



Progettazione Meccanica CAD/CAE Integrata

A.A. 2025/2026

Analisi strutturale in ambiente virtuale Definizione della mesh in Ansys mechanical

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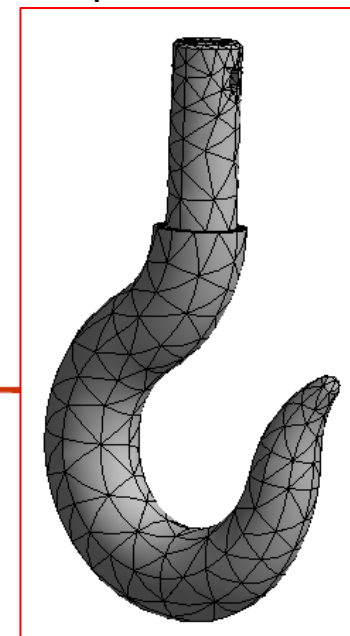
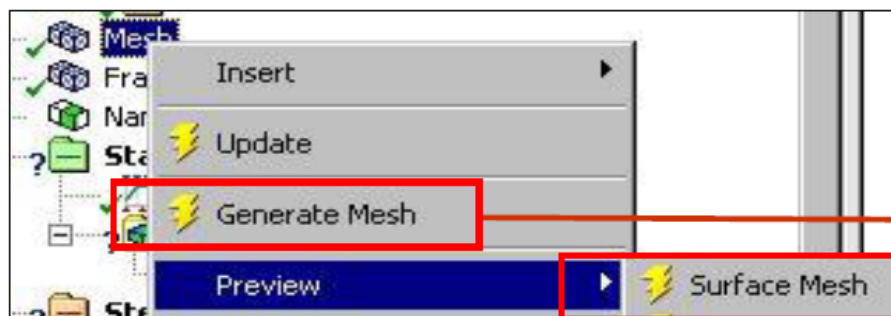


UNIVERSITÀ
DEGLI STUDI DI TRIESTE

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Università degli Studi di Trieste**

La discretizzazione (“mesh”) è generata attraverso l’utilizzo di nodi ed elementi:

- Nella maggior parte dei casi è possibile generare una mesh automatica con impostazioni di “default”
- In genere è raccomandato aggiungere “controlli” di mesh per definire una mesh specificamente adatta alla soluzioni del determinato problema,
- Una mesh più fine produce risultati più precisi ma allo stesso tempo richiede risorse di CPU e memoria più elevate e maggiori tempi computazionali



