

INGENIERÍA MECATRÓNICA



DI_CERO

DIEGO CERVANTES RODRÍGUEZ

INGENIERÍA ASISTIDA POR COMPUTADORA

COMSOL MULTIPHYSICS 5.6

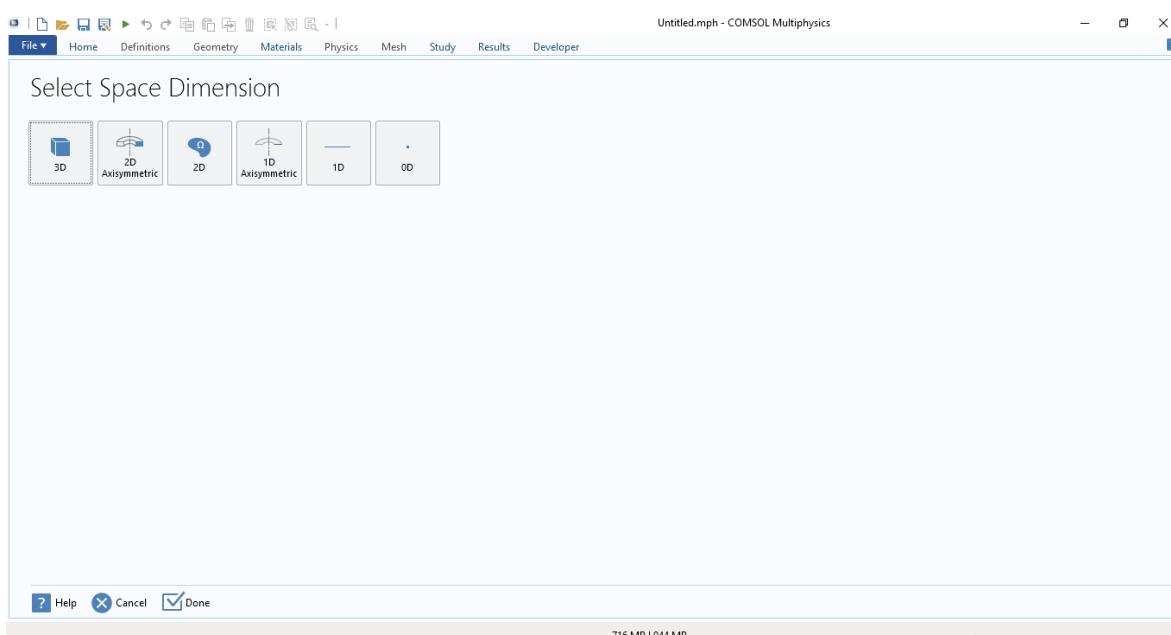
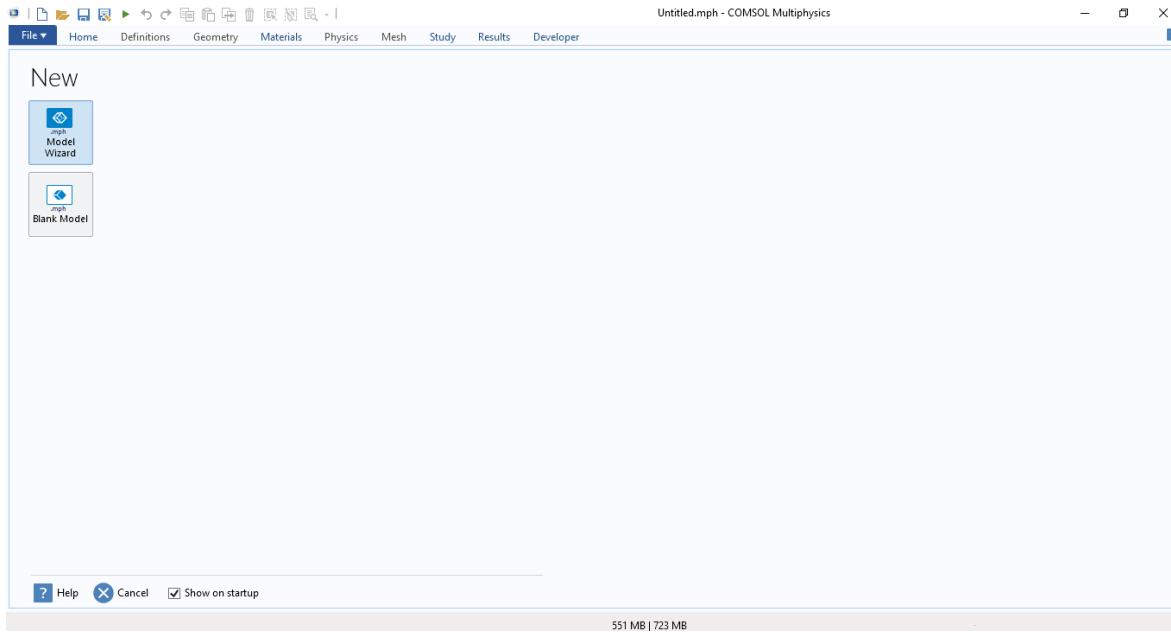
13: Torsión de una Viga con Área
de Sección Transversal No Circular

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CREACIÓN DE LA PIEZA EN COMSOL:



Select Physics

The Solid Mechanics interface is intended for general structural analysis of 3D, 2D, or axisymmetric bodies. In 2D, plane stress or plane strain assumptions can be used. The Solid Mechanics interface is based on solving Navier's equations, and results such as displacements, stresses, and strains are computed.

The Acoustics Module, MEMS Module, and Structural Mechanics Module add several features, for example geometric nonlinearity and advanced boundary conditions such as contact, follower loads, and nonreflecting boundaries.

With the Nonlinear Structural Materials Module or the Geomechanics Module, the interface is extended with, for example, material models for plasticity, hyperelasticity, creep, and concrete.

Solid Mechanics

Added physics interfaces:

Space Dimension: Study

? Help X Cancel Done

736 MB | 970 MB

Select Study

The Stationary study is used when field variables do not change over time.

Examples: In electromagnetics, it is used to compute static electric or magnetic fields, as well as direct currents. In heat transfer, it is used to compute the temperature field at thermal equilibrium. In solid mechanics, it is used to compute deformations, stresses, and strains at static equilibrium. In fluid flow it is used to compute the steady flow and pressure fields. In chemical species transport, it is used to compute steady-state chemical composition in steady flows. In chemical reactions, it is used to compute the chemical composition at equilibrium of a reacting system.

It is also possible to compute several solutions, such as a number of load cases, or to track the nonlinear response to a slowly varying load.

Stationary

Added study: Stationary

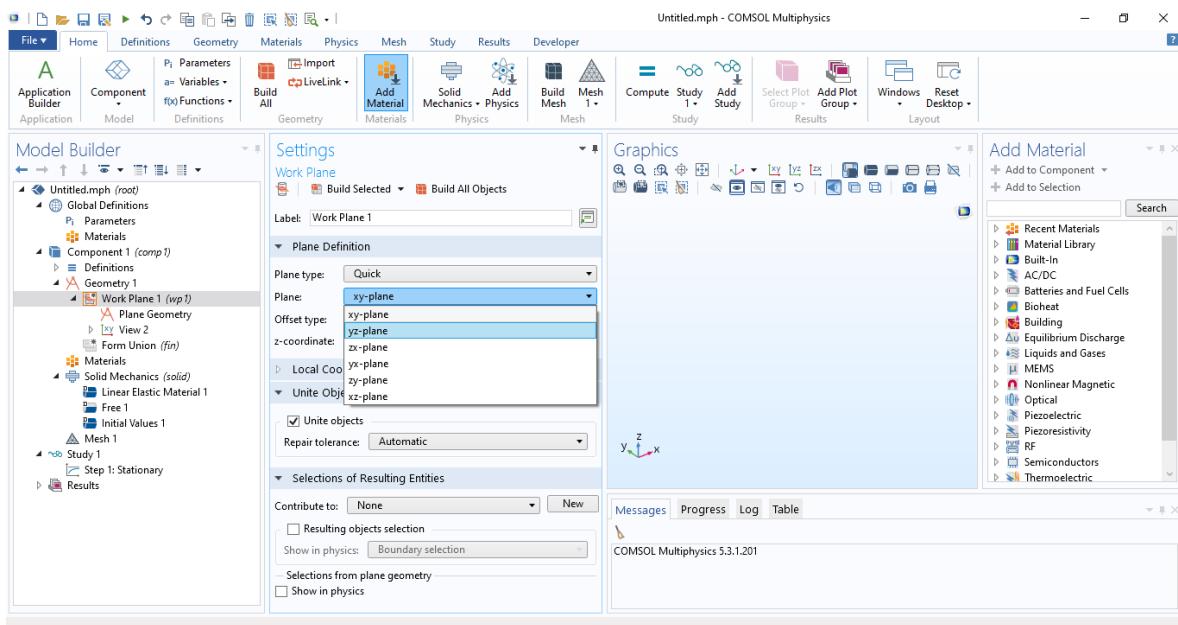
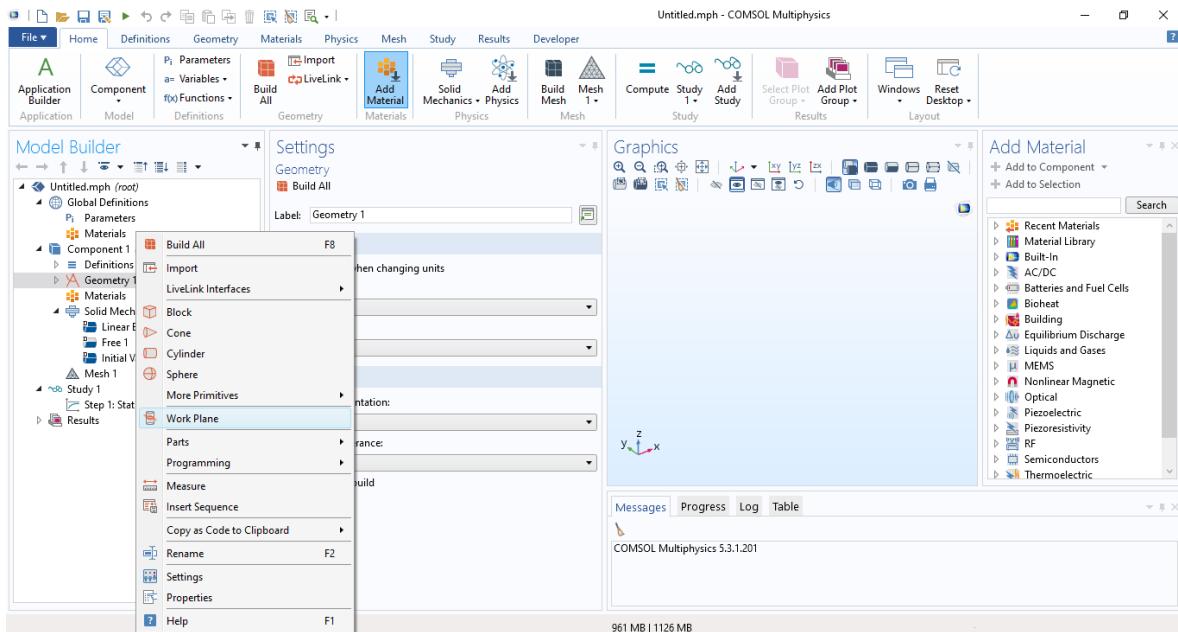
Added physics interfaces: Solid Mechanics (solid)

