

Week 4 Challenge

Aim- 2D meshing of Plastic Component

Google Drive Link of assignment -

https://drive.google.com/file/d/1WW-47VEUD1mc4yss-AZJKZwiZfewxzhA/view?usp=share_link

Procedure-

Step 1- Imported the Geometry

Step 2- Improved cons resolution from **mesh module- perimeter- length – 1.**

Step 3- Set orientation from **Topo module -Faces- orient**

Step 4 – Checked for connectivity between surfaces from **topo module – faces-topo.**

Step 5- Geometry checks – **tools – checks – geometry- fix.**

Step 6- Checked for number of properties – **ctrl+P** (shown in fig 1)

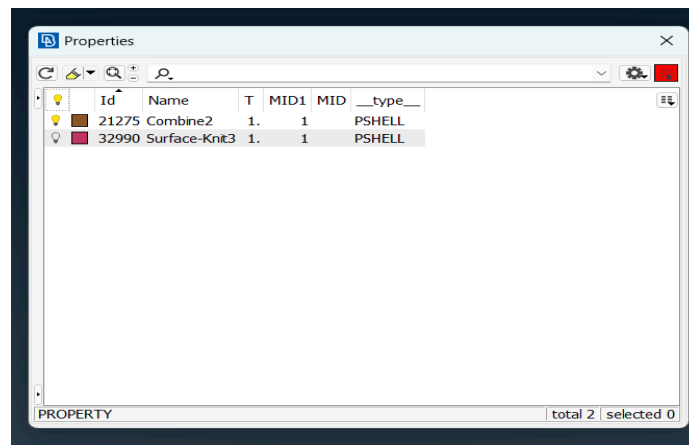


Fig 1- Property card.

Step 7- Worked on one property by turning off the other cards.

Step 8- Measured the thickness at different location from **Utilities- measure**, thickness is not same for different locations(shown in fig 2). So ,it is casting or plastic components and have to move from one surface for mid surface extraction.

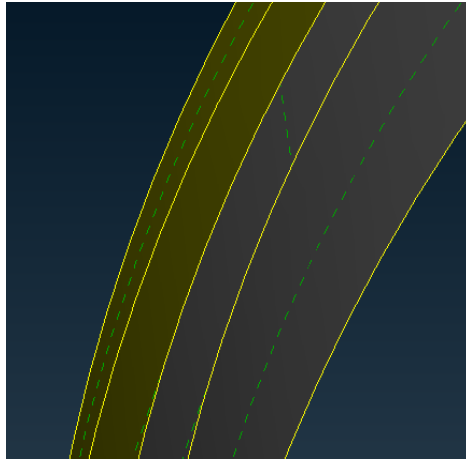


Fig 5- Mid surface for the bottom part

- Similar Process for the middle Part,

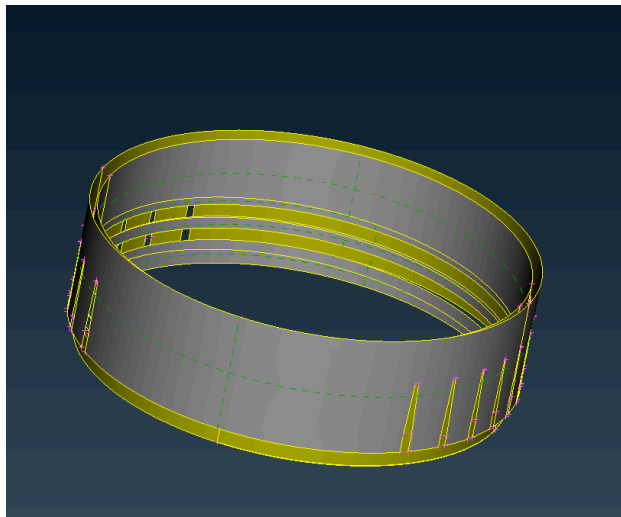


Fig 6- Middle Part of component

- After extraction of mid surface, There are some empty slots due to threaded portion, So need to be filled , Filled form **Topo Module - Faces – New** or **Topo module- Cons – Fill Hole**