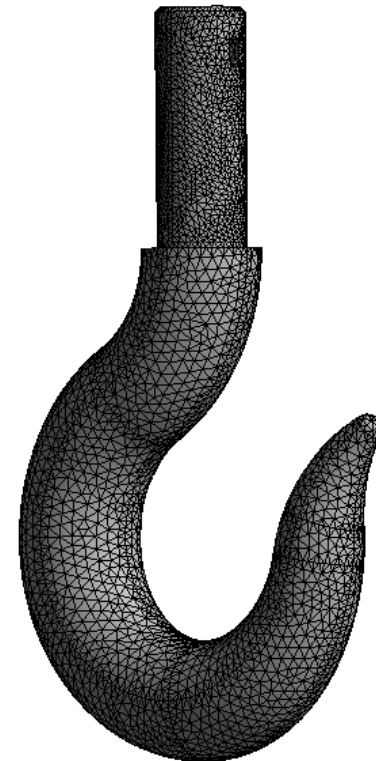


Meshing in Mechanical



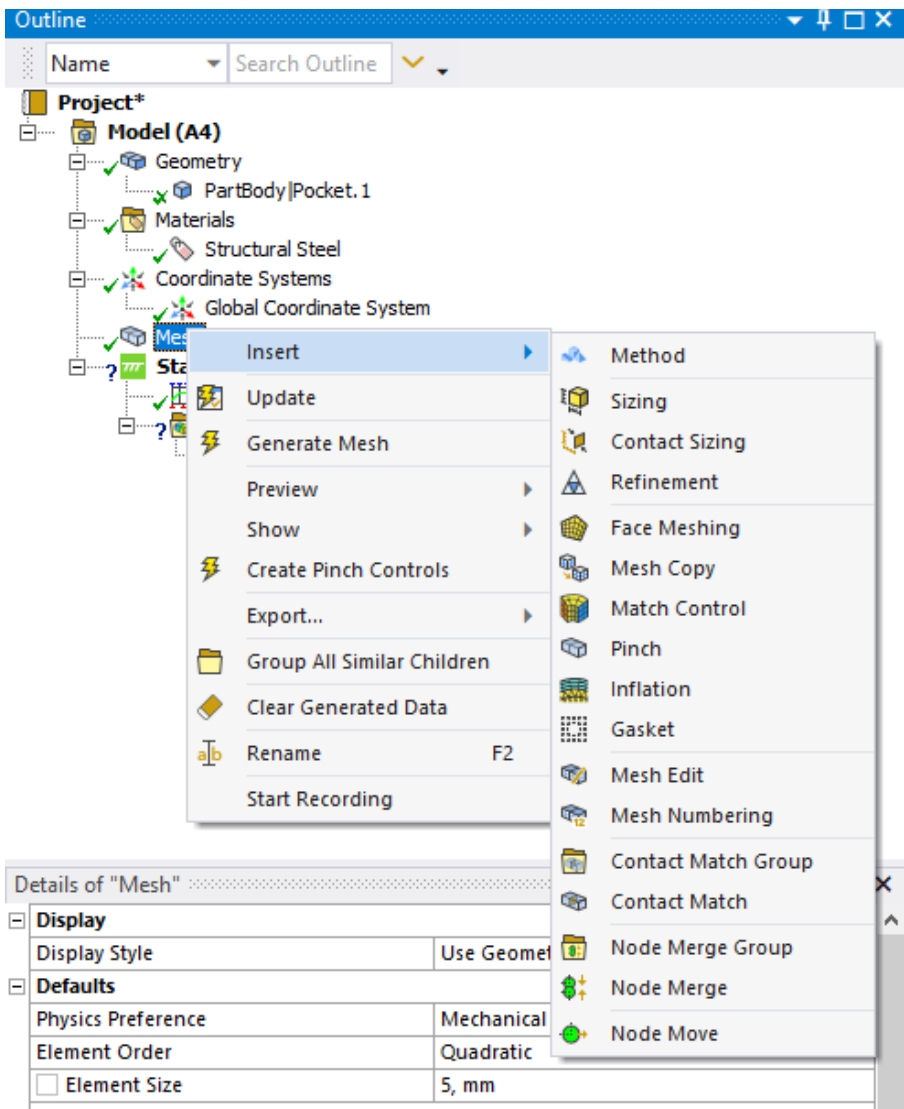
- Physics Based Meshing permette all'utente di specificare la metrica utilizzata nel misurare la qualità dell'elemento rispetto al tipo di analisi da effettuare.
- "Element size" è il primo (e più basilare) controllo di mesh che è possibile applicare al modello globale. Definisce la dimensione massima dell'element utilizzata per l'intero modello.

Details of "Mesh" ▼ 🔍 🗄 ✕	
Display	
Display Style	Use Geometry Setting
Defaults	
Physics Preference	Mechanical
Element Order	Program Controlled
<input type="checkbox"/> Element Size	5, mm
Sizing	
Use Adaptive Sizing	Yes
Resolution	Default (2)
Mesh Defeaturing	Yes
<input type="checkbox"/> Defeature Size	Default
Transition	Fast
Span Angle Center	Coarse
Initial Size Seed	Assembly
Bounding Box Diagonal	749,51 mm
Average Surface Area	9337,8 mm ²
Minimum Edge Length	5,9868 mm





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Local Mesh Controls can be applied to either a Geometry Selection or a Named Selection.

Some of the available controls include :

- Method Control**
- Sizing Control**
- Contact Sizing Control**
- Refinement Control**
- Face Meshing Control**
- Inflation Control**
- Pinch Control**



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Method Control: provides the user with options for the meshing algorithm to be used.

