

Università degli Studi di Padova – Dipartimento di Ingegneria Industriale

Corso di Laurea in Ingegneria Meccanica

Relazione per la prova finale

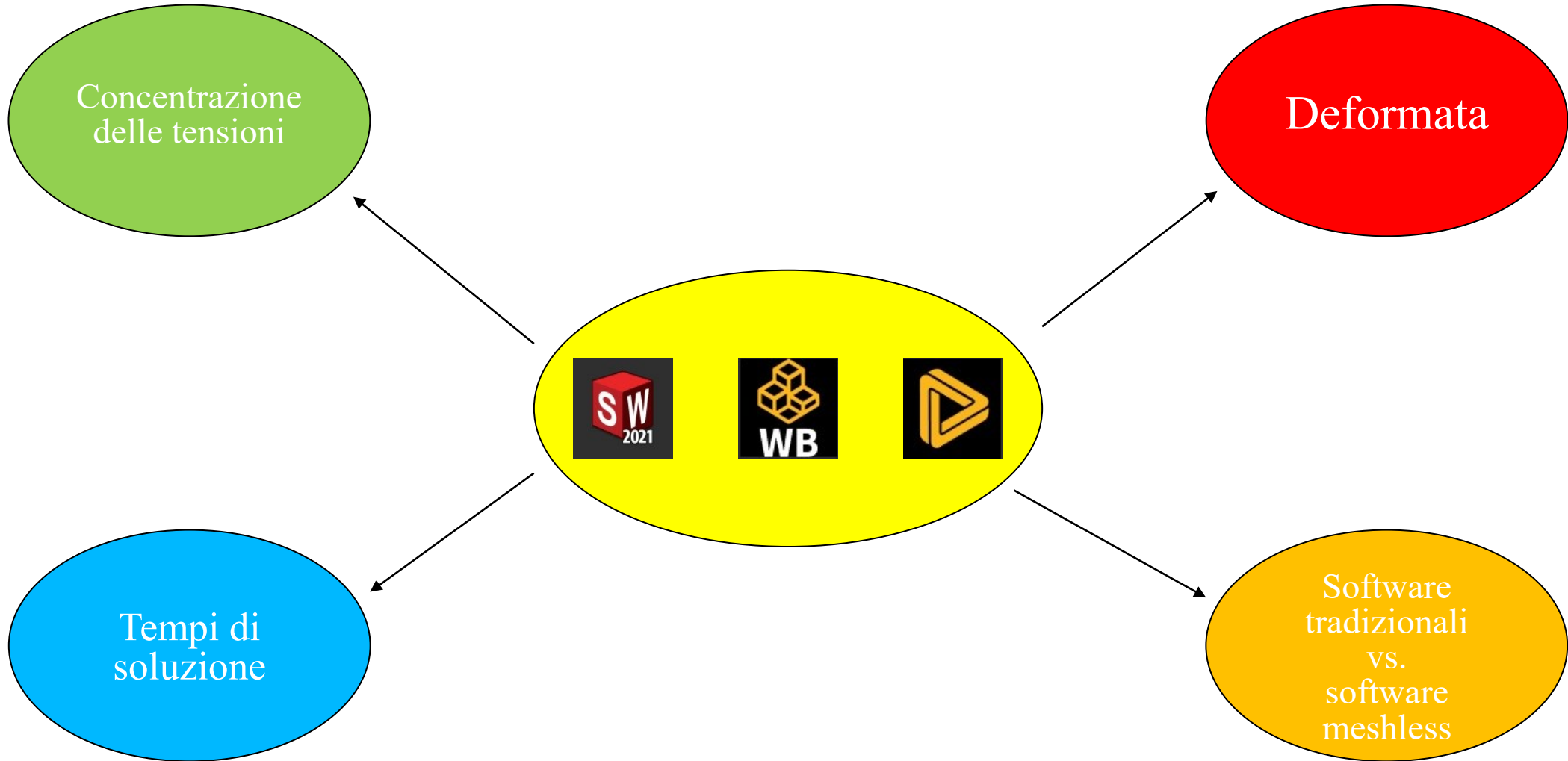
Analisi FEM per il calcolo delle concentrazioni di tensione e della deformata di componenti strutturali: confronto tra codici tradizionali e meshless