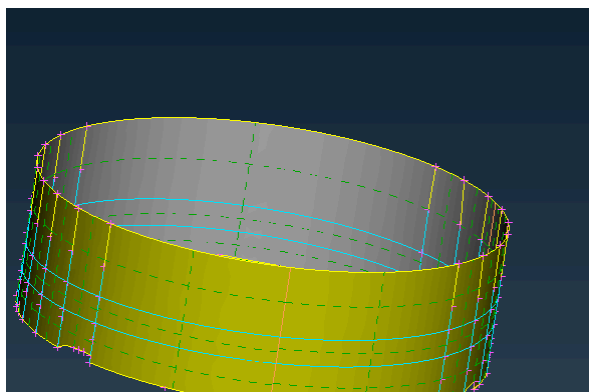


Fig 7- mid surface of middle Part after filling the slots.

- Joining the middle and bottom surface from the **Topo module – Face – New**.

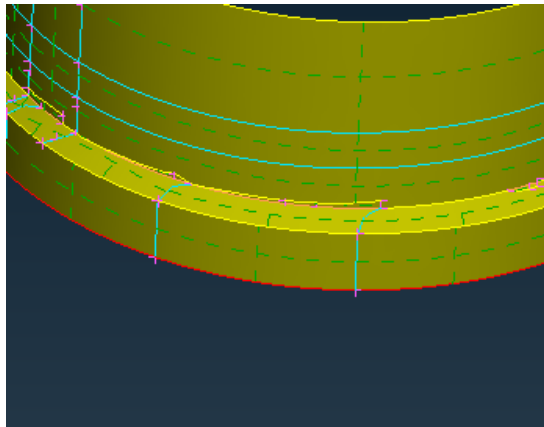


Fig 8 – joining the middle and bottom surface

- Similar Process for the top Parts.

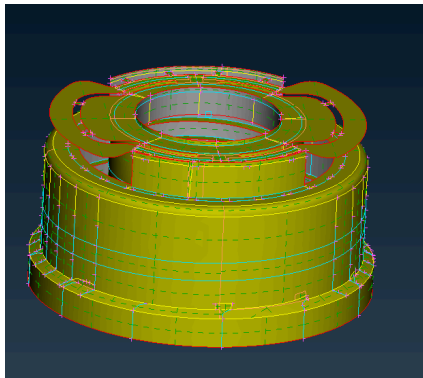


Fig 9- Mid surface for the complete component.

Ribs

1. Extracted mid surface from- Topo module-Faces – Middle- Single.
2. Extended the mid surface the adjacent surface from Topo Module- Face -Extend and selected the adjacent faces .
3. Using intersect command to get the proper connection between the surface.
4. Added a face cut and deleted the other faces
5. Repeated the same process for the other ribs.

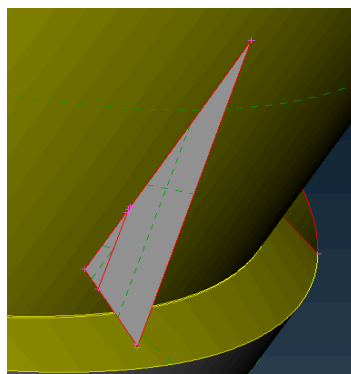


Fig 10 - Mid surface of ribs

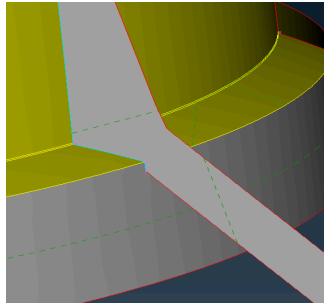


Fig 11-Mid surface after extend and intersect operation.