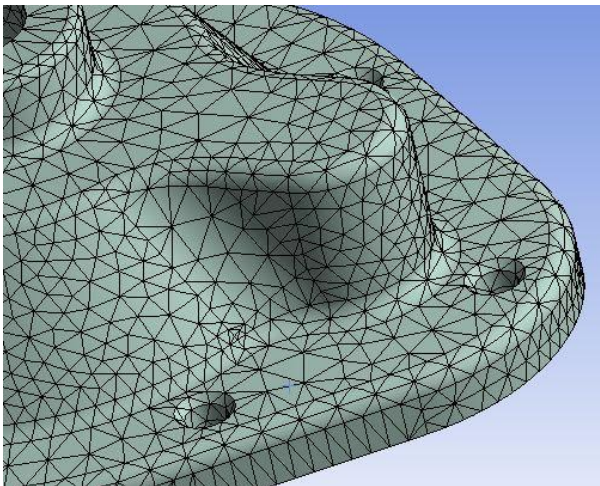
Method = Automatic (default):

–Body will be swept if possible. Otherwise, the “Patch Conforming Tetrahedron” mesher will be used.

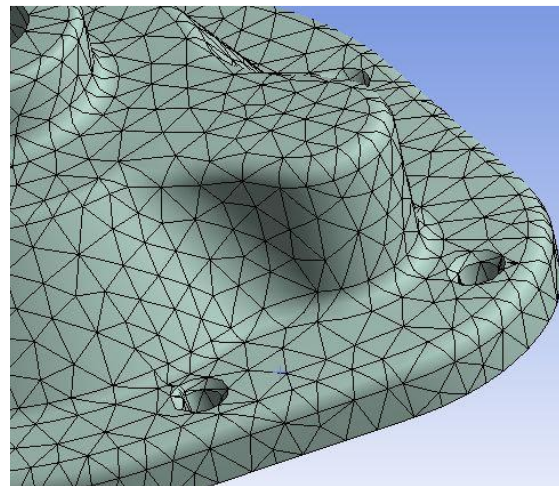
Method = Tetrahedrons:

- An all-tetrahedron mesh is generated (not usually requested for mechanical applications).
- Can use Patch Conforming or Patch Independent Meshing algorithms.

Patch conforming



Patch independent





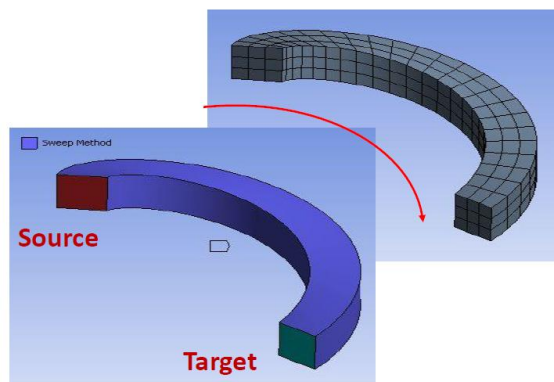
Method = Hex Dominant:

Creates a free hex dominant mesh

- Recommended for meshing bodies with large interior volumes.
- Not recommended for thin or highly complex shapes.
- Useful for meshing bodies that cannot be swept.

Method = Sweep (hex and possibly wedge shapes):

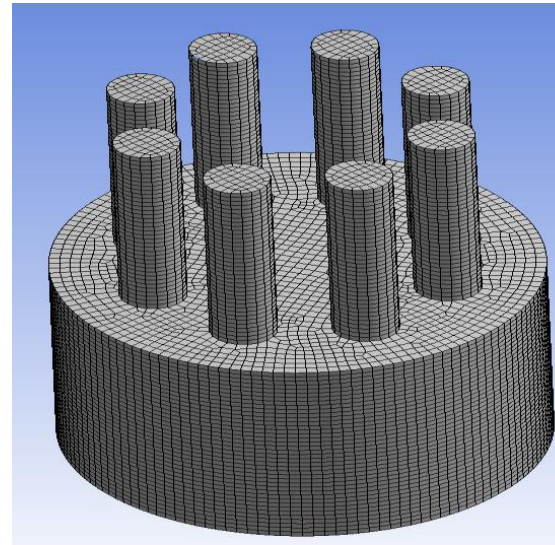
- Source/Target Selection: Manually select the start/end faces for sweeping or allow the mesher to choose.
- Can include size controls and/or biasing along sweep.