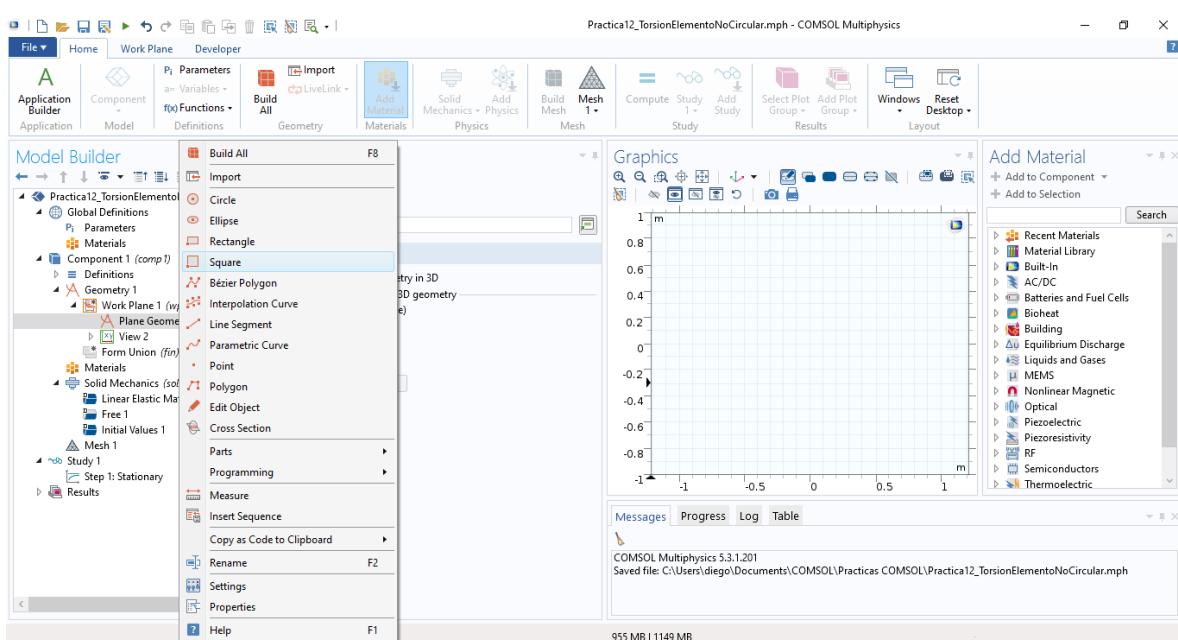
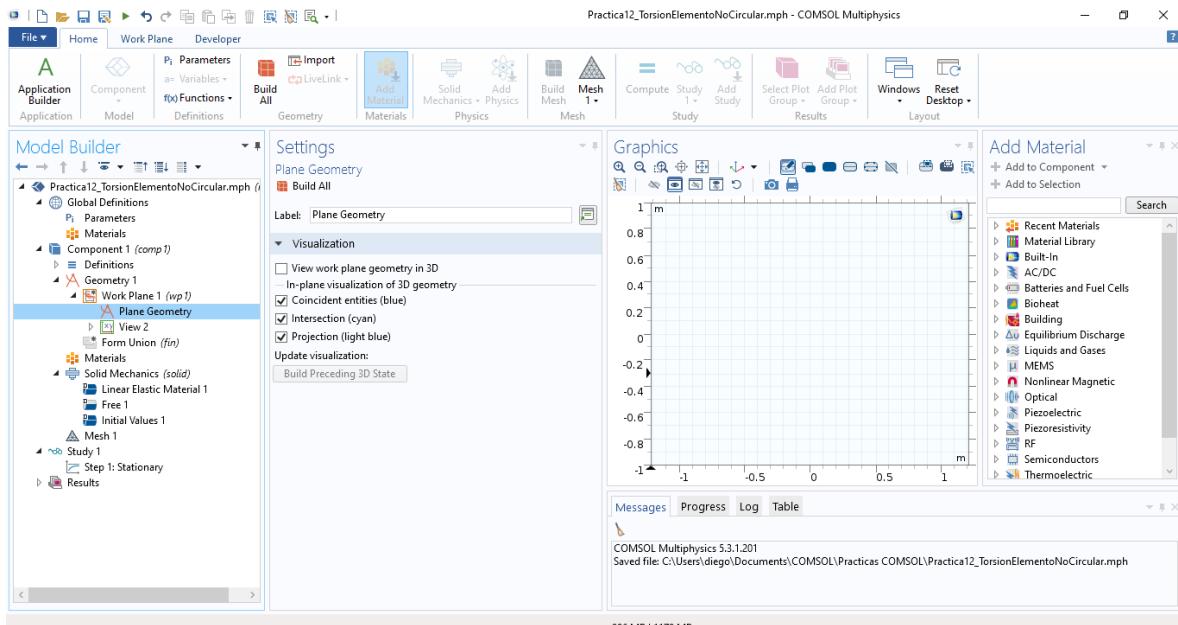
Physics

