PART_NAME
REAL/HIDE Weight
STRING/HIDE CONNECTION_TYPE
END_OF_COLUMNS

DATA
!
!CONNECTORS|Material|SHELL_SIZE|NUM_OF_CONTACT|Contact_Type|KEYWAY|21First_Century|MATES_WITH
!plug |SST |"25-J" |61 |female |N |no |"D38999/20KJ61PN"
!MEMBER_NAME |PART_NUMBER |PART_NAME |Weight|CONNECTION_TYPE
!"D-38999-26KJ61SN"|"D38999/26KJ61SN"|"M-38999-SOCKET-PLUG.prt"|0.3285|D38999
!
!38-25RSSM21
!
Receptacle-Solder-Mount SST "9-A" 3 male A yes "D38999/26KA3SA_21F-C"
"D-38999-25KA3PA" "D38999/25KA3PA_21F-C" "S-38999-PIN-RECE.prt" 0.0451 D38999
Receptacle-Solder-Mount SST "9-A" 3 male B yes "D38999/26KA3SB_21F-C"
"D-38999-25KA3PB" "D38999/25KA3PB_21F-C" "S-38999-PIN-RECE.prt" 0.0451 D38999
Receptacle-Solder-Mount SST "9-A" 3 male C yes "D38999/26KA3SC_21F-C"
"D-38999-25KA3PC" "D38999/25KA3PC_21F-C" "S-38999-PIN-RECE.prt" 0.0451 D38999
Receptacle-Solder-Mount SST "9-A" 3 male D yes "D38999/26KA3SD_21F-C"
"D-38999-25KA3PD" "D38999/25KA3PD_21F-C" "S-38999-PIN-RECE.prt" 0.0451 D38999
Receptacle-Solder-Mount SST "9-A" 3 male E yes "D38999/26KA3SE_21F-C"
"D-38999-25KA3PE" "D38999/25KA3PE_21F-C" "S-38999-PIN-RECE.prt" 0.0451 D38999
Receptacle-Solder-Mount SST "9-A" 3 male N yes "D38999/26KA3SN_21F-C"
"D-38999-25KA3PN" "D38999/25KA3PN_21F-C" "S-38999-PIN-RECE.prt" 0.0451 D38999
Receptacle-Solder-Mount SST "9-A" 3 male A yes "D38999/26KA98SA_21F-C"
"D-38999-25KA98PA" "D38999/25KA98PA_21F-C" "S-38999-PIN-RECE.prt" 0.0451 D38999
Receptacle-Solder-Mount SST "9-A" 3 male B yes "D38999/26KA98SB_21F-C"
"D-38999-25KA98PB" "D38999/25KA98PB_21F-C" "S-38999-PIN-RECE.prt" 0.0451 D38999
Receptacle-Solder-Mount SST "9-A" 3 male C yes "D38999/26KA98SC_21F-C"
"D-38999-25KA98PC" "D38999/25KA98PC_21F-C" "S-38999-PIN-RECE.prt" 0.0451 D38999
Receptacle-Solder-Mount SST "9-A" 3 male D yes "D38999/26KA98SD_21F-C"

```

!	GAUGE,	TYPE,	No_WIRES,	Jacketed_type,	COLOR,	Shield,	outerDiameter,	WEIGHT,	part_number,	STOCK_KEY,	PART_NAME,	NUM
18	"JF"	"1"	"White PTFE tape"	"White"	"Nickel Plated Copper braid"			0.131 0.001525	"M27500-18JF1N06"	"C-CABLE.prt"	C-JF-18-1.prt	
18	"JF"	"2"	"White PTFE tape"	"White"	"Nickel Plated Copper braid"			0.218 0.002858	"M27500-18JF2N06"	"C-CABLE.prt"	C-JF-18-2.prt	
18	"JF"	"3"	"White PTFE tape"	"White"	"Nickel Plated Copper braid"			0.231 0.003867	"M27500-18JF3N06"	"C-CABLE.prt"	C-JF-18-3.prt	
18	"JF"	"4"	"White PTFE tape"	"White"	"Nickel Plated Copper braid"			0.253 0.00485	"M27500-18JF4N06"	"C-CABLE.prt"	C-JF-18-4.prt	