Method=MultiZone:

- Based on blocking approach used in ANSYS ICEM CFD Hexa
- Automatically decomposes geometry
- Uses structured and unstructured blocks
- Can have multiple source and target faces
- Depends on settings of Free Mesh Type
- Structured blocks are meshed with Hexa or Hexa/Prism
- If Free Mesh Type is set to other than Not Allowed then unstructured blocks are meshed with Tetra, Hexa Dominant or Hex Core based on the selected method
- Program Controlled inflation

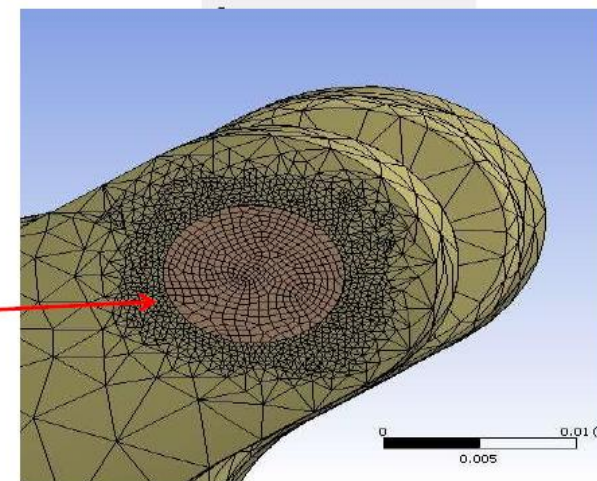
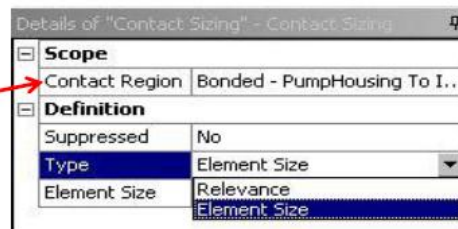
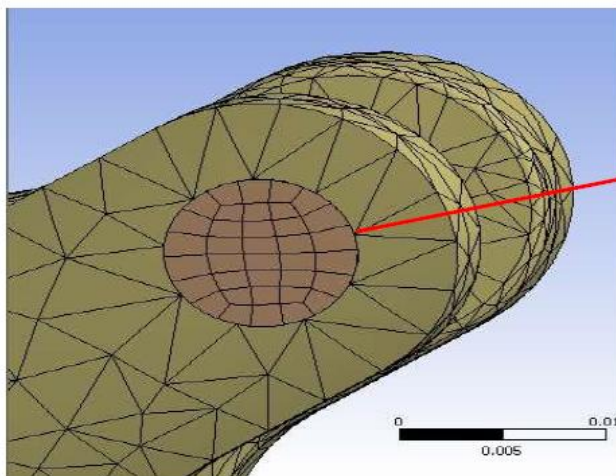


Contact Sizing:

generates similarly-sized elements on contact faces for face/face or face/edge contact regions.

–“Element Size” or “Relevance” can be specified.

–Can drag and drop a Contact Region object onto the “Mesh” branch as a shortcut.