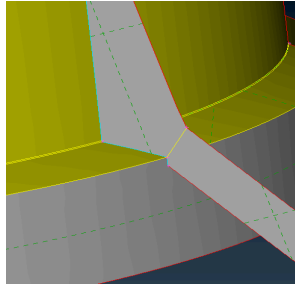


Fig 12- Face Cut operation

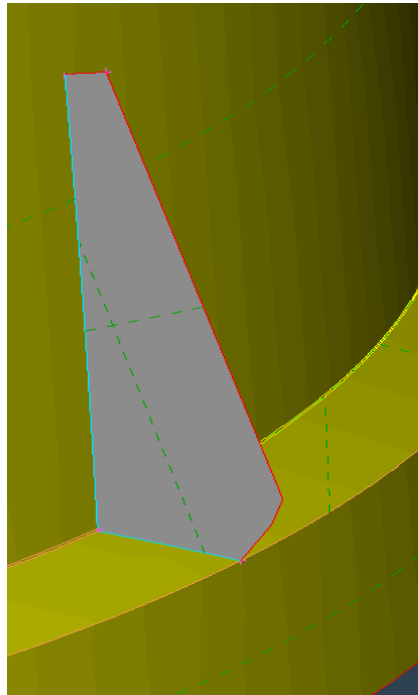


Fig 13- Deleted the extra face

Threaded Portion

1. Extracted the middle curve from **Topo module - Curves – Middle curve**.
2. Projected the Middle Curve to the mid surface from **Topo Module -Cons Project**.
3. Created surface by joining the curve and projected con by adding new surface.
4. Same process for inner threads, fins and ribs.