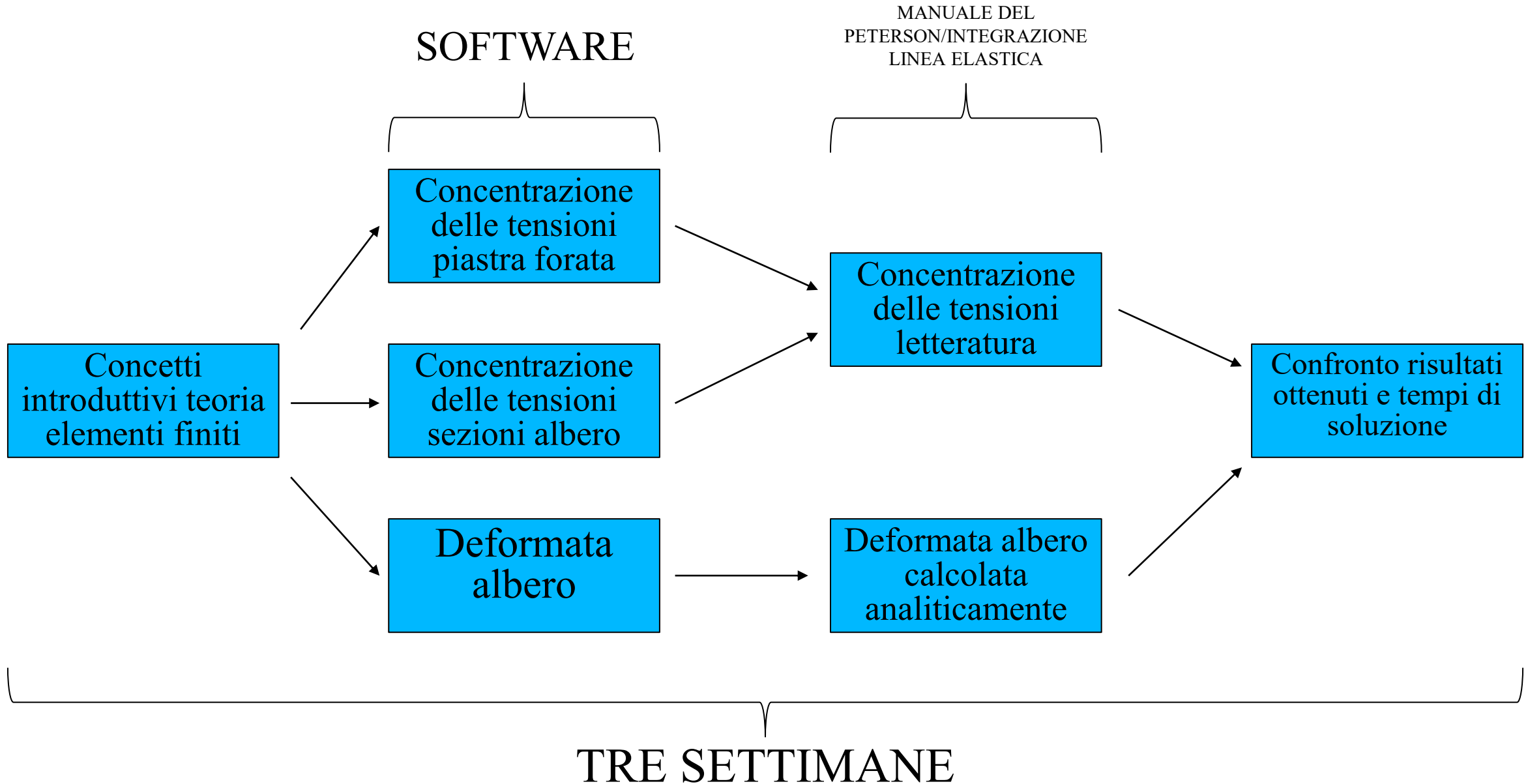
Tutor universitario: prof. Alberto Campagnolo

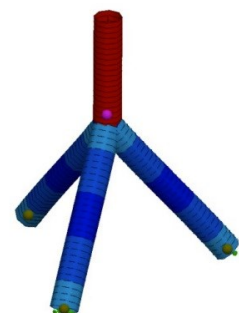
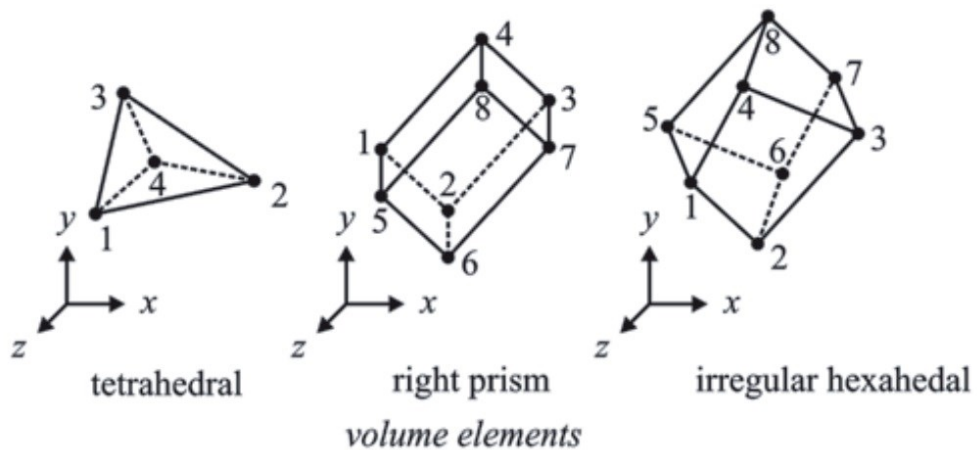
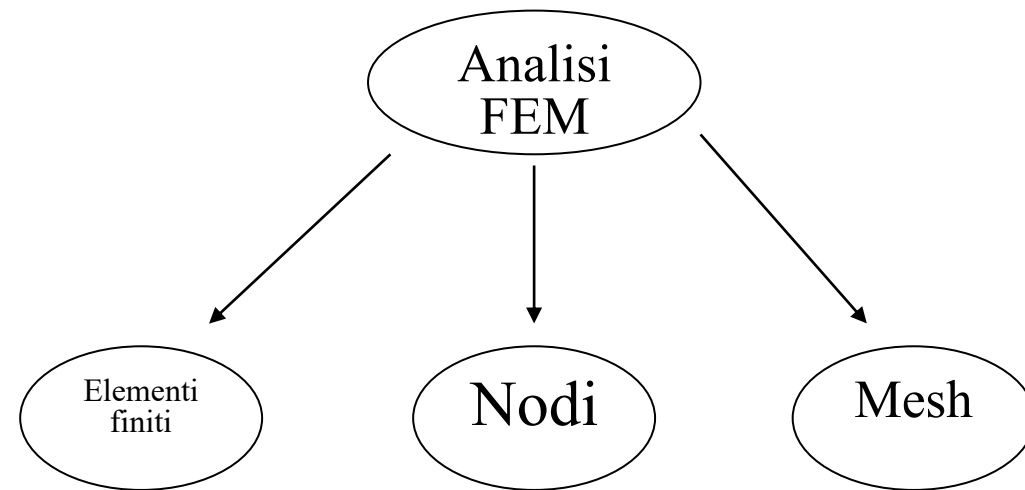
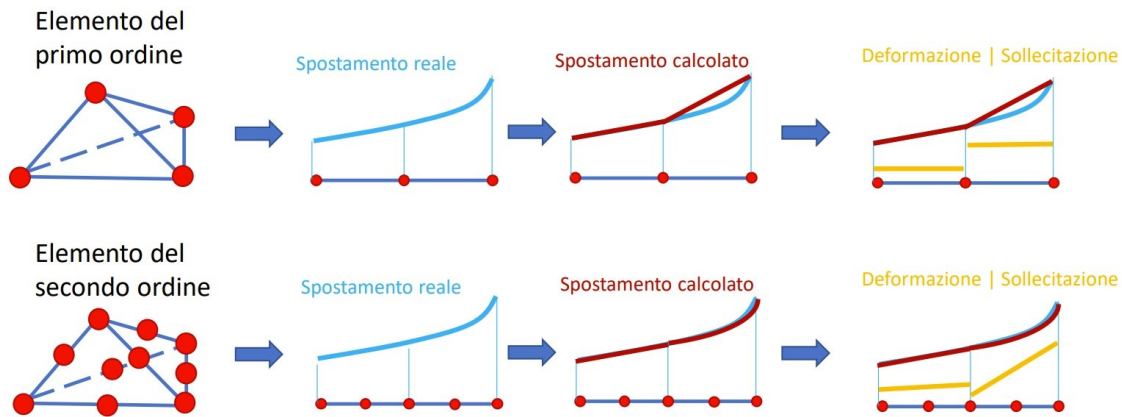
Laureando: Giulio Poles