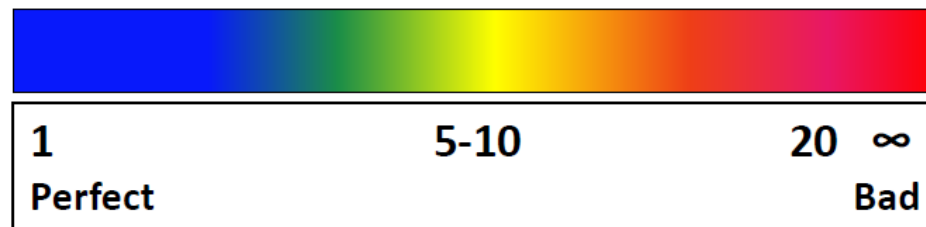
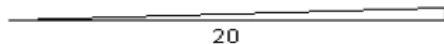
Mesh Quality Criteria



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Aspect Ratio:

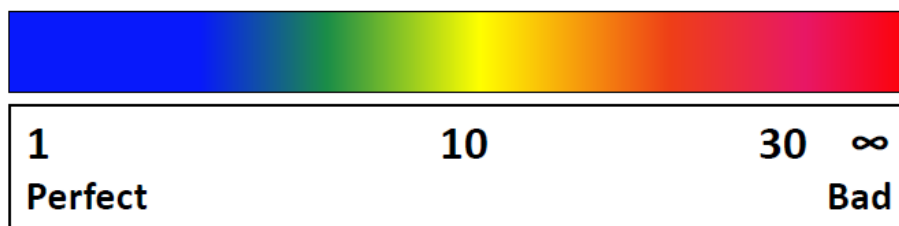
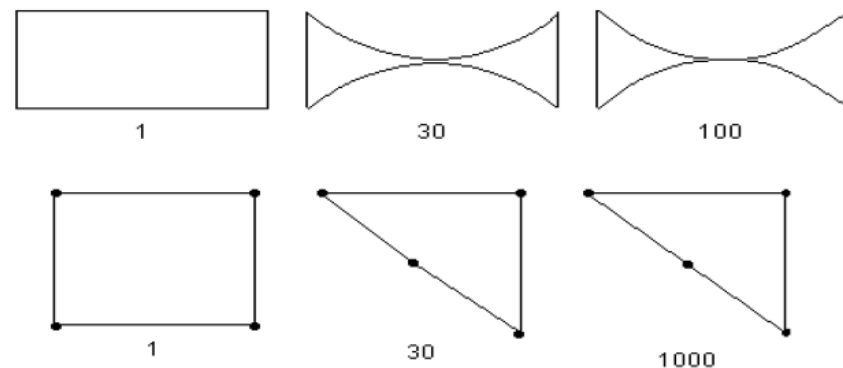
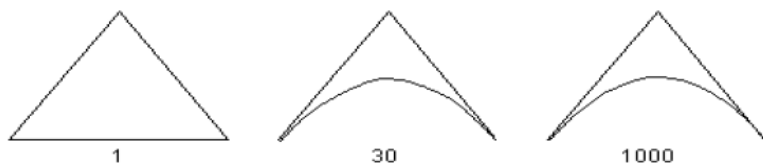




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Jacobian Ratio:

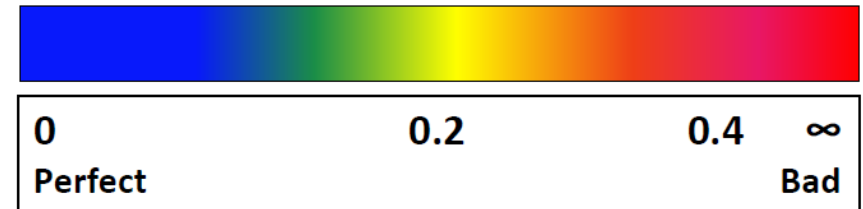
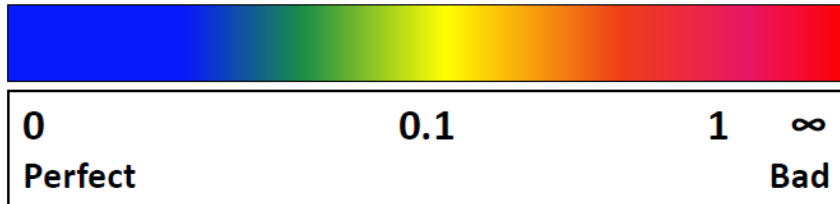
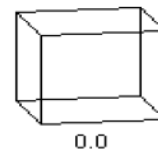
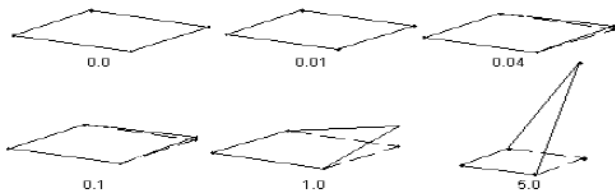