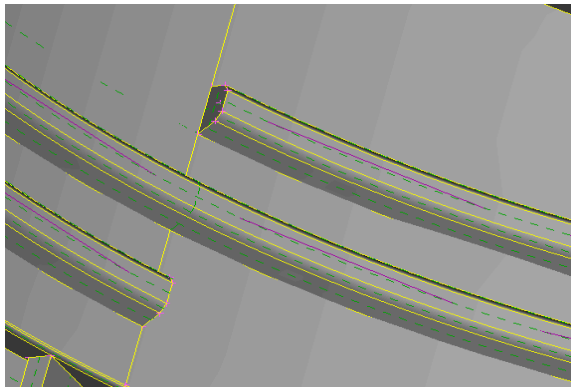


Fig 14 – Middle Curve

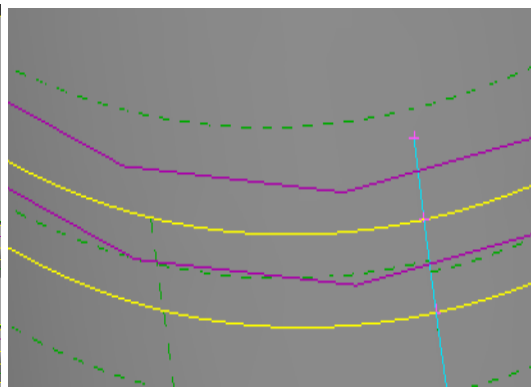


Fig 15- Cons Project

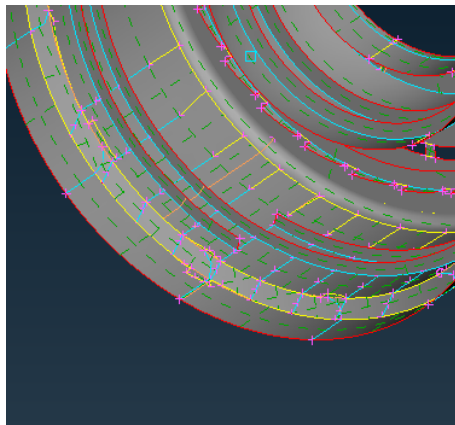


Fig 16 - Mid surface of thread

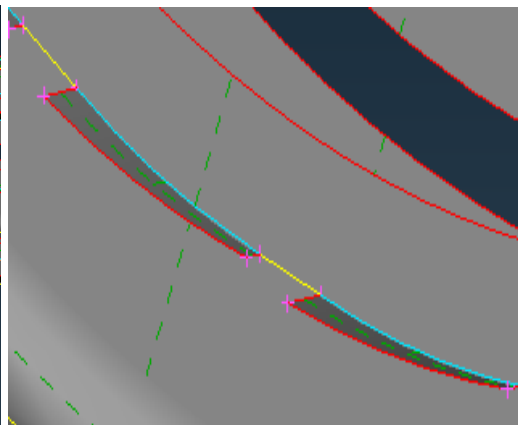


Fig 17 -Mid surface of Fins

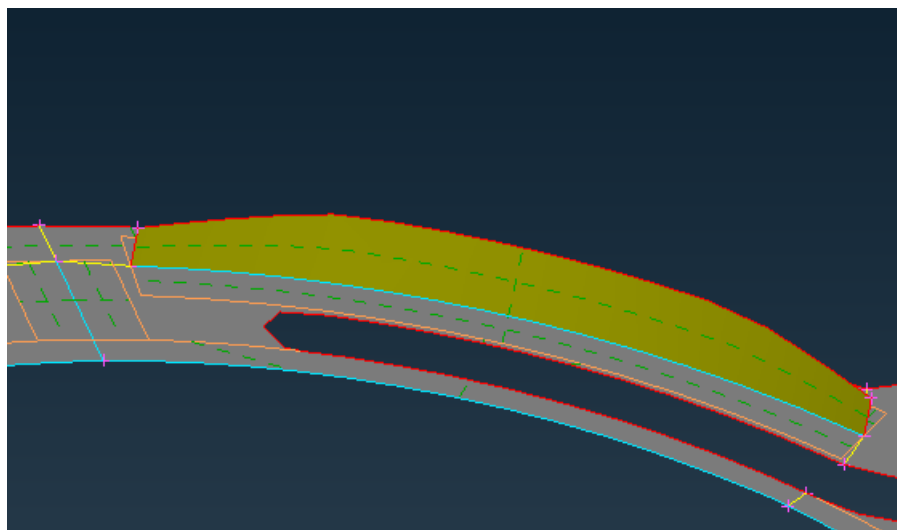


Fig 18 – Mid surface of Ribs

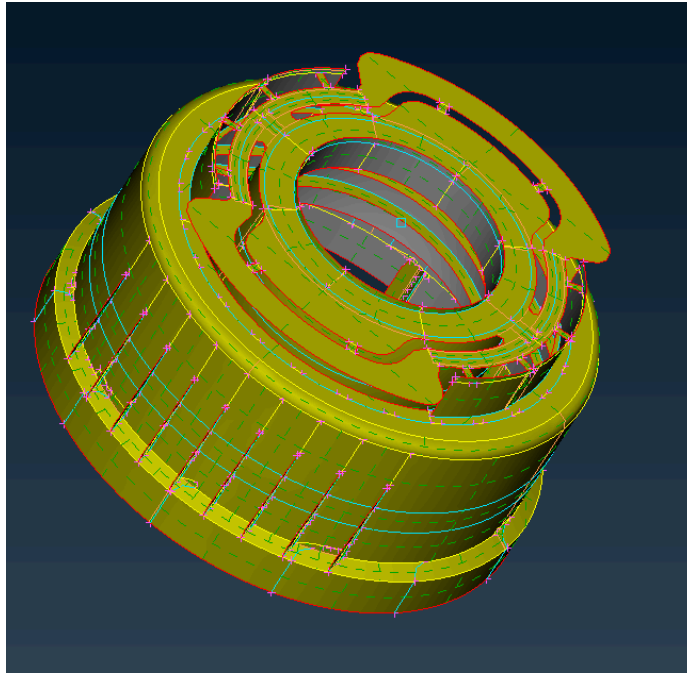


Fig 19 – Complete mid surface

Meshing

Step 1- Added quality criteria as per the assignment.

Step 2 – Meshed the Mid surface for different portion.

Step 3 – The required element size is set to 1 from **mesh module - perimeter- length – 1**.

Step 4 -meshed the Part by using Macro area selection and using the **Best** algorithm from **mesh module -shell mesh-best**

Step 5 – generated proper mesh characteristics by using **Split, Improve, Reconstruct, Grids Paste, Reshape** commands.

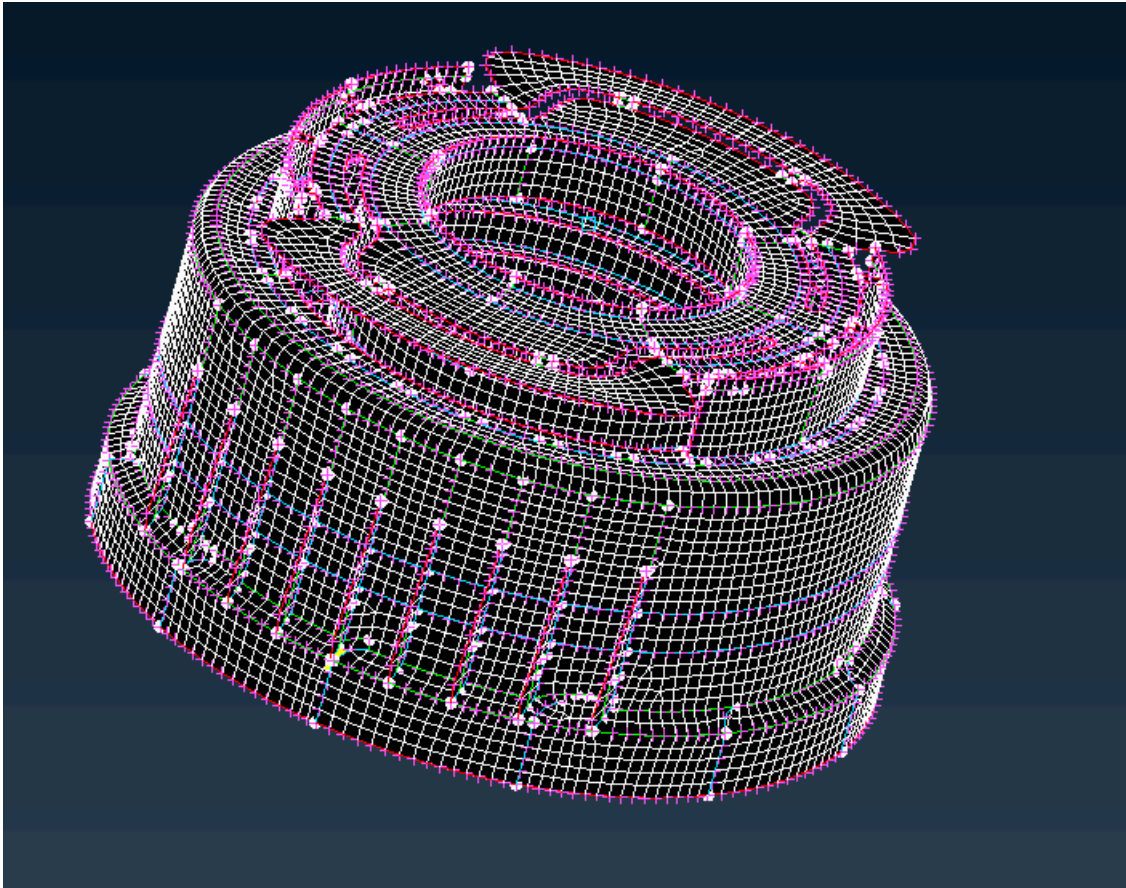


Fig 20 – Meshing of complete Part

- 4 Elements are failing for aspect ratio. Due to triple cons, So can be neglected.

Thickness Assignment to Parts.

1. Created the PID for of different thickness.
2. Separated the two adjacent faces from **mesh Module – Macros -Edge to perimeter**.
3. Assigned the Face to different PID form mesh **module-Macros- Set PID**.

Id	Name	T	MID1	MID	_type
21250	PSHELL_0.8249	0.8249	27		PSHELL
21252	Default PSHELL Property	1.	25		PSHELL
21253	PSHELL_1.5796	1.5796	24		PSHELL
21254	PSHELL_2.25	2.25	23		PSHELL
21255	PSHELL_2.00	2.	22		PSHELL
21256	PSHELL_1.137	1.137	21		PSHELL
21257	PSHELL_1.044	1.044	20		PSHELL
21258	PSHELL_1.1136	1.1136	19		PSHELL
21259	PSHELL_1.80	1.8	18		PSHELL
21260	PSHELL_0.6561	0.6561	17		PSHELL
21261	PSHELL_1.6177	1.6177	16		PSHELL
21262	PSHELL_1.53	1.53	15		PSHELL
21263	PSHELL_0.8597	0.8597	14		PSHELL
21264	PSHELL_1.04269	1.04269	13		PSHELL
21265	PSHELL_0.4	0.4	12		PSHELL
21266	PSHELL_1.02	1.02	11		PSHELL
21267	PSHELL_1.2239	1.2239	10		PSHELL
21268	PSHELL_Shell	1.	9		PSHELL
21272	PSHELL Property created fro...	0.5	5		PSHELL
21273	PSHELL Property created fro...	0.75	4		PSHELL
21274	PSHELL	1.	3		PSHELL
21275	Combine2	1.	1		PSHELL

PROPERTY total 22 selected 0

Fig 21 – PIDs of different thickness.

- For Tapered section, The average of thickness is take.

For the ribs

1. The boundary is approximately separated by edge to Perimeter.
2. The two faces are then assigned to PID of 0.82 and 0.4.

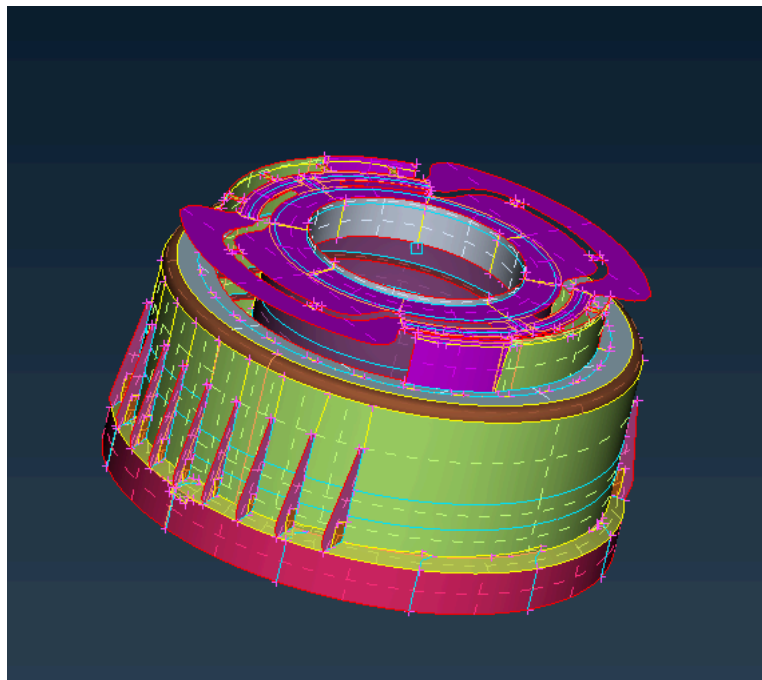


Fig 22 - PID for different faces.

Conclusion

- Mid surface Extraction of Plastic components.
- Meshing of complicated components.
- Learned about some constraints of software.
- Learned about assigning the thickness to different thickness.