Matricola: 1217738

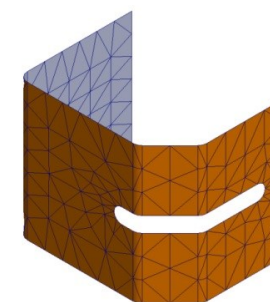
Padova, 24/11/2022



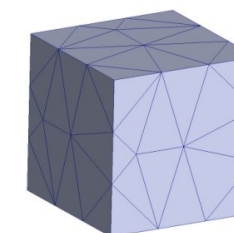




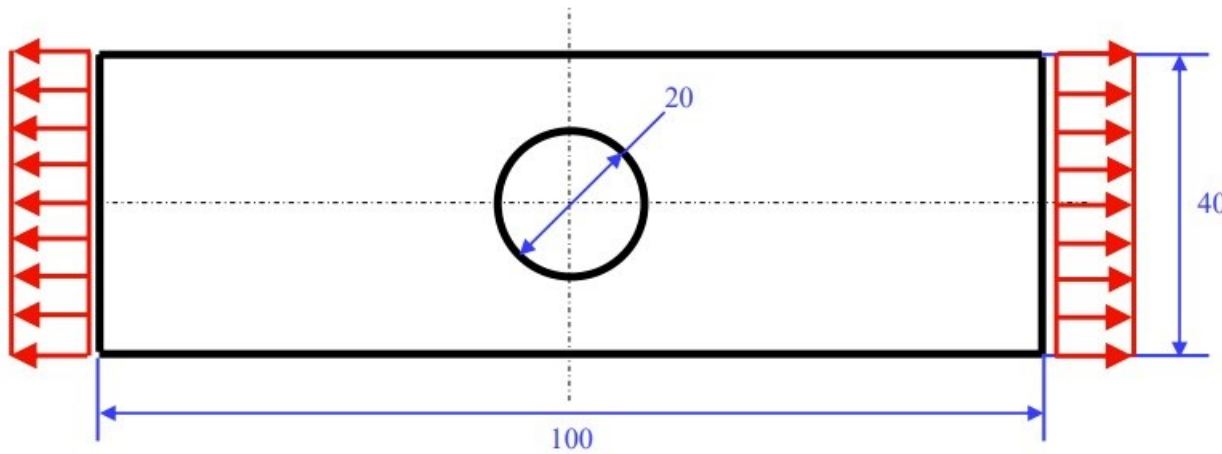
Trave



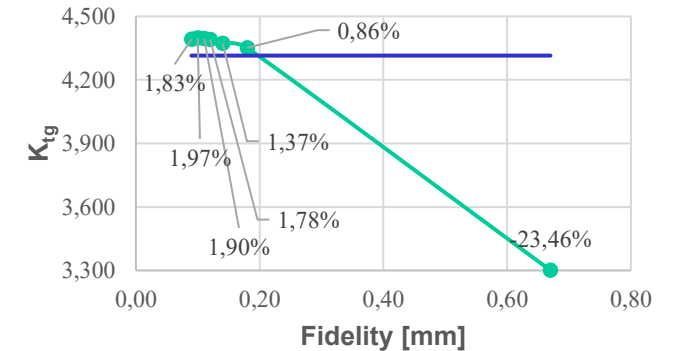
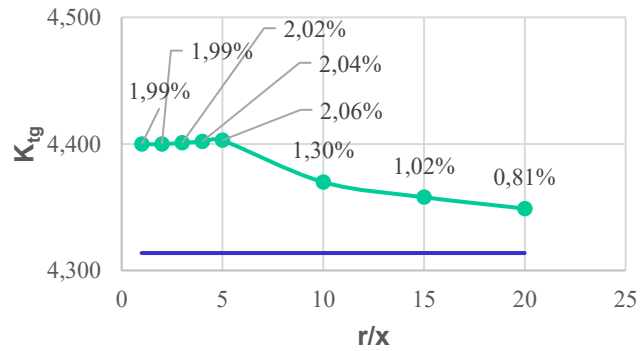
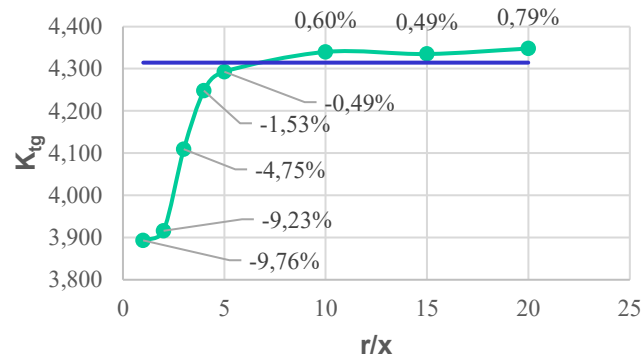
Shell



Solida



Spessore $s = 1$ mm
 Modulo di elasticità lineare $E = 206000$ MPa
 Coefficiente di Poisson $\nu = 0,3$
 Tensione di trazione $\sigma = 1$ MPa

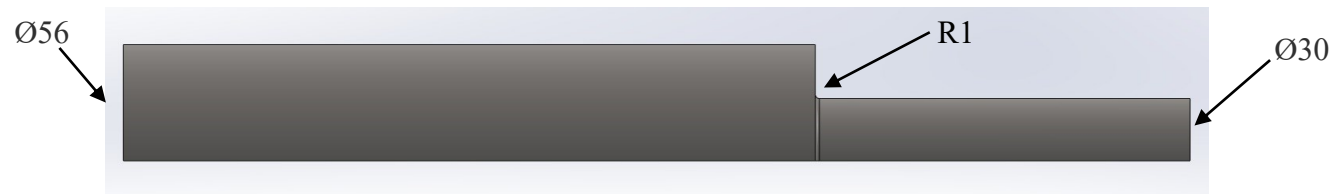


—●— SOLIDWORKS Simulation — Manual del Peterson

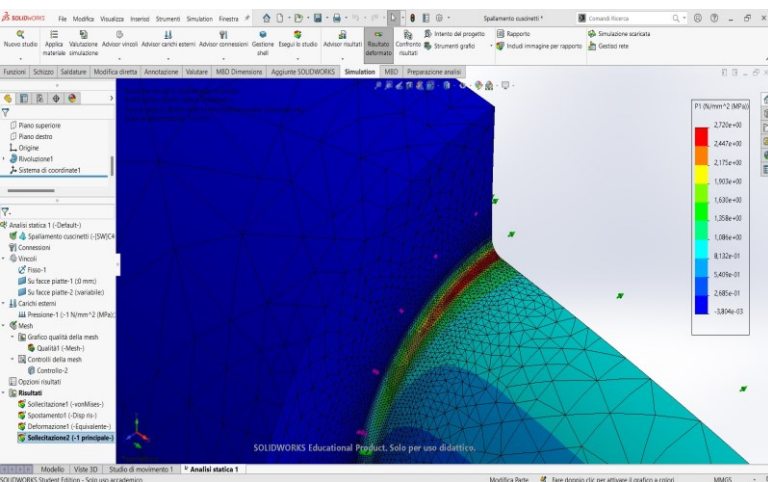
—●— Ansys Workbench — Manual del Peterson

—●— Ansys Discovery — Manual del Peterson

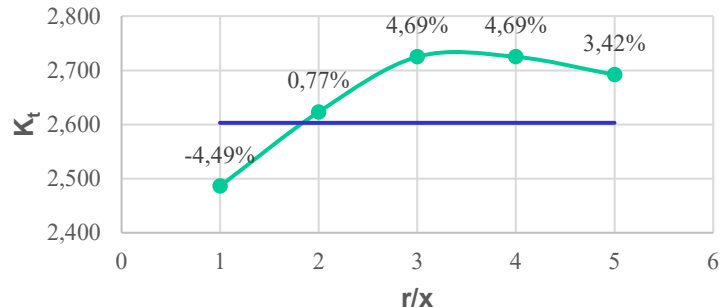
Solidworks® Simulation	Ansys Workbench	Ansys Discovery	Manuale del Peterson
4,348	4,349	4,393	4,314



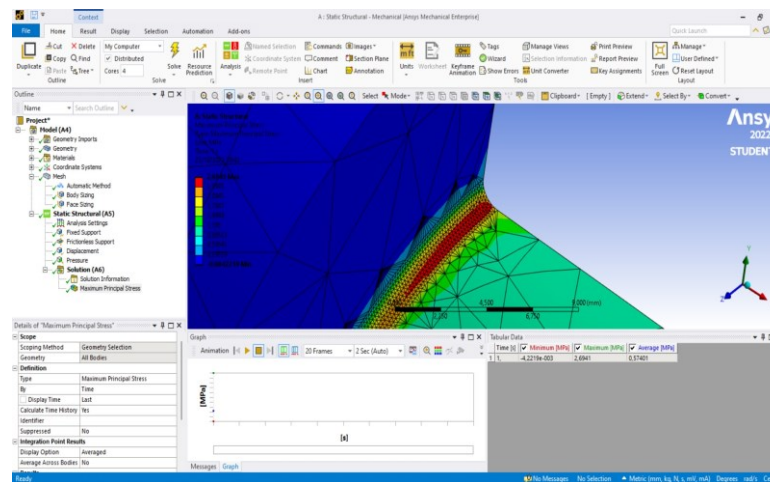
SOLIDWORKS® Simulation	Ansys Workbench	Ansys Discovery	Manuale del Peterson
Sezioni A e H			
2,692	2,694	1,498	2,603



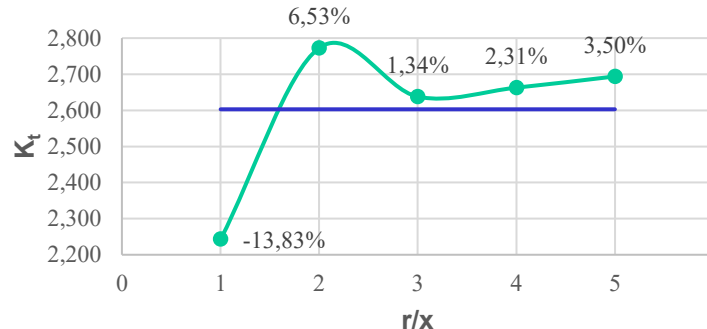
Sezioni A e H



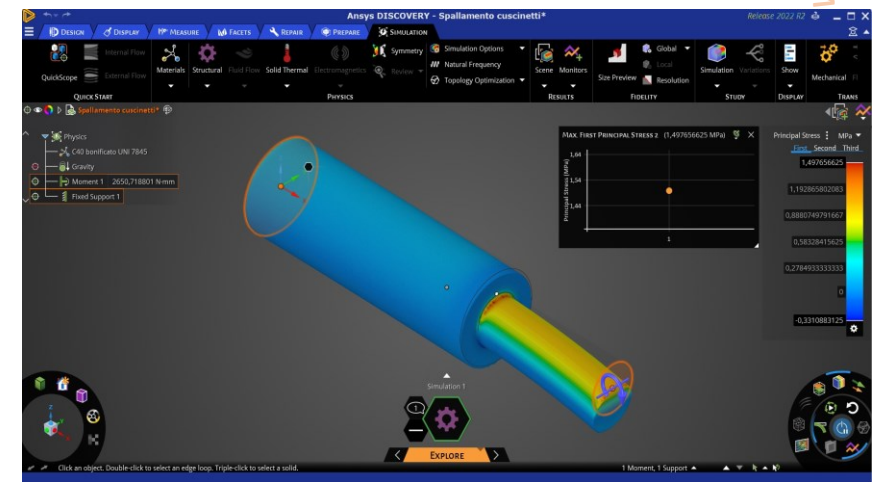
● SOLIDWORKS Simulation — Manuale del Peterson



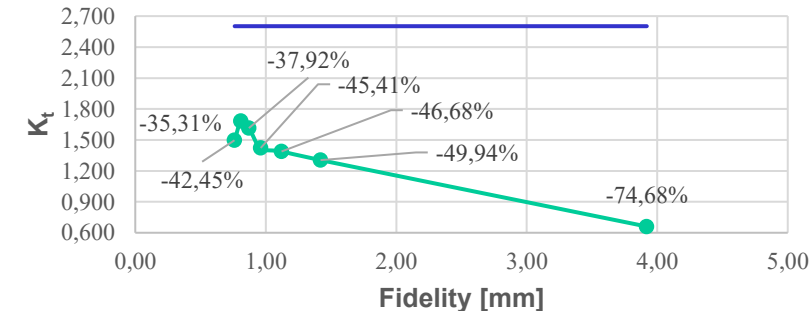
Sezioni A e H



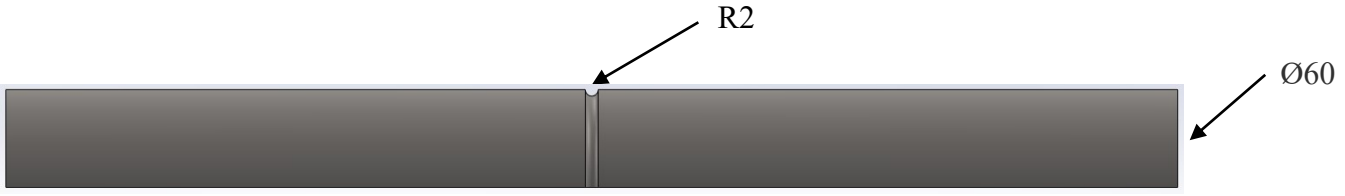
● Ansys Workbench — Manuale del Peterson



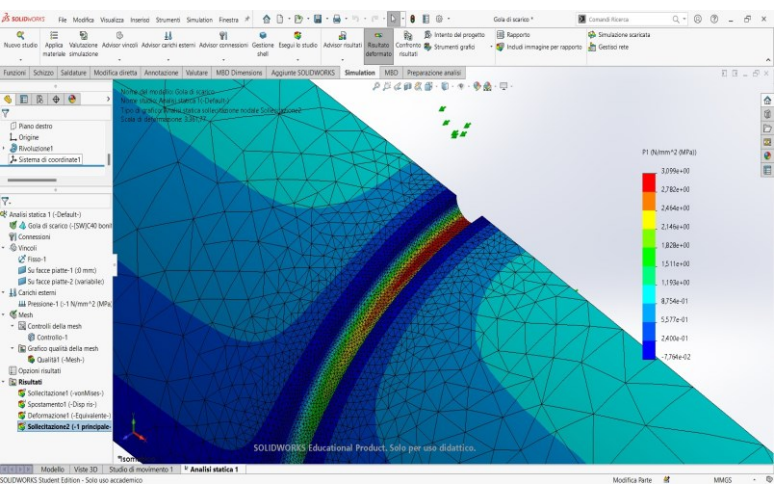
Sezioni A e H



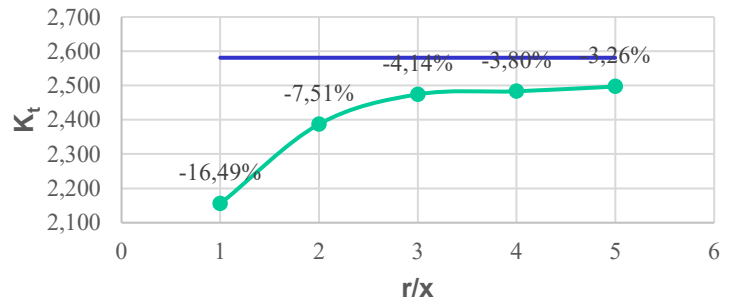
● Ansys Discovery — Manuale del Peterson



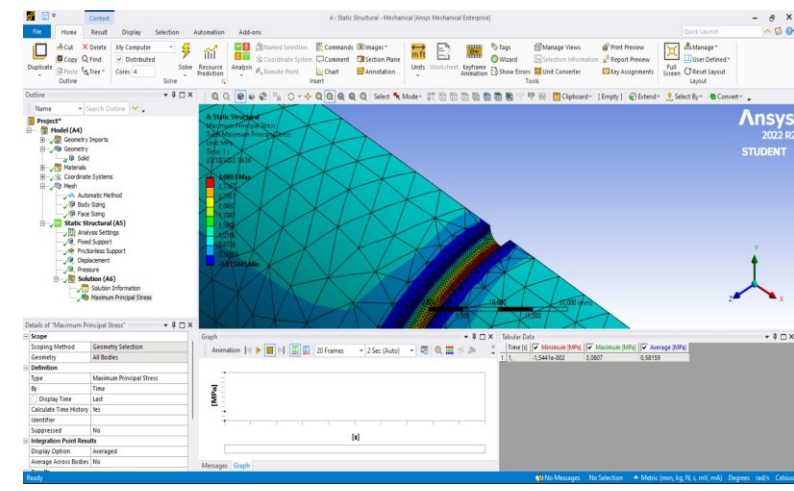
SOLIDWORKS® Simulation	Ansys Workbench	Ansys Discovery	Manuale del Peterson
Sezioni B e G			
2,497	2,505	1,735	2,581



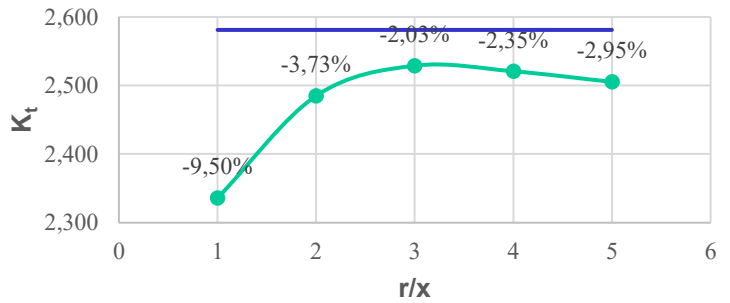
Sezioni B e G



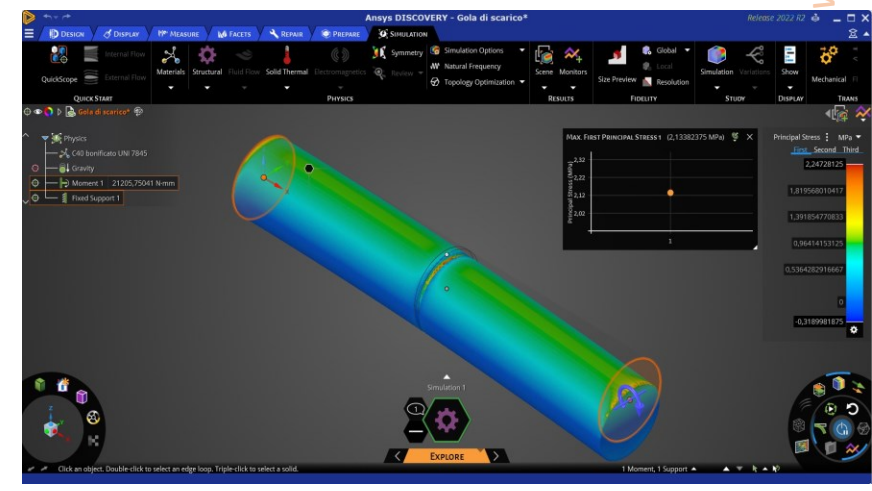
● SOLIDWORKS Simulation — Manuale del Peterson



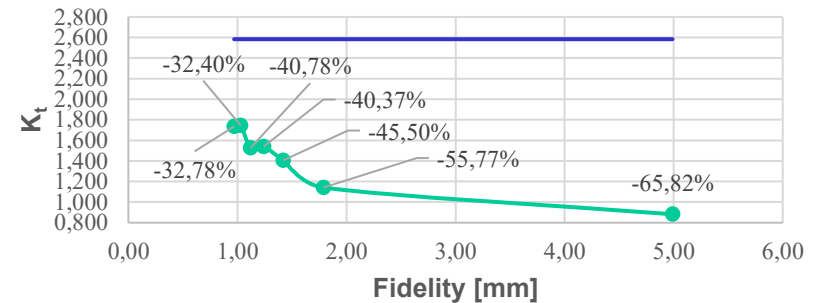
Sezioni B e G



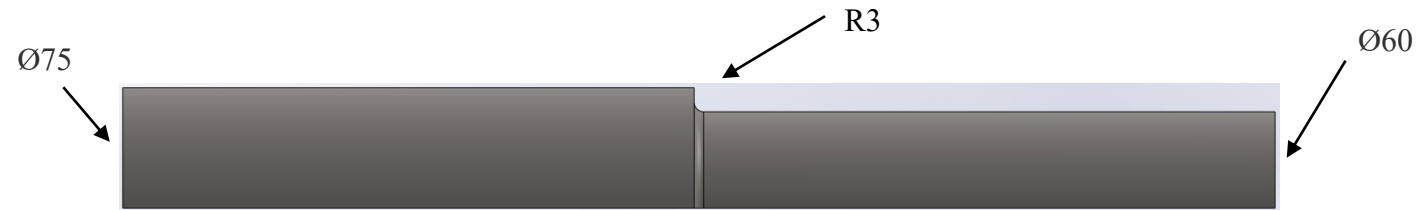
● Ansys Workbench — Manuale del Peterson



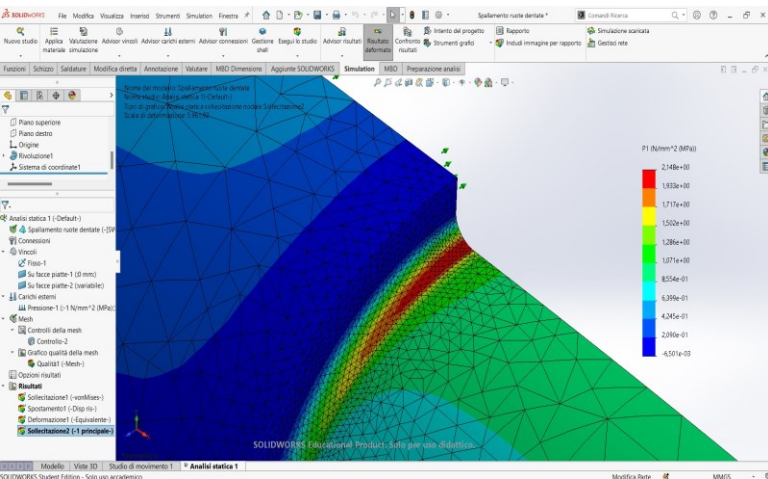
Sezioni B e G



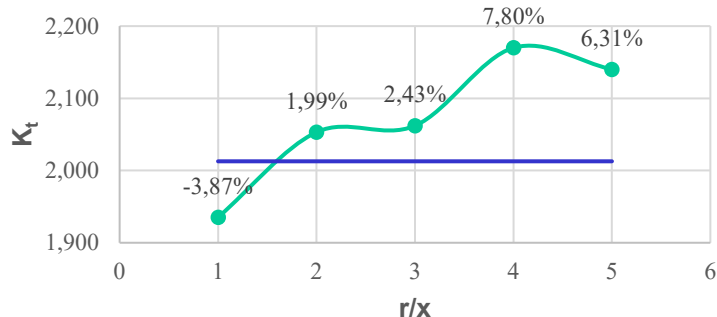
● Ansys Discovery — Manuale del Peterson



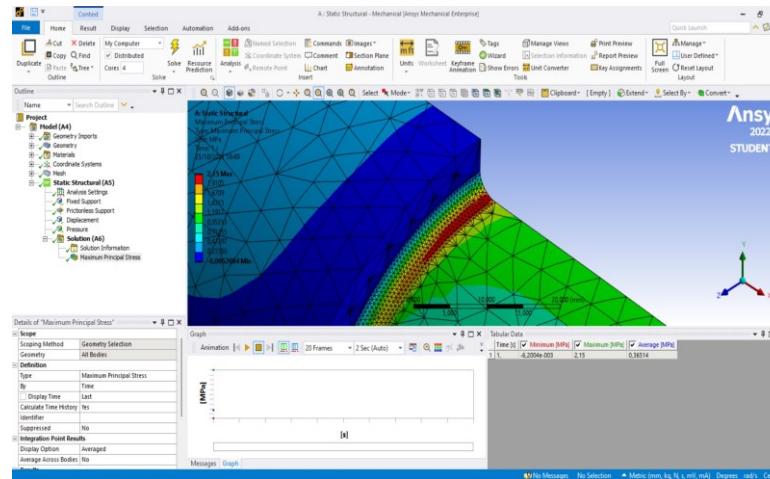
SOLIDWORKS® Simulation	Ansys Workbench	Ansys Discovery	Manuale del Peterson
Sezioni D ed E			
2,140	2,150	1,644	2,013



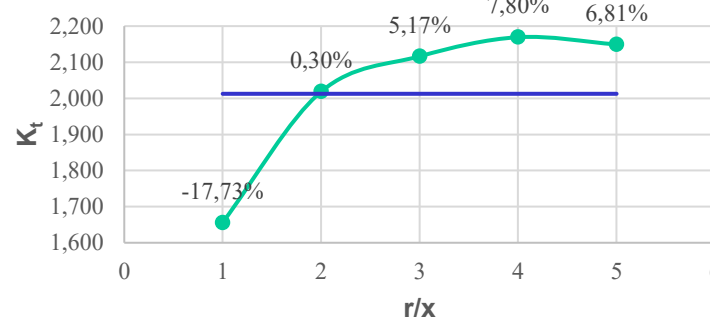
Sezioni D ed E



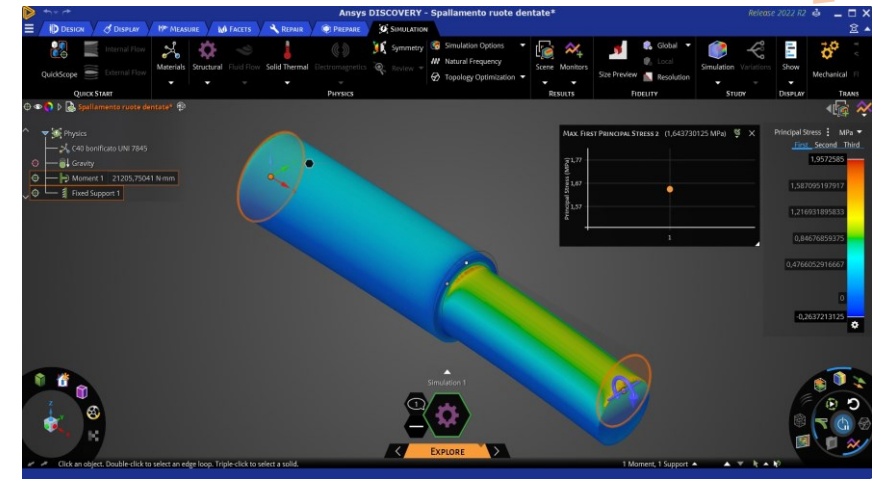
● SOLIDWORKS Simulation — Manuale del Peterson



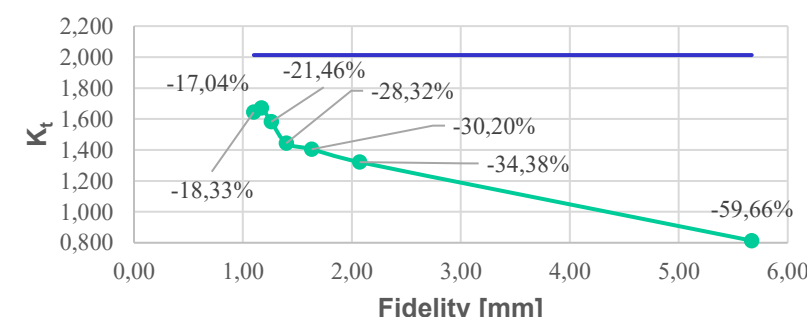
Sezioni D ed E



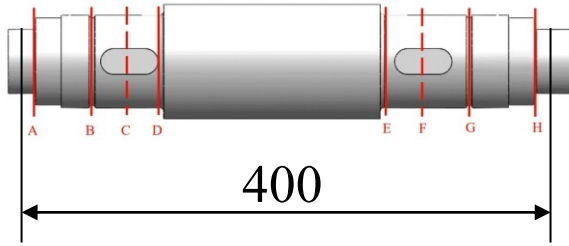
● Ansys Workbench — Manuale del Peterson



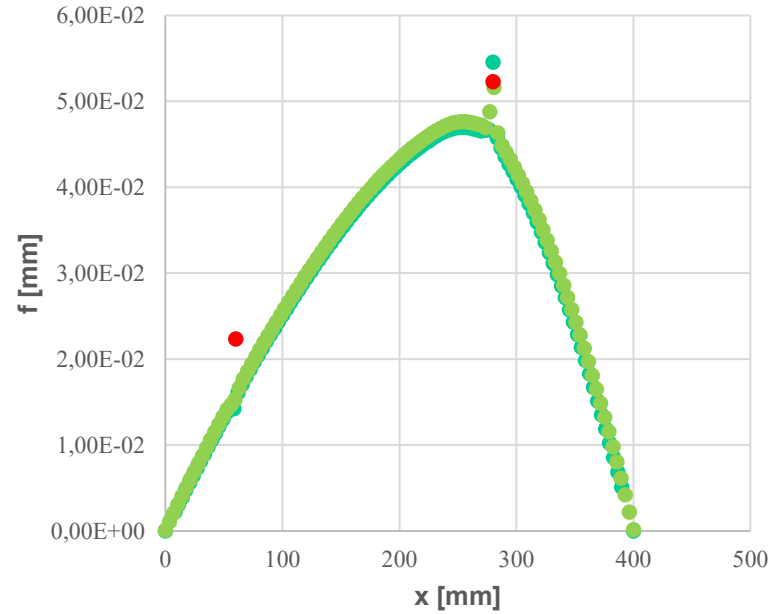
Sezioni D ed E



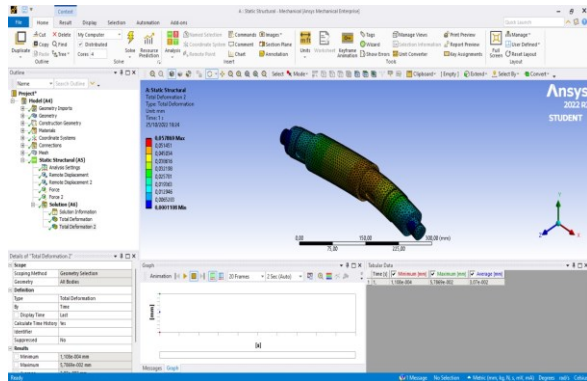
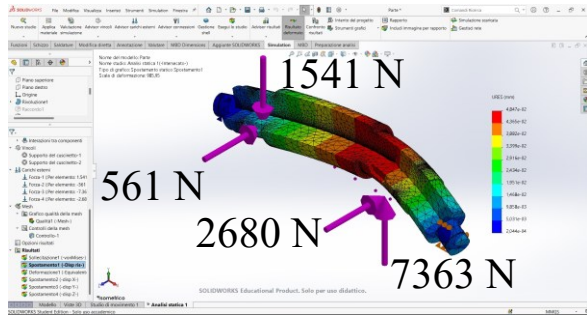
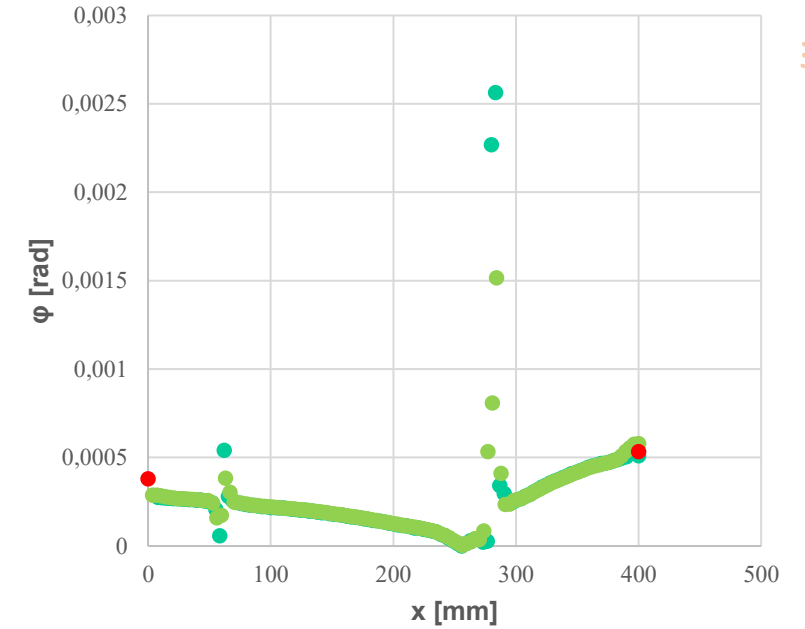
● Ansys Discovery — Manuale del Peterson



Frecce asse albero



Rotazioni asse albero



● SOLIDWORKS Simulation ● Ansys Workbench ● Valori analitici

● SOLIDWORKS Simulation ● Ansys Workbench ● Valori analitici

SOLIDWORKS® Simulation	Ansys Workbench	Valori analitici
	f_2 [mm]	
$1,485 \cdot 10^{-2}$	$1,470 \cdot 10^{-2}$	$2,232 \cdot 10^{-2}$
	f_3 [mm]	
$4,844 \cdot 10^{-2}$	$5,322 \cdot 10^{-2}$	$5,228 \cdot 10^{-2}$
	ϕ_s [rad]	
$2,712 \cdot 10^{-4}$	$2,902 \cdot 10^{-4}$	$3,784 \cdot 10^{-4}$
	ϕ_d [rad]	
$4,957 \cdot 10^{-4}$	$5,475 \cdot 10^{-4}$	$5,326 \cdot 10^{-4}$

SOLIDWORKS® Simulation	Ansys Workbench	Ansys Discovery
<ul style="list-style-type: none"> • tempi di soluzione bassi (circa 20 secondi); • coerenza nella visualizzazione della deformazione; • valori simili ad Ansys Workbench; • valori simili a quelli forniti in letteratura (deviazione percentuale di circa 5% o inferiore); • modifica manuale dimensioni della mesh per raggiungere la convergenza. 	<ul style="list-style-type: none"> • tempi di soluzione bassi (circa 20 secondi); • coerenza nella visualizzazione della deformazione; • valori simili a SOLIDWORKS® Simulation; • valori simili a quelli forniti in letteratura (deviazione percentuale di circa 5% o inferiore); • comando per raggiungere la convergenza che modifica in automatico le dimensioni della mesh. 	<ul style="list-style-type: none"> • tempi di soluzione molto bassi (circa 5 secondi); • coerenza nella visualizzazione della deformazione; • valori molto diversi dalla letteratura e dagli altri due software (deviazione percentuale di almeno il 10% o superiore); • impossibilità di eseguire l'analisi a deformazione dell'albero.