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Warping Ratio:

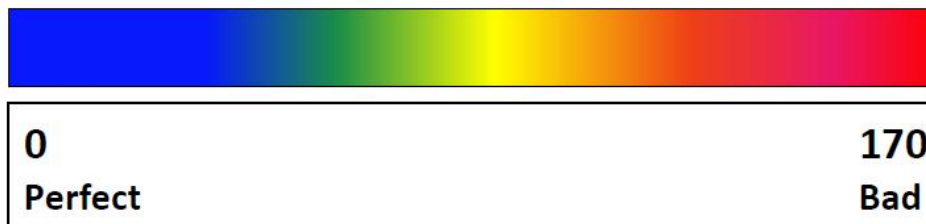
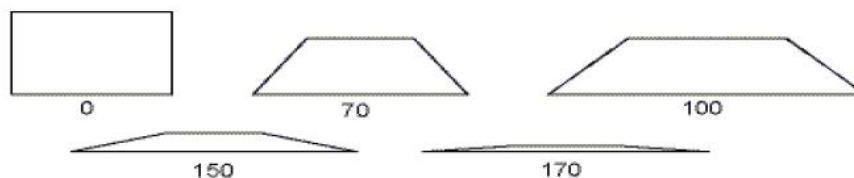




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Parallel Deviation:

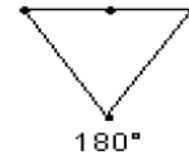
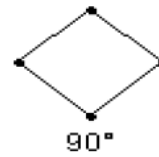
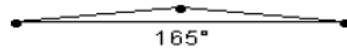
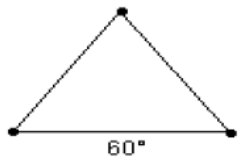




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Maximum Corner Deviation:



60	165
Perfect	Bad



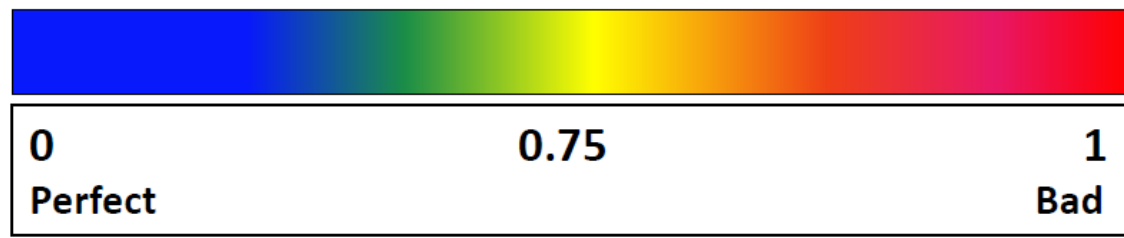
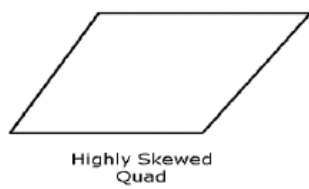
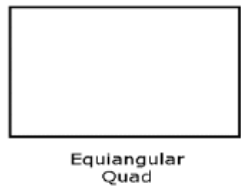
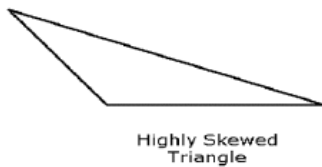
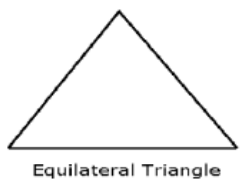
90	180
Perfect	Bad



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Skewness:



Orthogonal Quality:

