Exercise 11a – Auto Beam Property

The purpose of the Beam Auto Property tool is to quickly generate cross section beam elements properties from a solid. Typically this would be used to help generate global loads models.

Step 1: Switch to the Aerospace profile and open the model

1. Select the Aerospace User Profile with the OptiStruct option.

	🔨 User Profiles 📃 💌							
	Customize user interface:							
l	Application: Engineering Solutions							
	C Crash Radioss *							
	C CFD AcuSolve *							
	C DropTest							
	Aerospace OptiStruct							
Always show at start-up								
	OK Cancel							

2. Open the HyperMesh model file, 11a GFEM beam.hm.

Step 2: Interrogate the model

1. Use the Model Browser to toggle on and off the geometry and mesh in each component.

Notice that **20737:Part3.1** contains the geometry for a rib, **Skin-FEM** contains elements representing the airframe skin and **Plotels** contains 1D plotel elements.



Step 3: Use the Beam Auto Property tool to assign 1D cross section properties to the plotel elems

2. From the menu bat select *Aerospace > Beams > Beam Auto Property.*

Aerospace Applica	atio	ons Help
Assembly	►	🖙 1 11 🦛
Panel	►	
Beams		Beams from lines
Composites	►	Beam Sections from CSV
Loads/BCs	۲	Beam Auto Property

- 3. With the dialog now open, select the elements in the **Plotel component** for the **Plotel** field.
- 4. Select 20737:Part3.1 component for the Comp field.
- 5. Check the Equal offsets on both ends option as well.

👍 Beam Auto Property 📃 💌							
Plotels:	Elems	н					
Comp:	Comp	н					
Equal offsets on both ends							
Use Elements instead of Geom							
Section mesh size:	0	.5					
Create Cancel							

- 6. Once selected, click **Create**.
- 7. You will notice that the tool will then make 2D cross section properties for each element. It will slide the CAD normal to the nodes of each plotel element to define the cross section boundaries. Additionally, the 3D beam visualization was turned on to graphically visualize the beam sections it defined.



8. Go into the Model Browser and notice that 35 beam properties were created, one for each plotel element.

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5 • «		Ç	- 1	•	6	9 +/-	
ntities		ID	•	Include			
- 💫 Ass	embly Hierarchy						
H 🙀 Bea	am Section Collectors (1)						
÷- 👔	20737:Part3.1_beams	1		0			
- 😂 Cor	nponents (4)						
🛛 🙀 Mal	erials (15)						
- 💫 Pro	perties (35)						
:	20737:Part3.1-beam1	1		0			
:	20737:Part3.1-beam2	2		0			
:0	20737:Part3.1-beam3	3		0			
:	20737:Part3.1-beam4	4		0			
:0	20737:Part3.1-beam5	5		0			
:0	20737:Part3.1-beam6	6		0			
:	20737:Part3.1-beam7	7		0			
:0	20737:Part3.1-beam8	8		0			
:0	20737:Part3.1-beam9	9		0			
:0	20737:Part3.1-beam10	10		0			
- : ©	20737:Part3.1-beam11	11		0			
:0	20737:Part3.1-beam12	12		0			
: ©	20737:Part3.1-beam13	13		0			
Mamo	20727:Part2 1 hearns						
ID	1						
Include	[Master Model]						

Step 4: Review the section definitions in HyperBeam

Now that the section information was generated, review it both in the graphics area and in HyperBeam.

9. From the Model Browser, select the **HyperBeam** view icon to visualize the section information.



10. Click through the definitions to review different cross sections.

Madel	Data		
	Be	esults	
	Area	= 4.304116	i9 🔺
	Centroid :		
	Local		
Entities ID	Yc	= 0.106815	,4
🖻 🧝 20737:Part3.1_beams 1	Zc	= 4.422722	:5
20737:Part3.1-beam1 1	Moments Ut Inertia :		_
- 20737 Part 31-beam 2 2		- 126 7996	2402
- 20737-Part31-beam3 3	17	= 3.683453	403
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	Centroidal		
20737, and Tuberro	ly ly	= 42.59908	i19
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20/3/:Pat31-beam/ /	lyz	= -6.274833	34
- 20737:Patt31-beam8 8	Principal	10 50 10 1	
- 20737:Patt3.1-beam9 9	IV Iv	= 43.58464	48
- 2 20737:Part3.1-beam10 10	Angle	= 2.040702	20
- 😰 20737:Part3.1-beam11 11	Polar	= 46 23342	2
20737:Part3.1-beam12 12	Badius of Gyration	= 0.784478	37
20737:Part3.1-beam13 13	Torsional Constant	= 0.173461	5
- 20737:Part31-beam14_14	Warping Constant	= 31.90566	42
- 20737:Part31-beam15 15	Shear center :		
20137-Parts Libeanto 16	Local		
	Ys	= 1.402917	6
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	We	= 0.000369	11
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	Ay	= 4.450925	6
1 -2.582848 8.007243	Az	= 1.832647	1
2 -0.586771 8.320997	Ayz	= 0.424025	<i>i</i> 6
2 01/300/ 03/3050	Principal Shear Coef	f	
3 -0.14/894 8.21/959	AV	= 4.517883	5
4 1.027667 0.732819	AW	= 1.765689	13
5 0.64703 0.499589	Ku	= 0.229736	3
	Kz	= 0.557957	4
6 -1.3543/1 U.18581/	Kyz	= -0.053154	48 -
7 1.305470 -0.125469 -			•