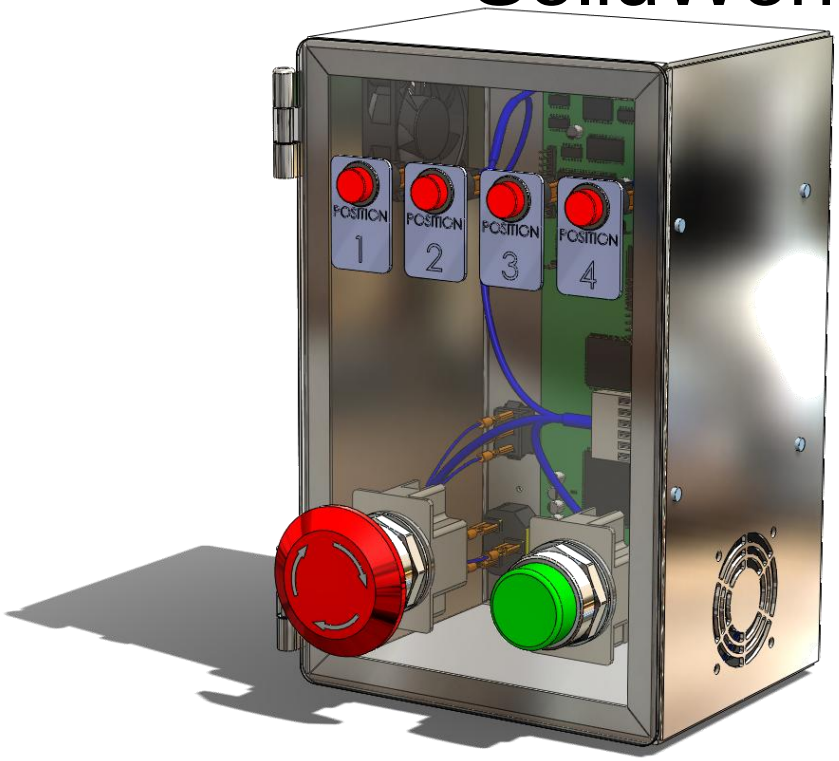
North East SolidWorks User Conference

Cable and Harness Design Using SolidWorks Routing



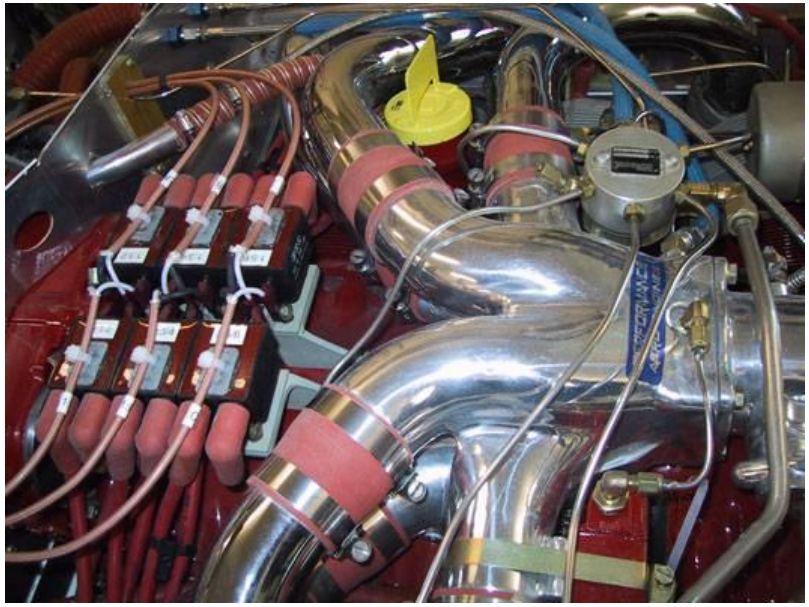
Gabe Enright

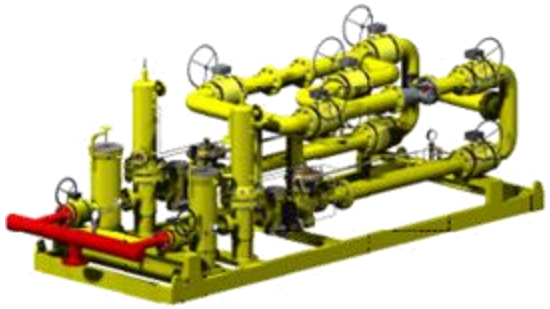
Senior Applications Engineer

CADD Edge Inc.

Agenda

- Why Routing?
- SolidWorks Skills
- Creating Routes
- Libraries
- Learning Routing
- Tips & Tricks





Why Routing?

- Move Routing Design Forward in Design Process
- Claim space
- Create consistent Products
- Prevent Errors

Actual Quotes

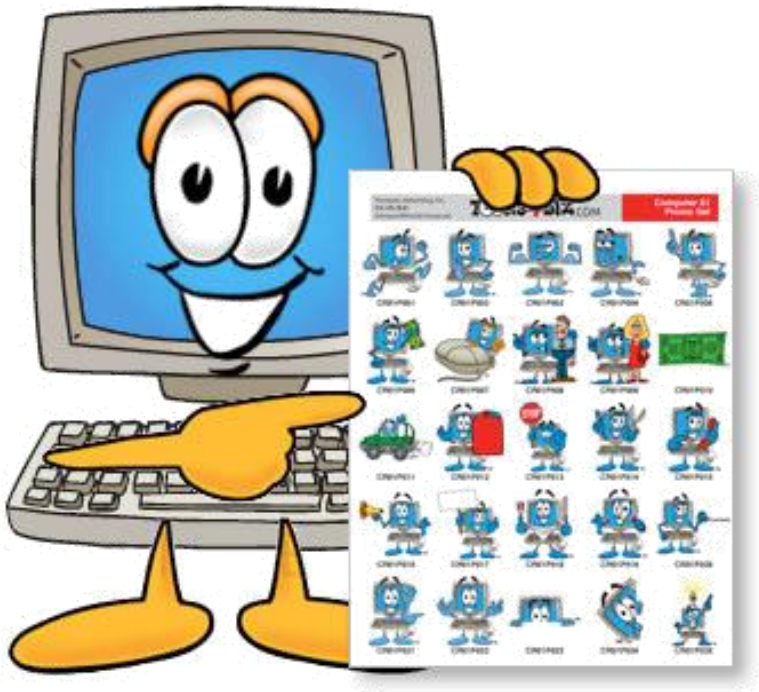
"Wire Harnesses are the last thing we design before the box"

"Once we put all the wiring in we couldn't close the cabinet door"

"If our welder ever quits we are going to have to buy back a machine to learn how its plumbed"

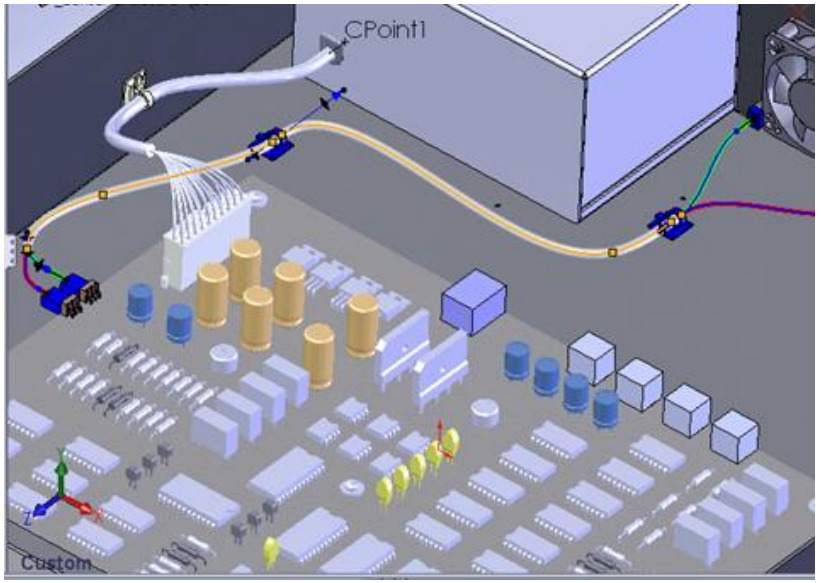
SolidWorks Skills

- Top Down Assembly modeling
- Mate References
- 3D sketching
- Display States
- Virtual Parts

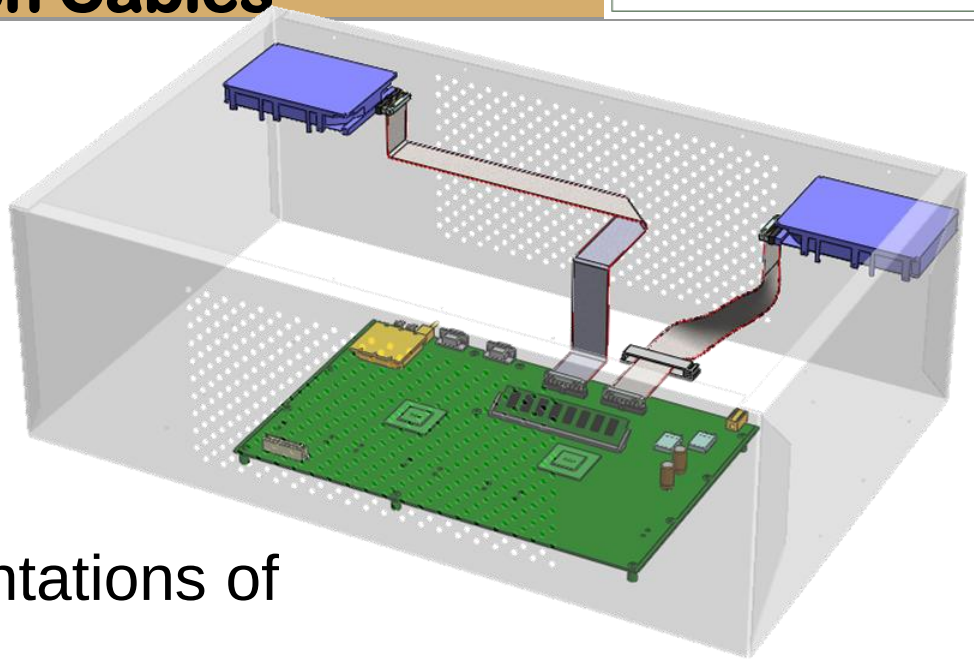


Electrical Routing WorkFlow

- Place connectors
  - Manually or Via From To
- Create Routes between connectors
  - Use clips to constrain them
- Add Wires
  - Manually or Via From-To
- Document
  - Flatten Assembly
    - Manufacturing
    - Annotation



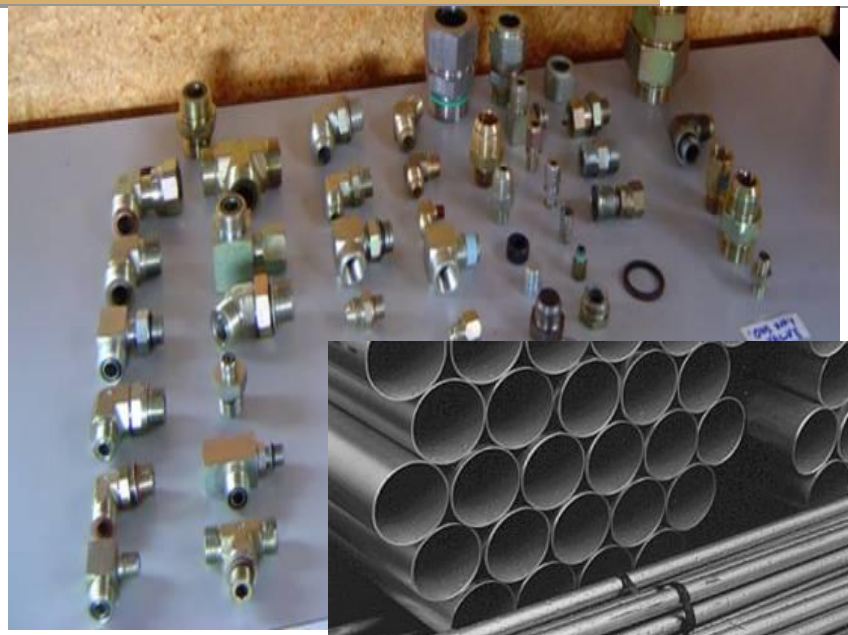
Ribbon Cables



- New in 2009 SP2
- Create Physical Representations of Ribbon or Flat Cables
- Limitations
  - Edit Wires cannot be used to assign wires to a ribbon cable.
  - From-to Lists cannot be used with ribbon cables.
  - Auto Route is the only way create routes. Manual sketching is not allowed.
  - Repair Route cannot be used.

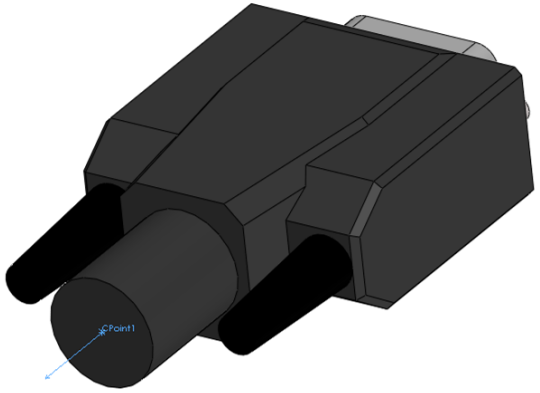
Libraries

- What's in it?
- What else is out there?
- Strategies for creation.



Creating Connectors

- Geometry
- Connection points
- Mate Reference
- Axis of Rotation
- Add to Connector library



LEARN WITH THE WIZARD!!

(the software not me)

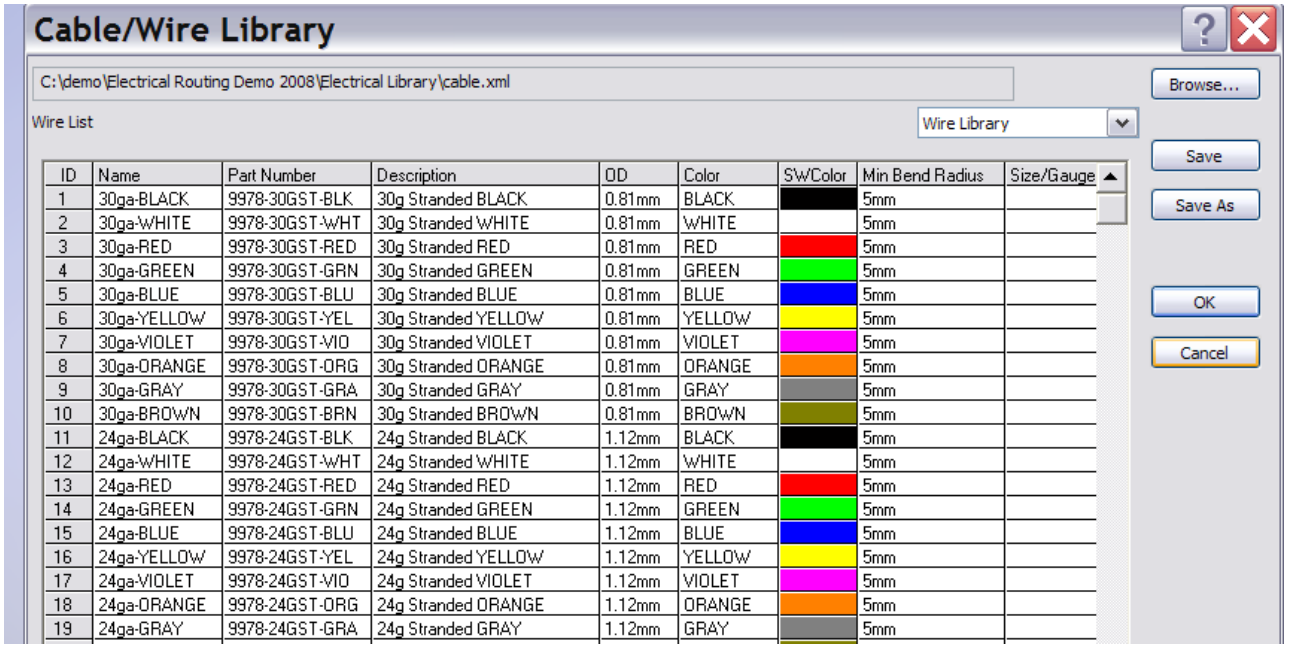
Library's

- Folder Structure
- Components

Connectors	SLDPRT, SLDASM
Clips	SLDPRT, SLDASM
Wire & Cable	XML
Other parts	XML

Wire Library Import

- Build Manually (tedious)
- Import Excel



Cable/Wire Library

C:\demo\Electrical Routing Demo 2008\Electrical Library\cable.xml

Browse...

Wire List

Wire Library

Save

Save As

OK

Cancel

ID	Name	Part Number	Description	OD	Color	SWColor	Min Bend Radius	Size/Gauge
1	30ga-BLACK	9978-30GST-BLK	30g Stranded BLACK	0.81mm	BLACK		5mm	
2	30ga-WHITE	9978-30GST-WHT	30g Stranded WHITE	0.81mm	WHITE		5mm	
3	30ga-RED	9978-30GST-RED	30g Stranded RED	0.81mm	RED		5mm	
4	30ga-GREEN	9978-30GST-GRN	30g Stranded GREEN	0.81mm	GREEN		5mm	
5	30ga-BLUE	9978-30GST-BLU	30g Stranded BLUE	0.81mm	BLUE		5mm	
6	30ga-YELLOW	9978-30GST-YEL	30g Stranded YELLOW	0.81mm	YELLOW		5mm	
7	30ga-VIOLET	9978-30GST-VIO	30g Stranded VIOLET	0.81mm	VIOLET		5mm	
8	30ga-ORANGE	9978-30GST-ORG	30g Stranded ORANGE	0.81mm	ORANGE		5mm	
9	30ga-GRAY	9978-30GST-GRA	30g Stranded GRAY	0.81mm	GRAY		5mm	
10	30ga-BROWN	9978-30GST-BRN	30g Stranded BROWN	0.81mm	BROWN		5mm	
11	24ga-BLACK	9978-24GST-BLK	24g Stranded BLACK	1.12mm	BLACK		5mm	
12	24ga-WHITE	9978-24GST-WHT	24g Stranded WHITE	1.12mm	WHITE		5mm	
13	24ga-RED	9978-24GST-RED	24g Stranded RED	1.12mm	RED		5mm	
14	24ga-GREEN	9978-24GST-GRN	24g Stranded GREEN	1.12mm	GREEN		5mm	
15	24ga-BLUE	9978-24GST-BLU	24g Stranded BLUE	1.12mm	BLUE		5mm	
16	24ga-YELLOW	9978-24GST-YEL	24g Stranded YELLOW	1.12mm	YELLOW		5mm	
17	24ga-VIOLET	9978-24GST-VIO	24g Stranded VIOLET	1.12mm	VIOLET		5mm	
18	24ga-ORANGE	9978-24GST-ORG	24g Stranded ORANGE	1.12mm	ORANGE		5mm	
19	24ga-GRAY	9978-24GST-GRA	24g Stranded GRAY	1.12mm	GRAY		5mm	

Available Colors for Wires

BLACK
WHITE
RED
GREEN
BLUE
YELLOW
MAGENTA
CYAN
GRAY
LIGHTGRAY
DARKRED
DARKGREEN
DARKBLUE
LIGHTBROWN
DARKMAGENTA
DARKCYAN

FROM-TO Import

Component Library

C:\ProgramData\SolidWorks\SolidWorks 2010\design library\routing\electrical\components.xml

Component List

ID	Name	SolidWorks Document	Configuration	Description	Pins List
1	db15-plug	db15-e.sldprt	Default	Connector	1,2,3,4,5,6,7
2	db9-plug	db9 male.sldprt	Default	Connector- 9 Pin Male	1,2,3,4,5,6,7
3	5pindin-plug	plug-5pindin.sldprt	Default	Connector	1,2,3,4,5
4	plug-sma	plug-sma.sldprt	Default	Connector	1,2,3,4,5,6
5	plug-6pin-mini	plug-6pin-minidin.sldprt	Default	Connector	1,2,3,4,5,6
6	ring_term_18-2	ring_term_18-22_awg-x_6.sld	Default	Connector	1
7	ring_term_awg-	ring_term_awg-14-16_awg-x	Default	Connector	1
8	plug-usb1	plug-usb1.sldprt	Default	Connector	1
9	plug-usb2	plug-usb2.sldprt	Default	Connector	1
10	socket-6pinmin	socket-6pinmindin.sldprt	Default	Connector	1,2,3,4,5,6
11	connector (3pi	connector (3pin) female.SLD	Default	Connector	1,2,3
12	LED	LED.SLDPRT	Default	Light	1,2
13	LED - RS_276-0	LED - RS_276-068.SLDPRT	Default	Light	1,2
14	connector (3pi	connector (3pin) male.sldprt	Default	Connector	1,2,3
15	5Pinner	aa5pin.sldprt	Default	End Connector	1,2,3,4,5
16	3Pinner	aa3pin.sldprt	Default	End Connector	1,2,3

Cable/Wire Library

C:\ProgramData\SolidWorks\SolidWorks 2010\design library\routing\electrical\cable.xml

Wire List

Wire Library

ID	Name	Part Number	Description	OD	Color	SWColor	Min Bend R	Size/Gau
1	20g yellow	9982	20g yellow	2mm	Y		2mm	2.5
2	20g white	9983	20g white	2mm	W		1mm	2
3	20g red	9984	20g red	2mm	R		1mm	16
4	20g blue	9985	20g blue	2mm	B		1mm	22

Header Definitions(From/To)

Column headers for data import. Use ';' to enter multiple values.

Wire name:
Wire Name;Wire

From reference:
From Ref

From pin:
Pin;From Pin

Part number:
From Part number;Part number;Partno

To reference:
To Ref

To pin:
Pin;To Pin

Part number:
To Part Number;Partno;Part number

Cable name:
Cable;Cable name

Core name:
Core Identifier;Core Colour;Core

Colour:
Colour;Color

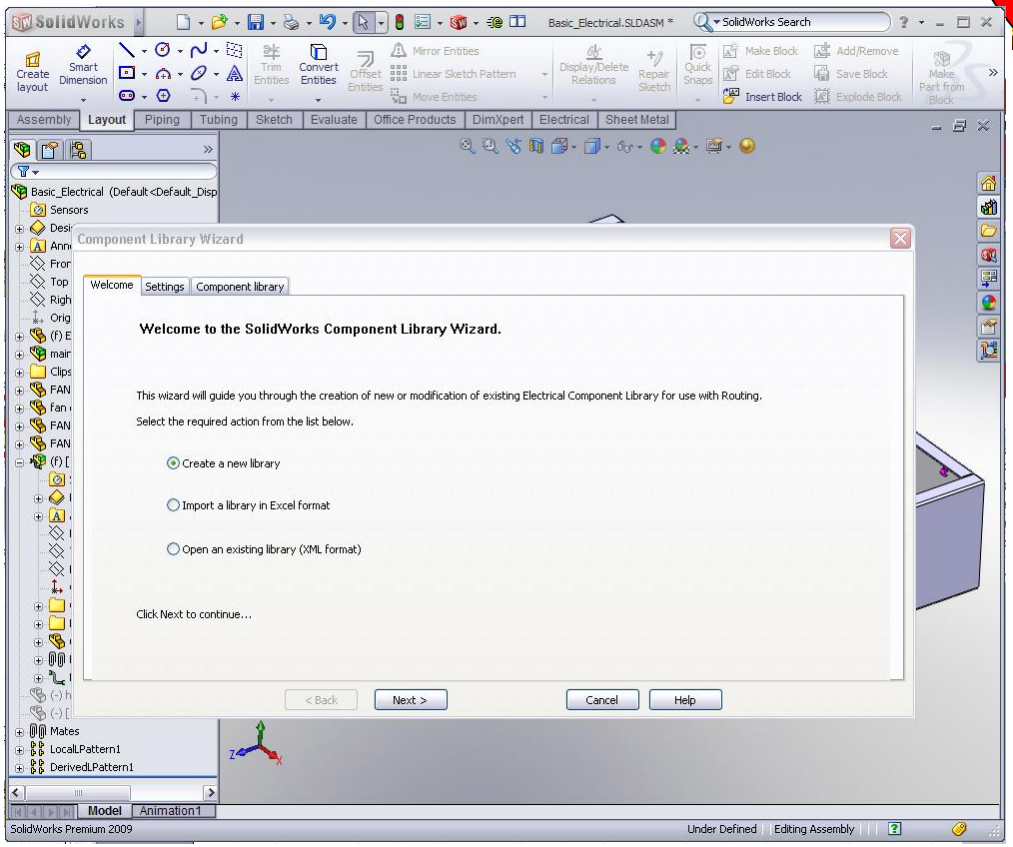
Wire spec:
Wire/Cable Spec;Cable Spec;Wire Spec;Spec

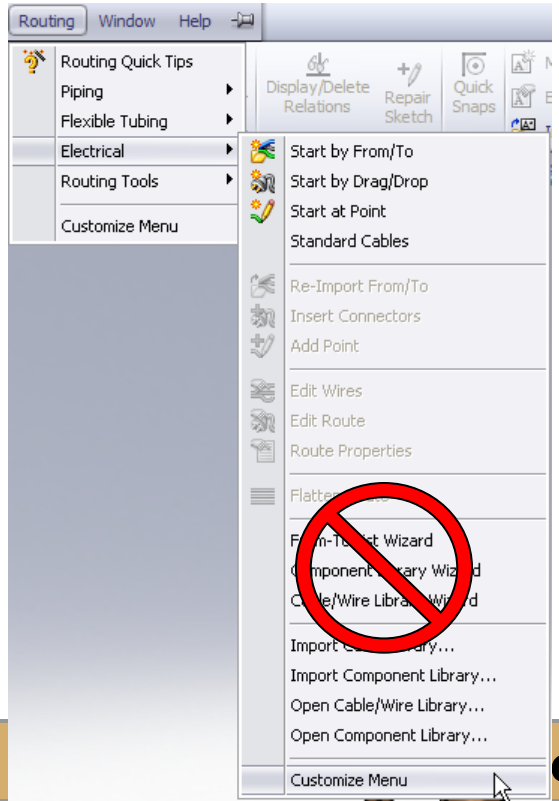
G16

	A	B	C	D	E	F	G	H	I
1									
2	**Wire**	**Wire Spec**	**From Ref**	**From Part Number**	**From Pin**	**To Ref**	**To Part Number**	**To Pin**	**Color**
3	W1	9982	motor1	5pindin-plug	1	xcon1	plug-6pin-minidin	1	
4	W2	9983	motor1	5pindin-plug	2	xcon1	plug-6pin-minidin	2	
5	W3	9984	motor1	5pindin-plug	3	xcon1	plug-6pin-minidin	1	
6	W4	9985	battery1	plug-6pin-minidin	1	xcon1	plug-6pin-minidin	2	
7	W5	9982	battery1	plug-6pin-minidin	2	xcon2	plug-6pin-minidin	1	
8	W6	9983	battery1	plug-6pin-minidin	3	xcon2	plug-6pin-minidin	2	
9	W7	9984	battery1	plug-6pin-minidin	4	xcon3	plug-6pin-minidin	1	
10	W8	9985	battery1	plug-6pin-minidin	5	xcon3	plug-6pin-minidin	2	
11									

ETC…

- AVOID or Request Enhancements to



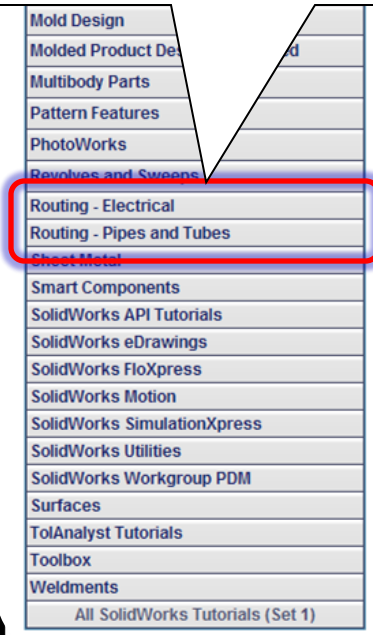


How to Learn Routing

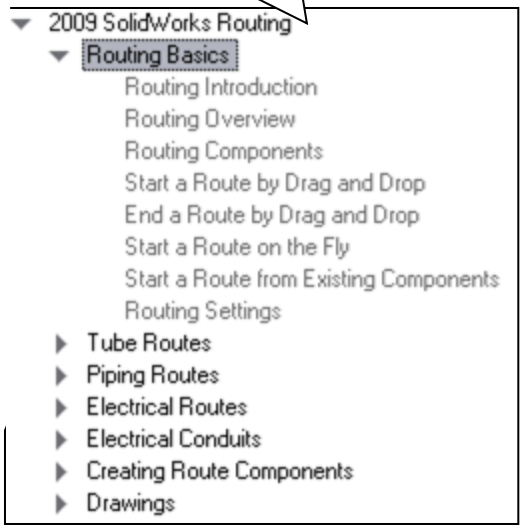
Reseller Led Training

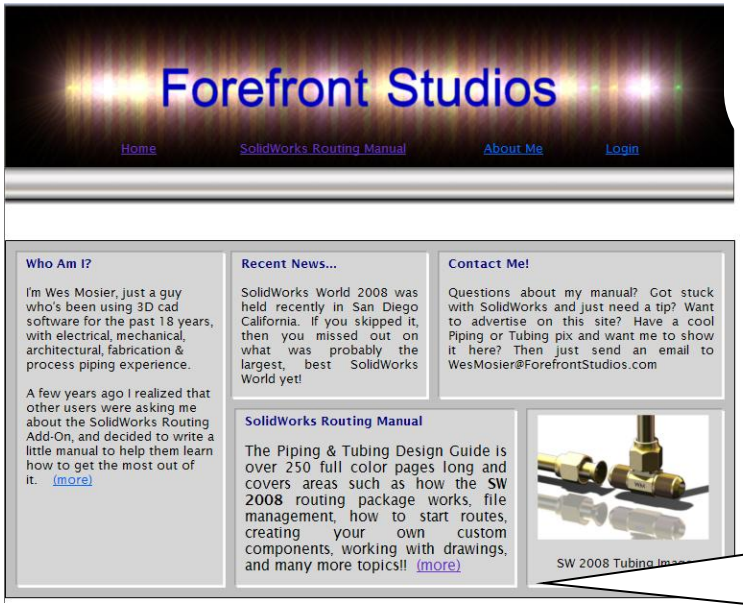
SolidWorks Authorized Training & Support Center

SolidWorks Tutorials



SolidProfessor



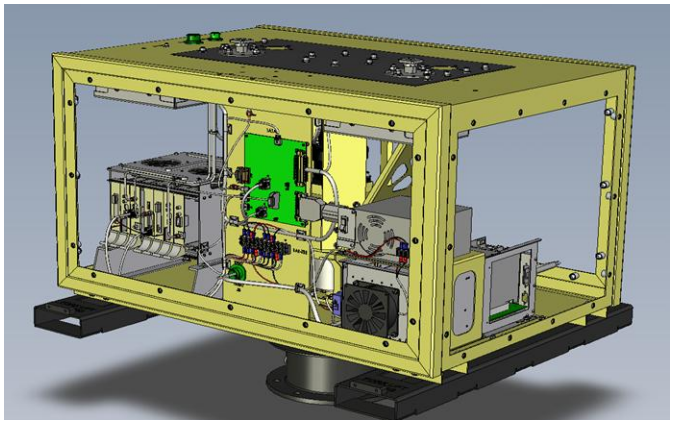


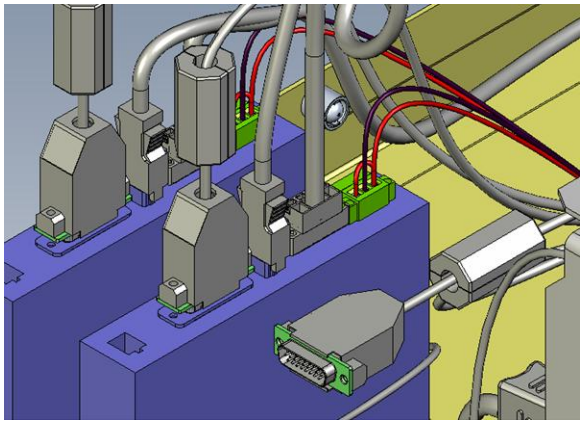
Independent Routing Manual

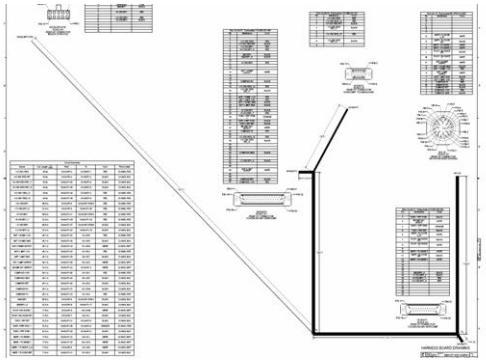
www.forefrontstudios.com

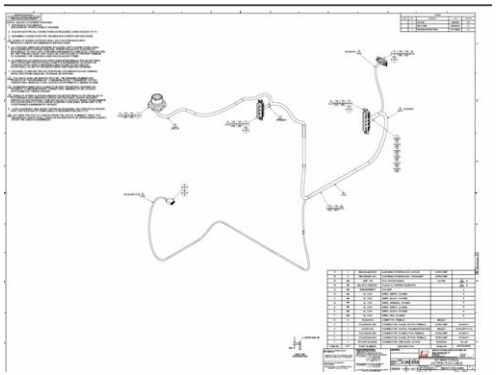
Tube and Pipe specific

Real World Routing









- Courtesy of Kirk L. Jess
  - RCX Radar Systems

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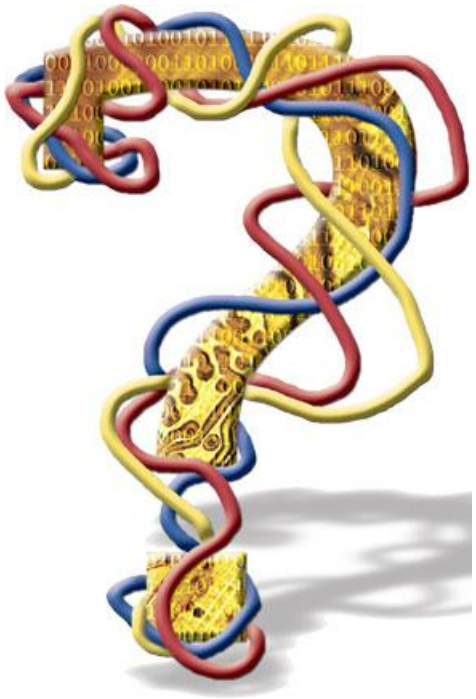
icx radar systems

THANK YOU!

Questions



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