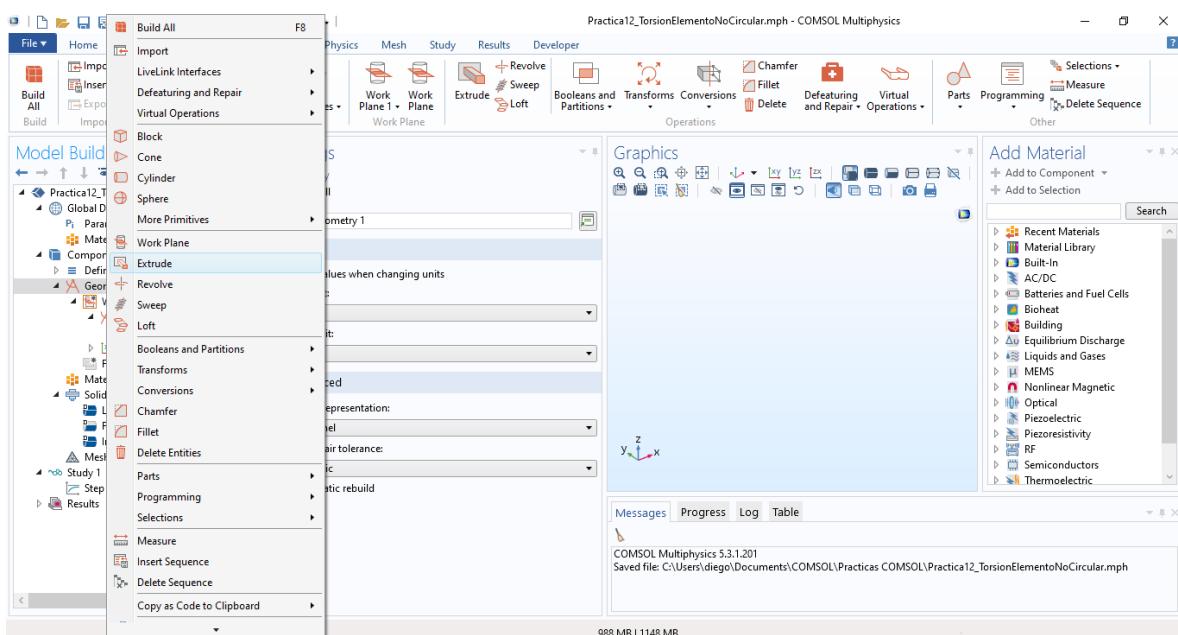
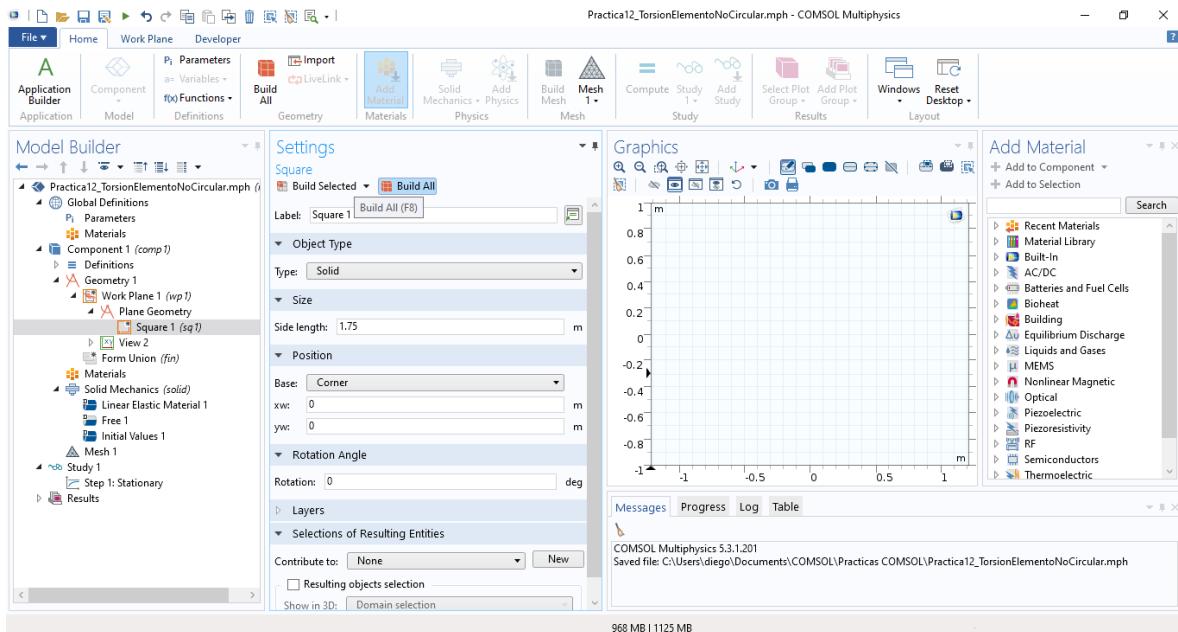
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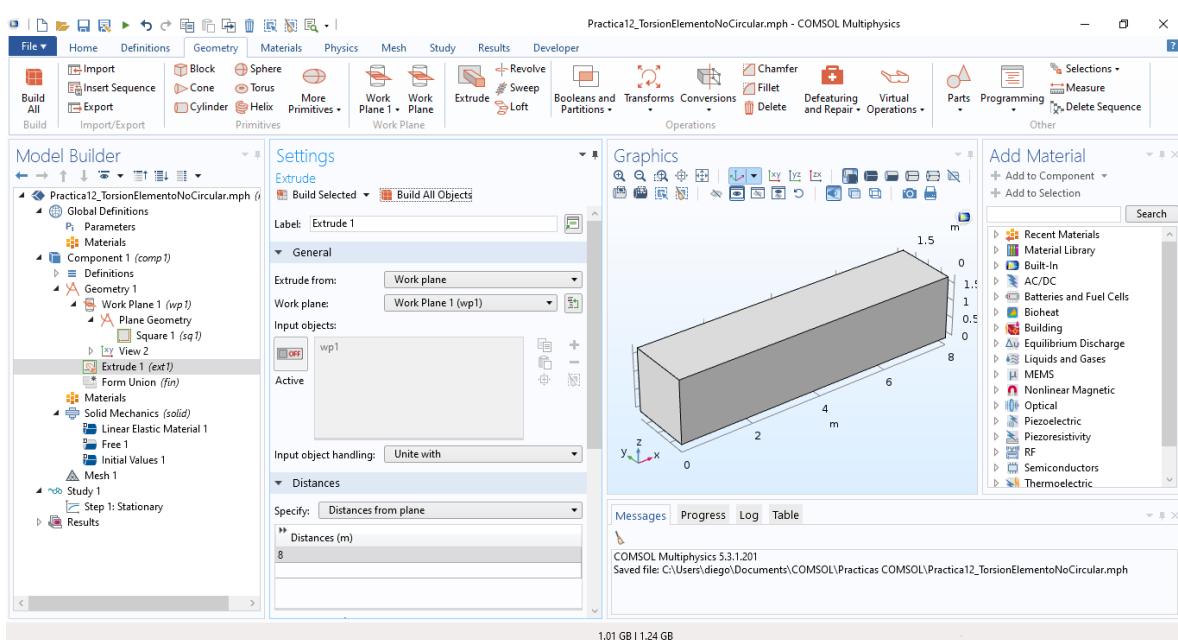
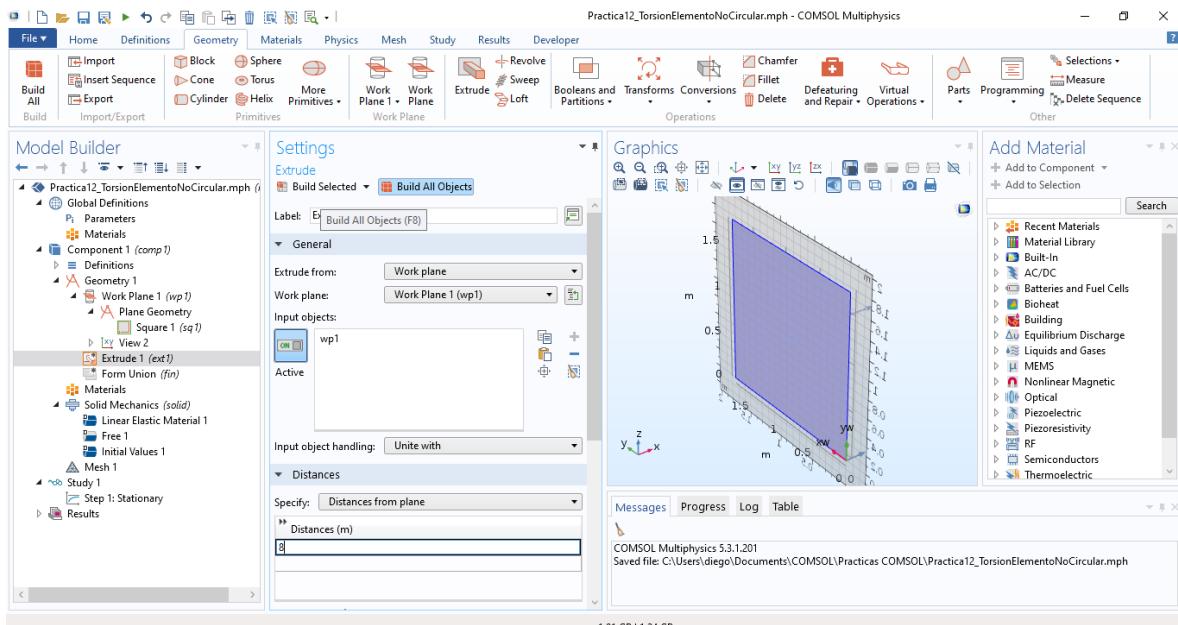
Add Selected Study and Physics Interfaces and Finish

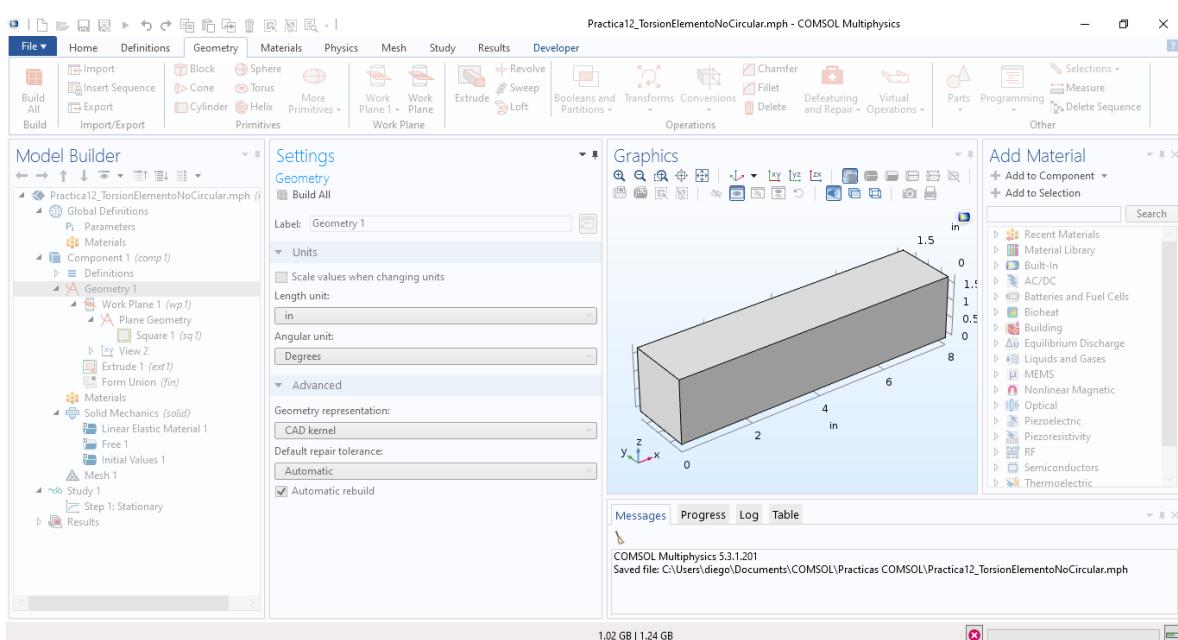
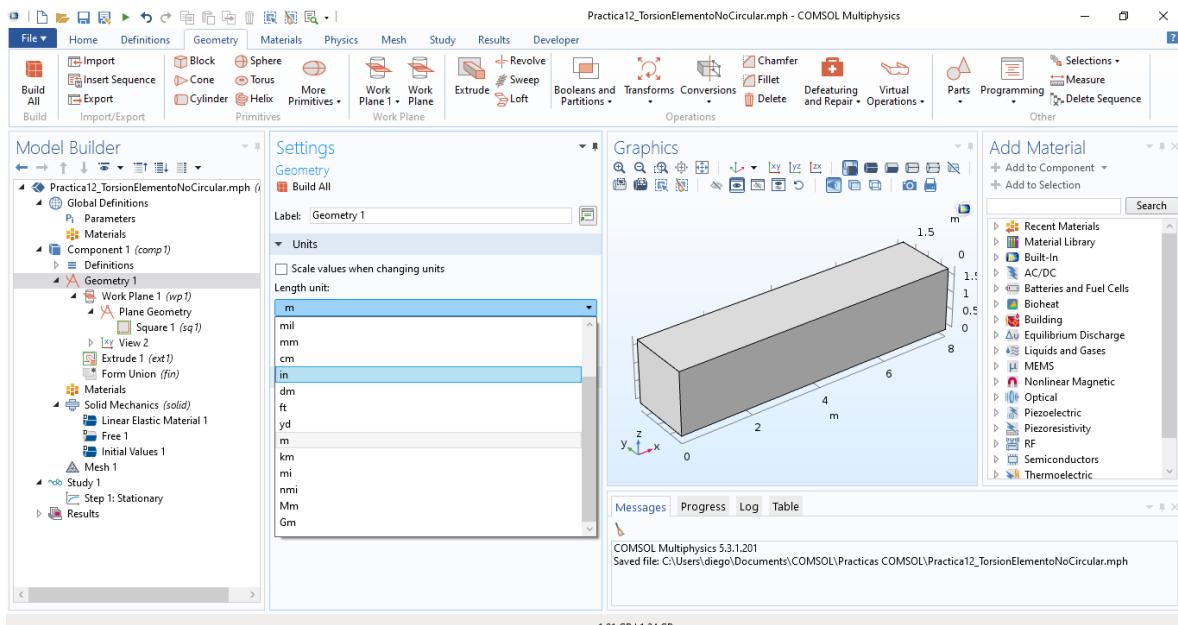
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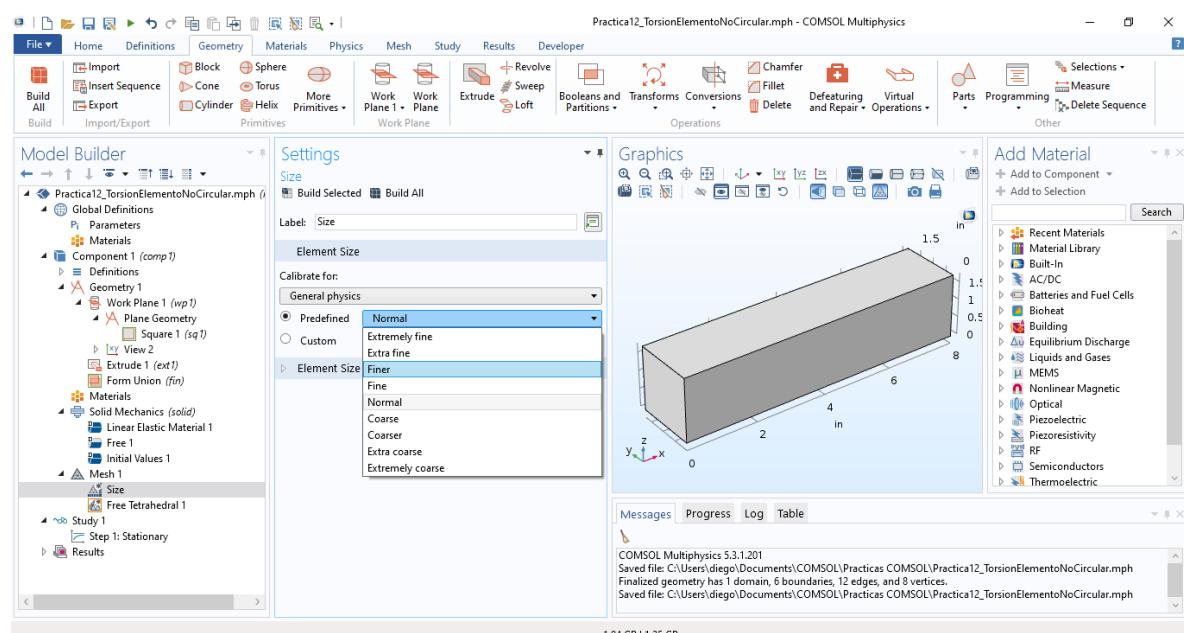
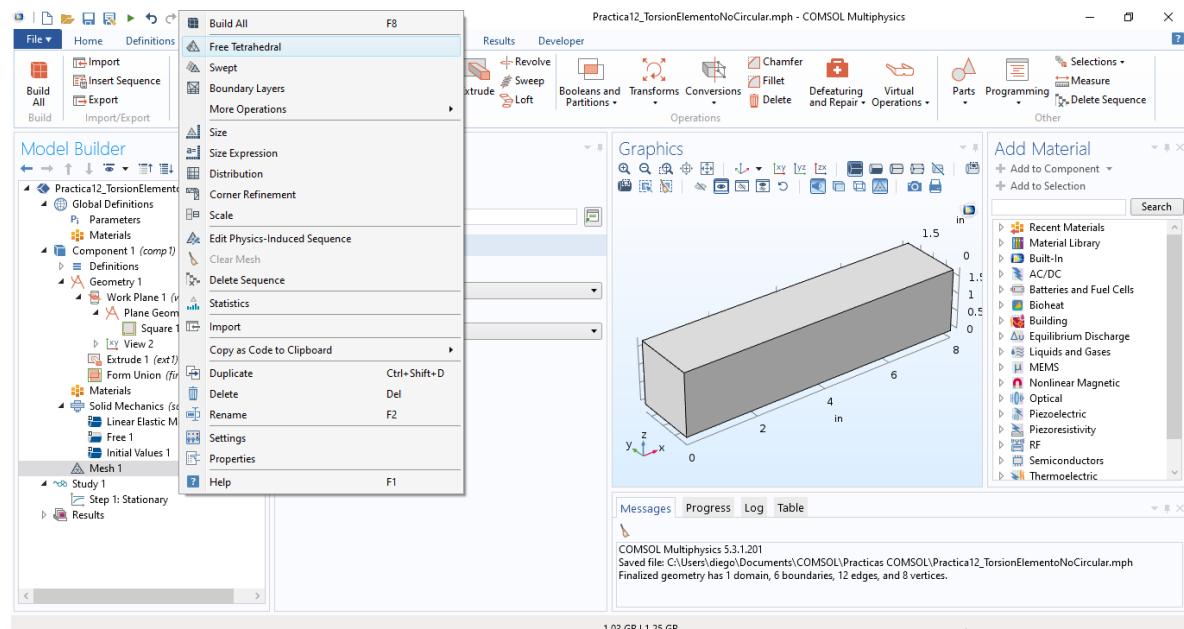


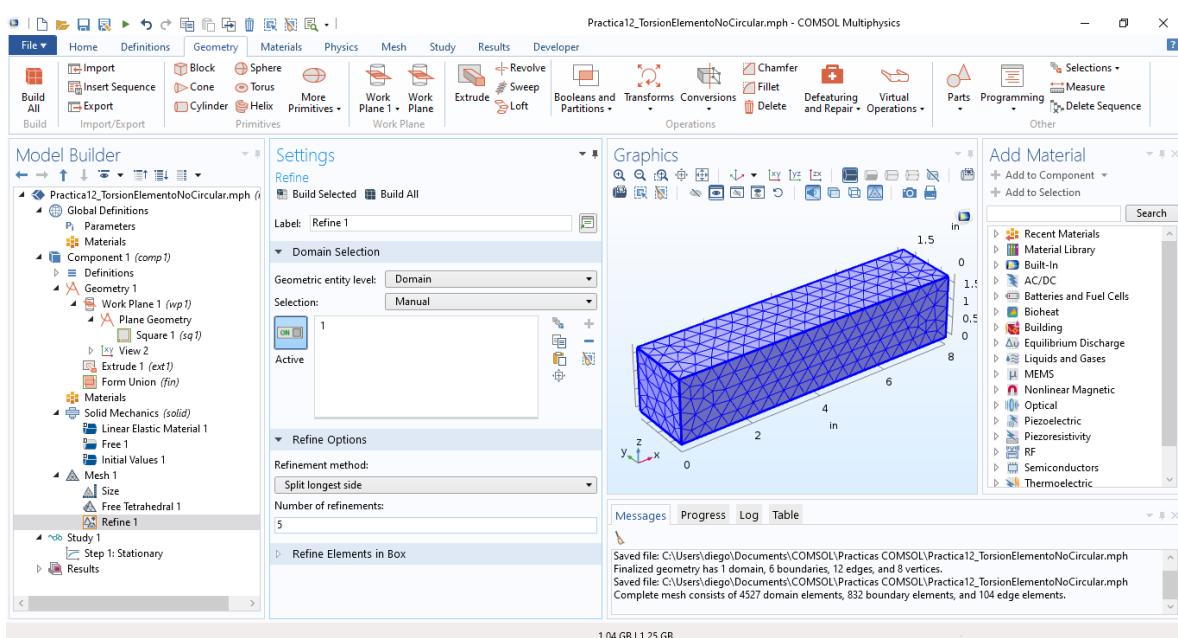
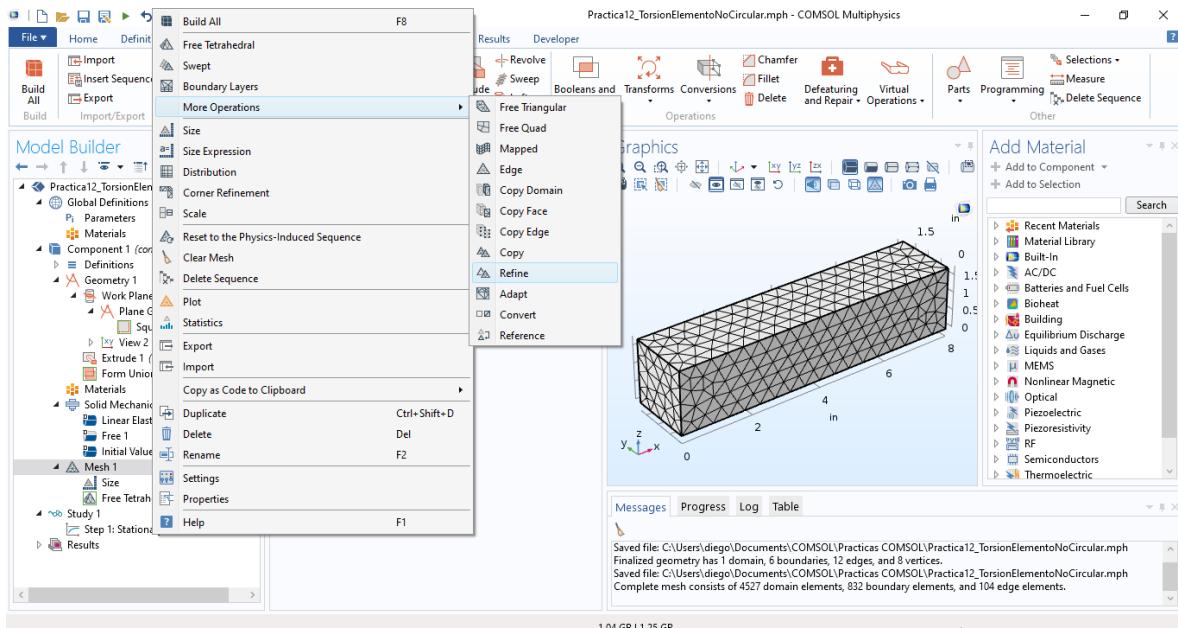


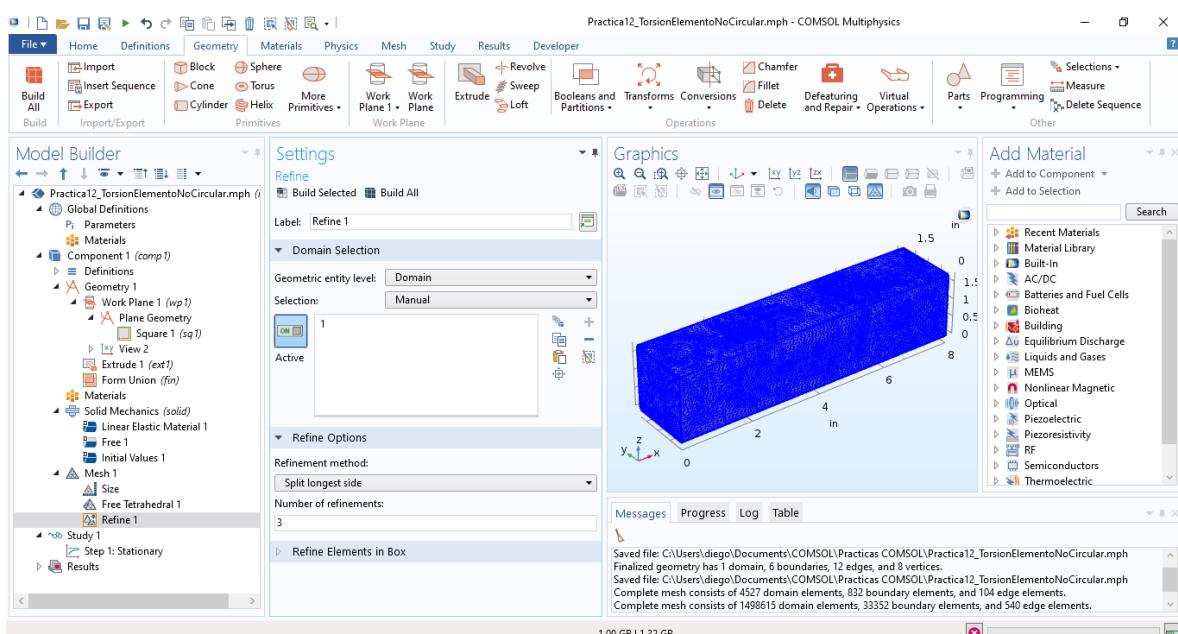
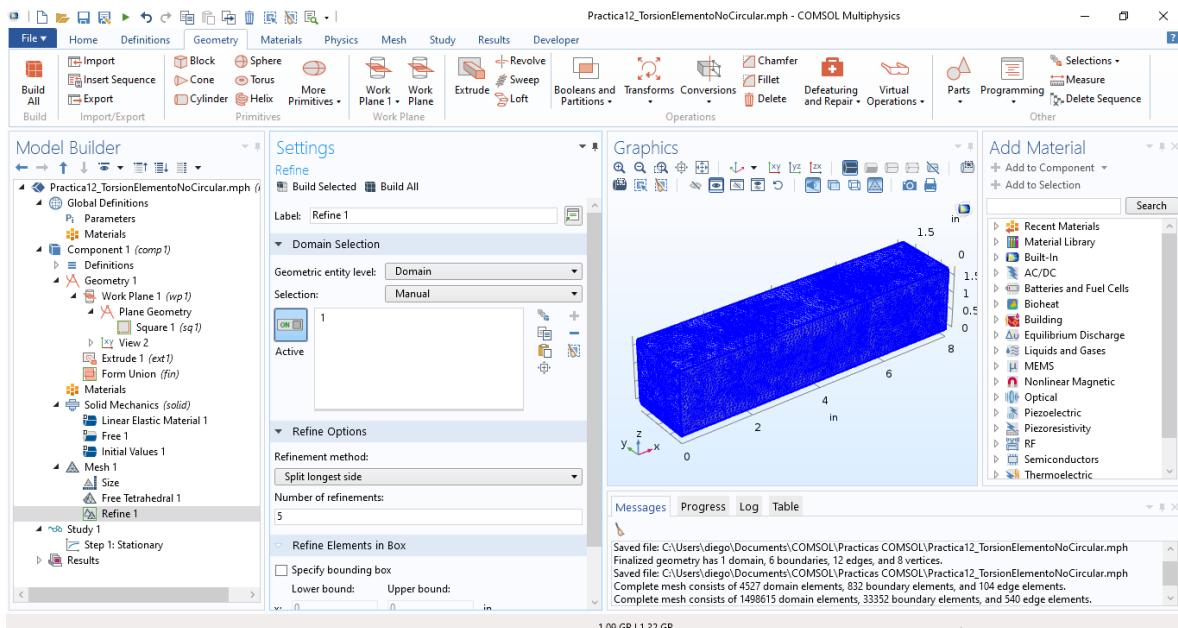


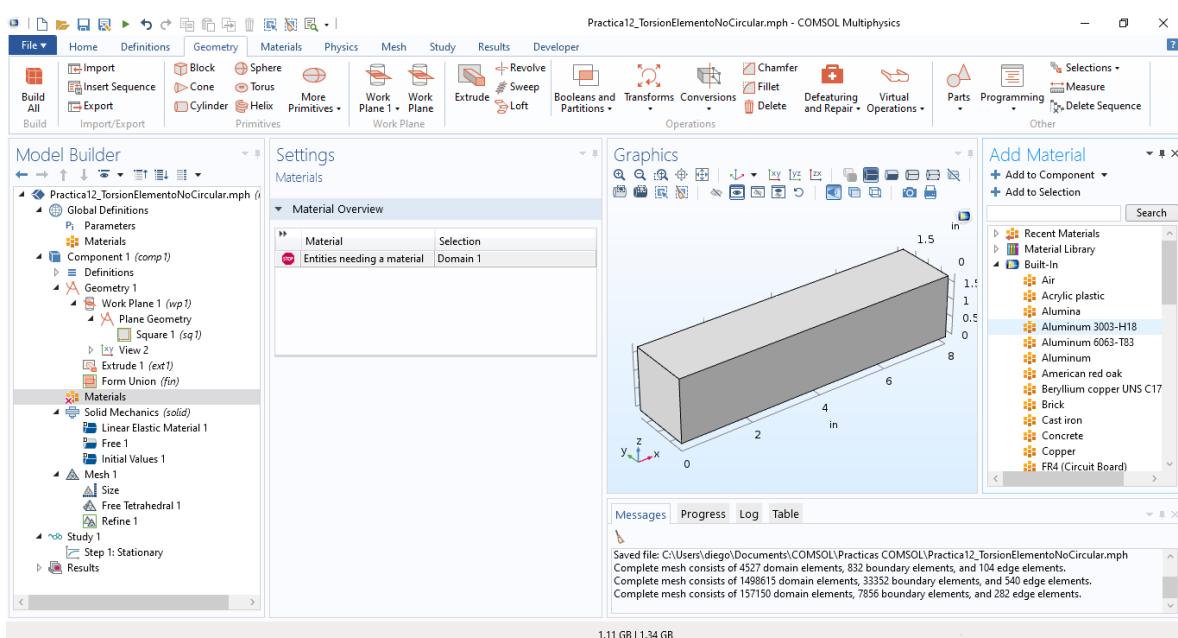
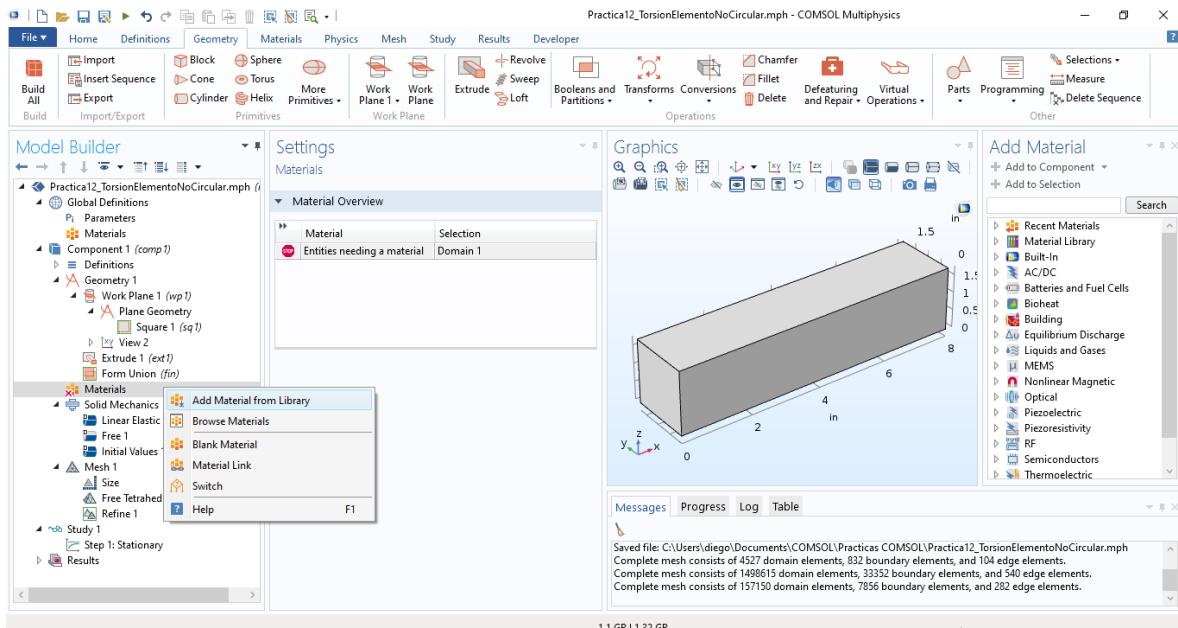


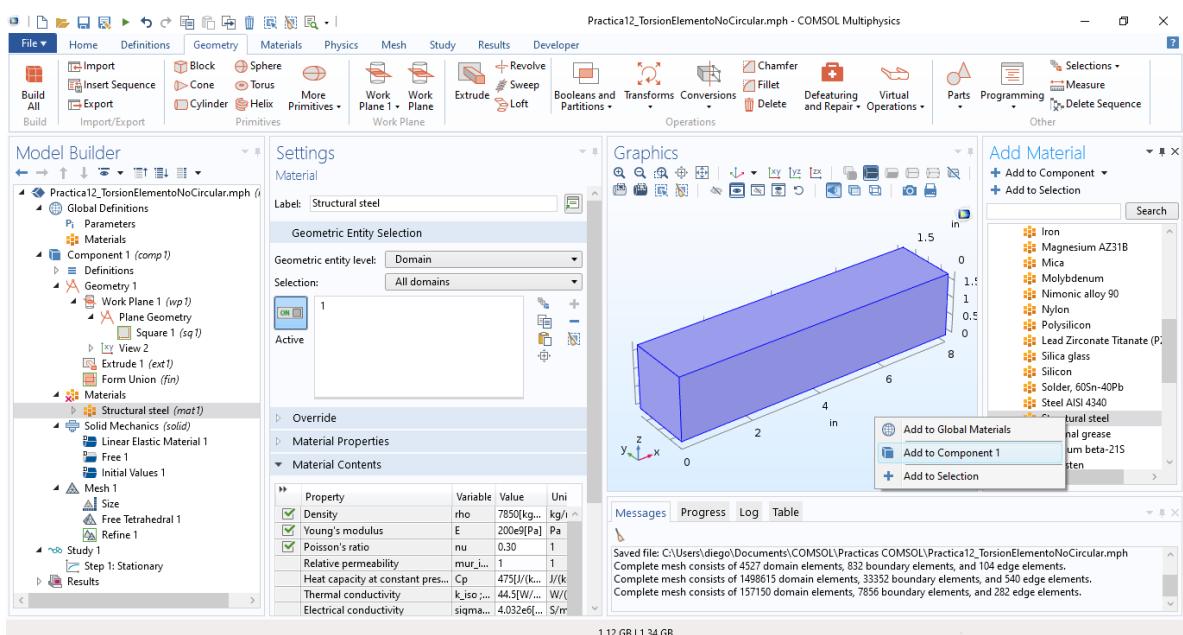
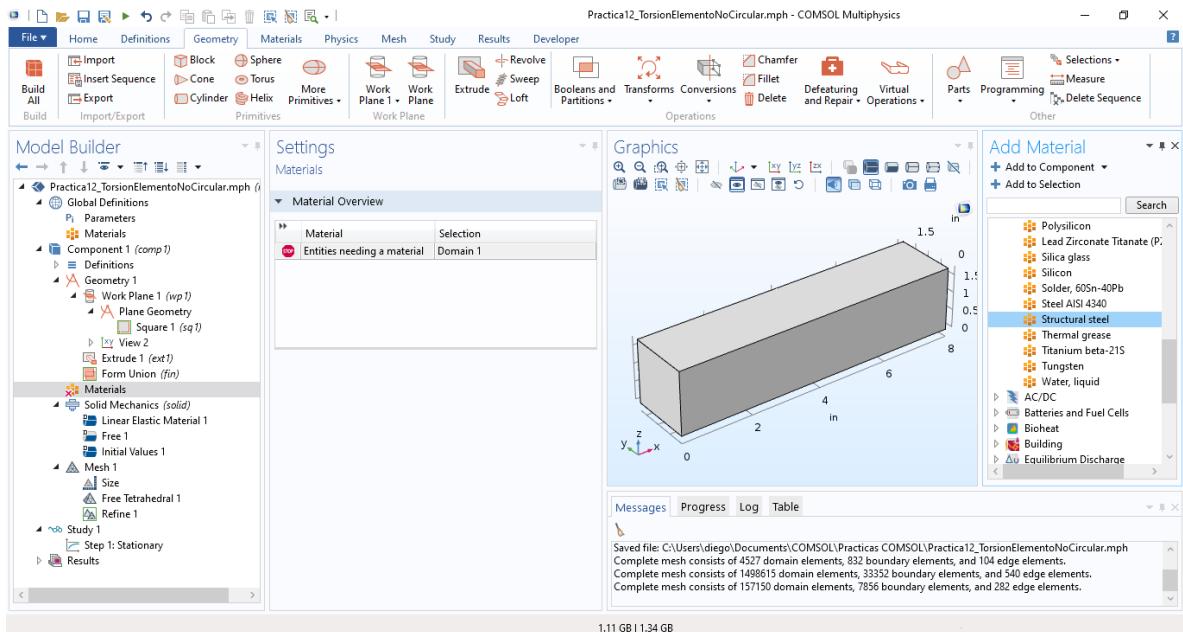
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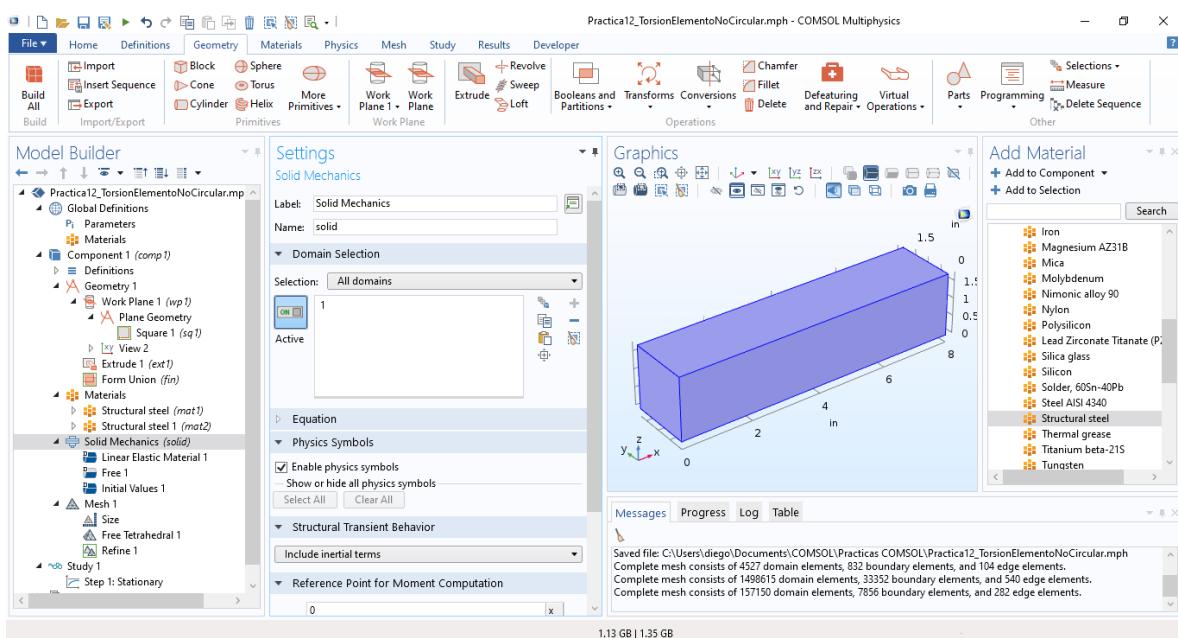
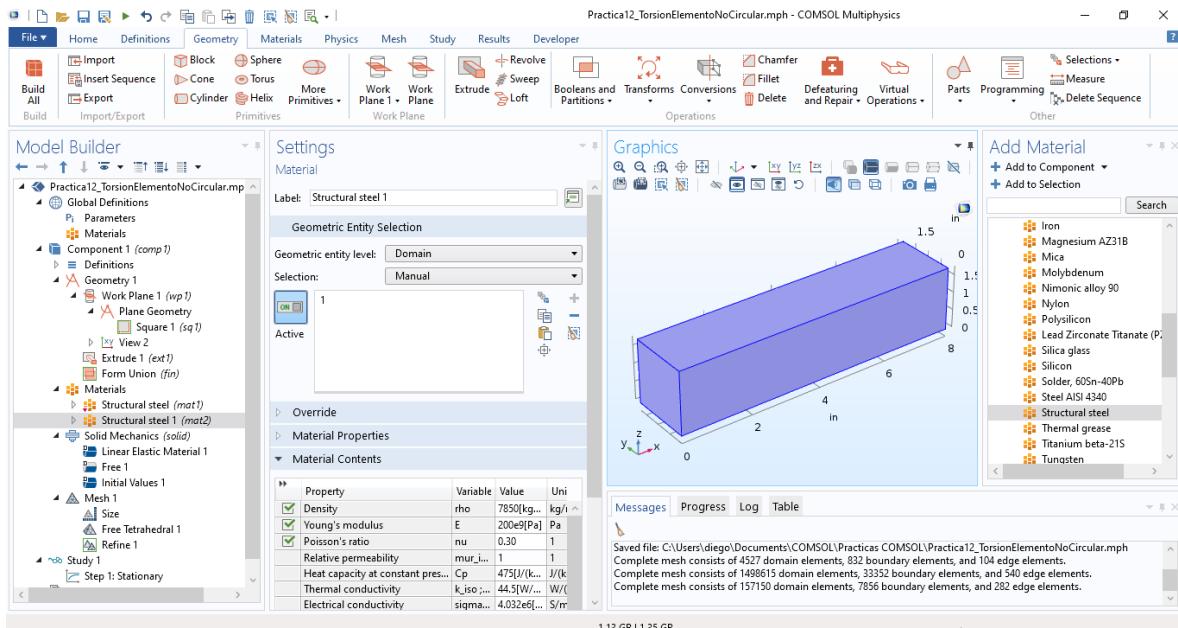


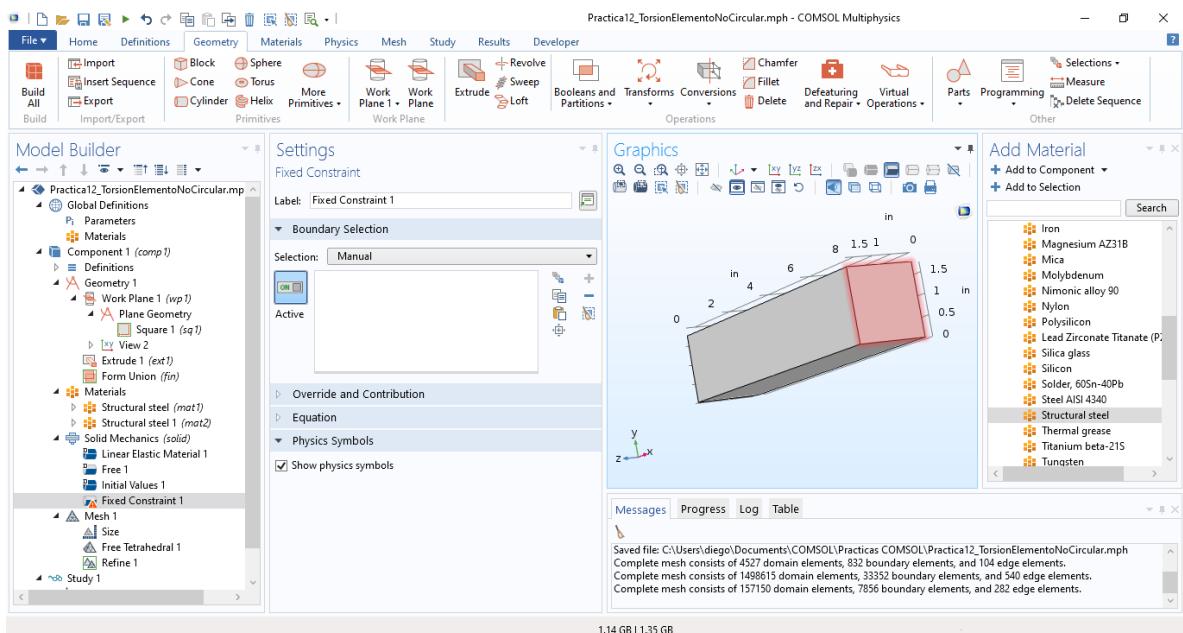
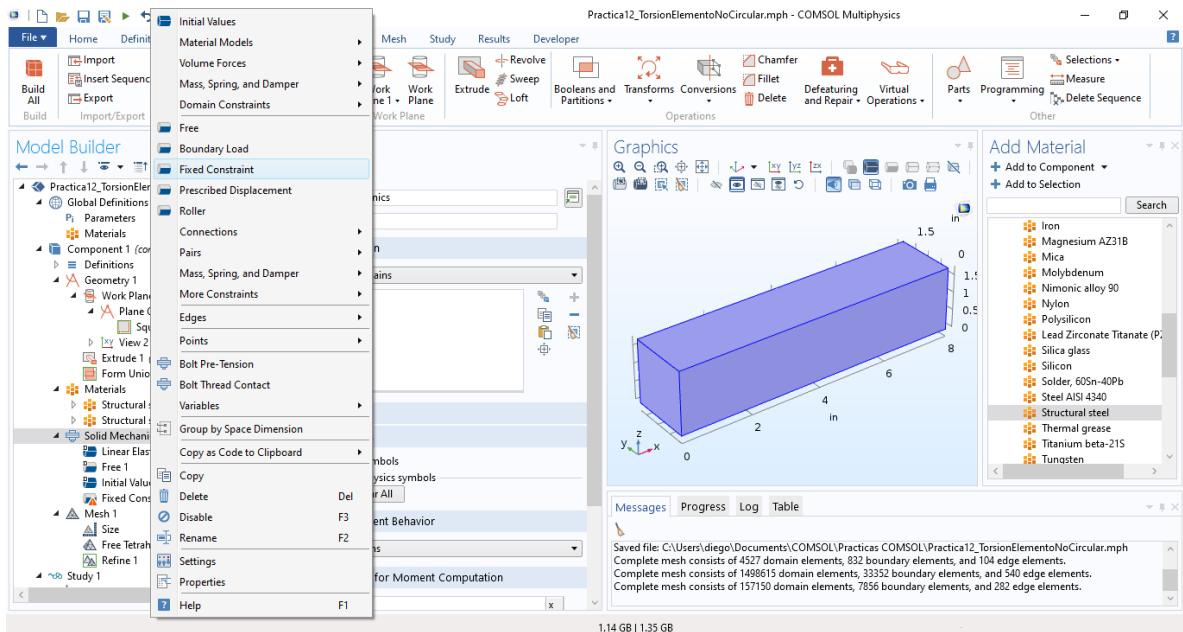


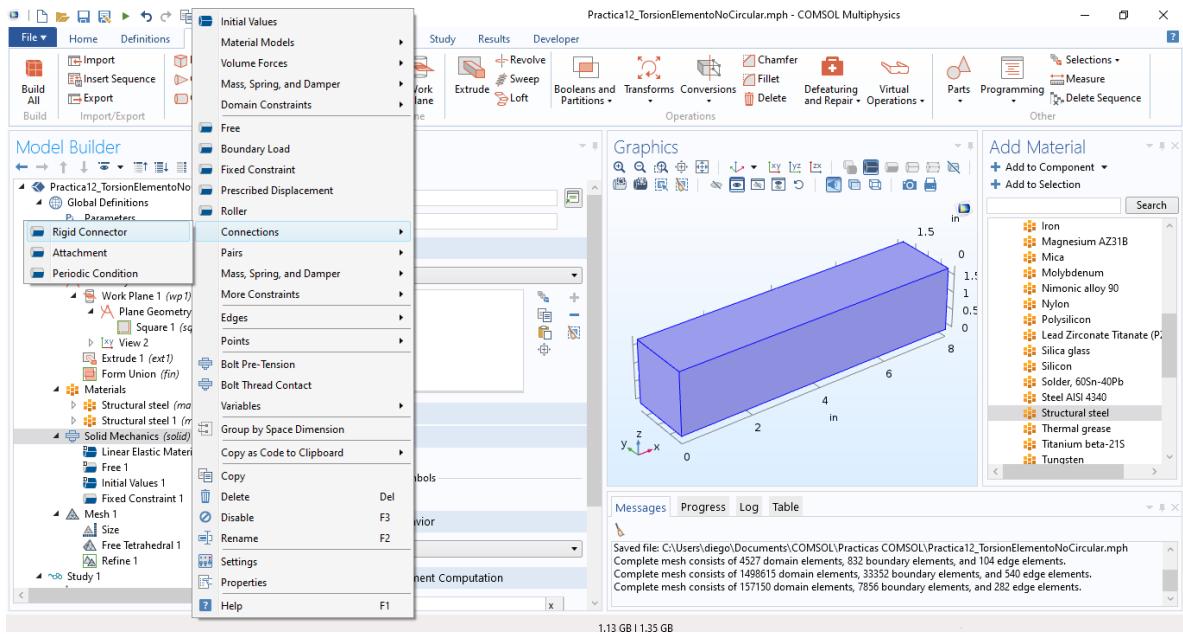




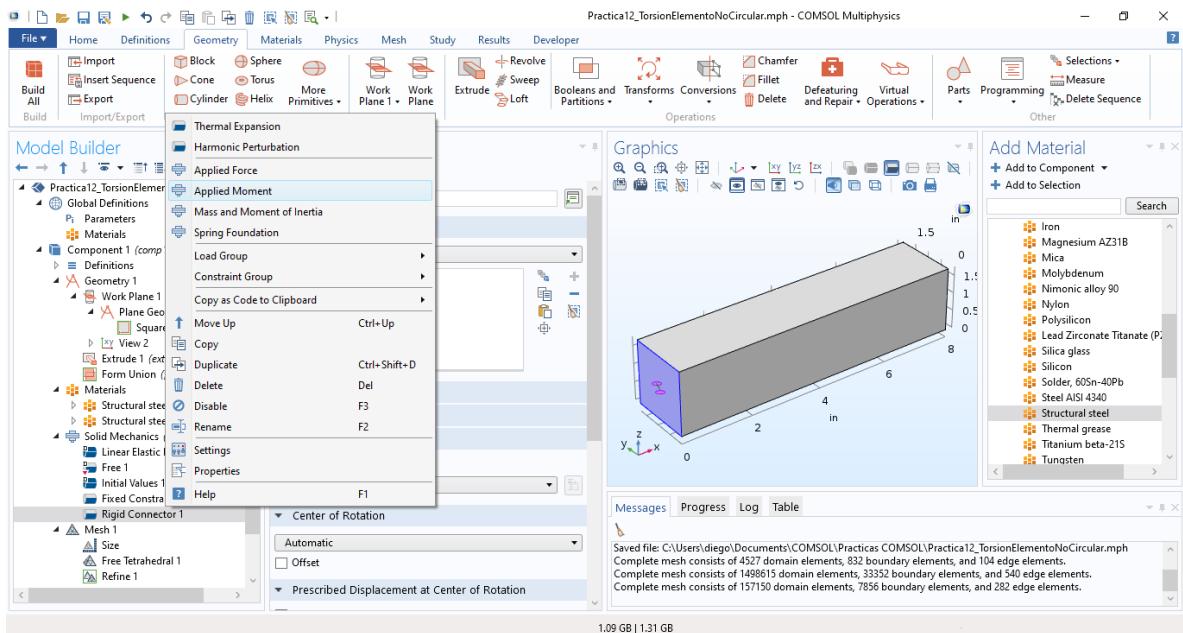


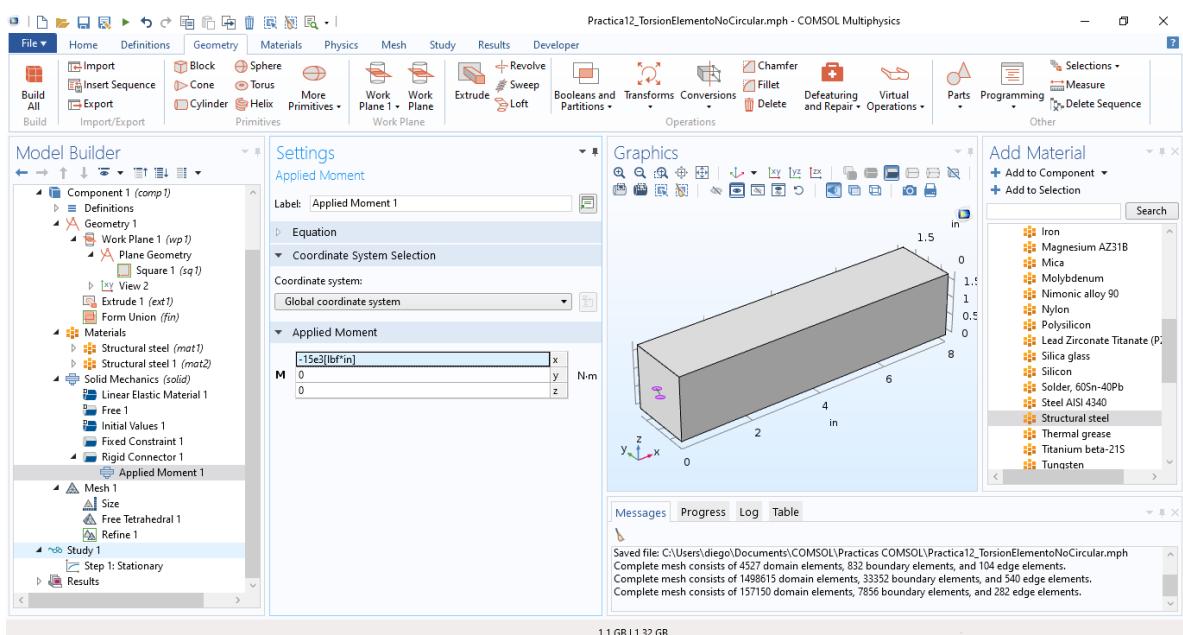
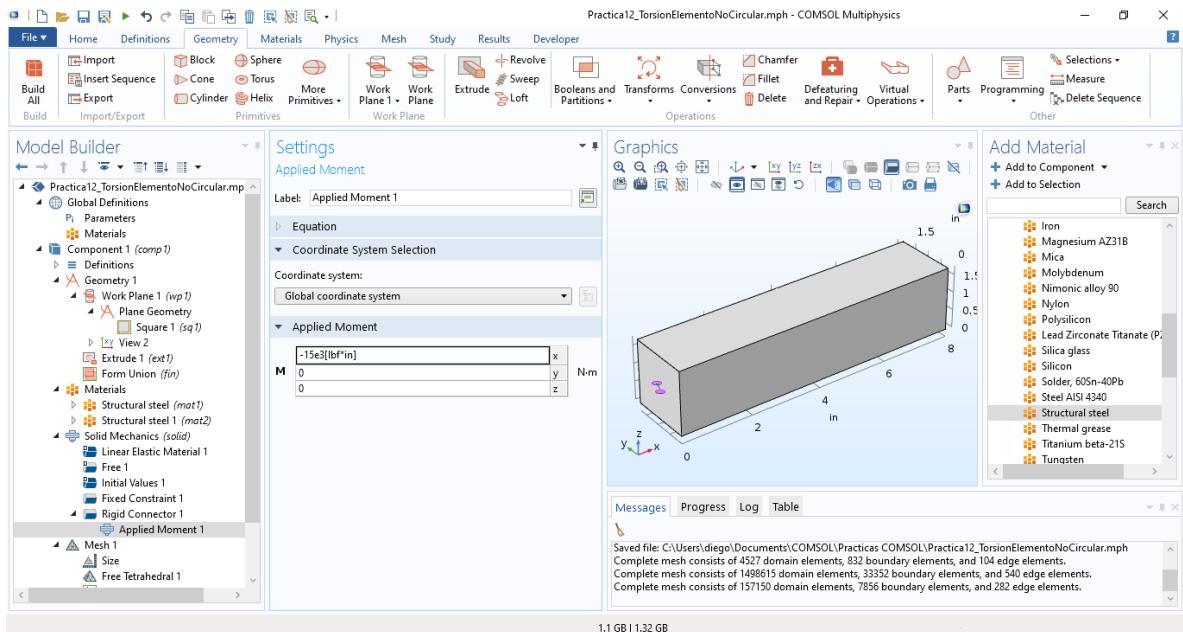




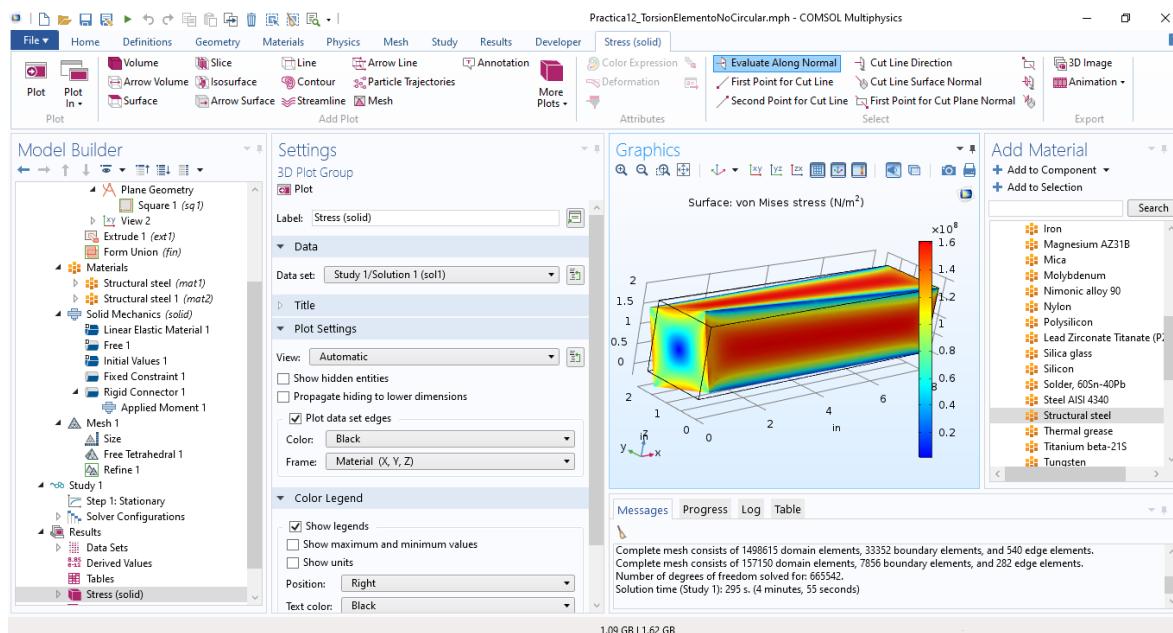
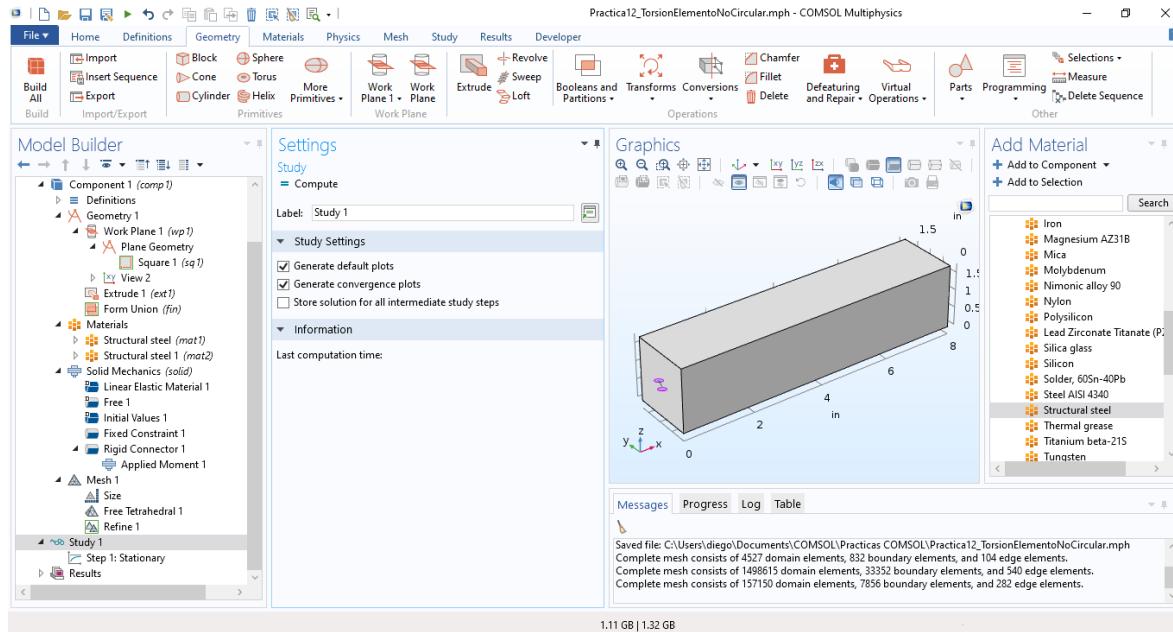


Esto se realiza para que todos los puntos de una cara reciban fuerzas de tensión, compresión o momento (torsión).



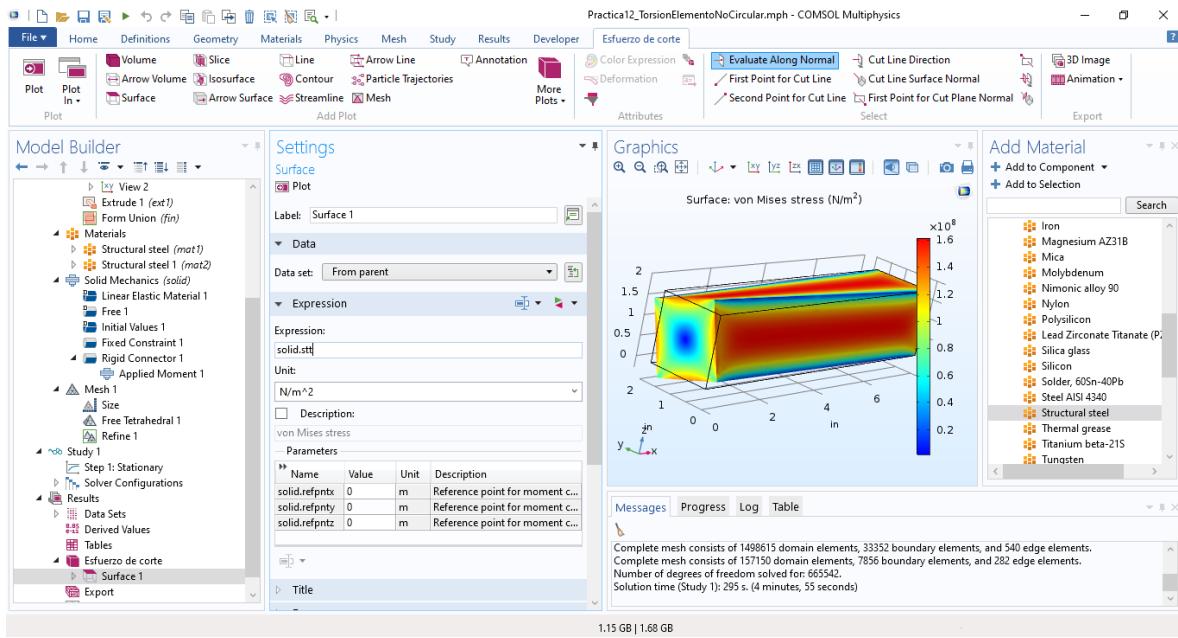


RESULTADO DEL ELEMENTO FINITO EN COMSOL:

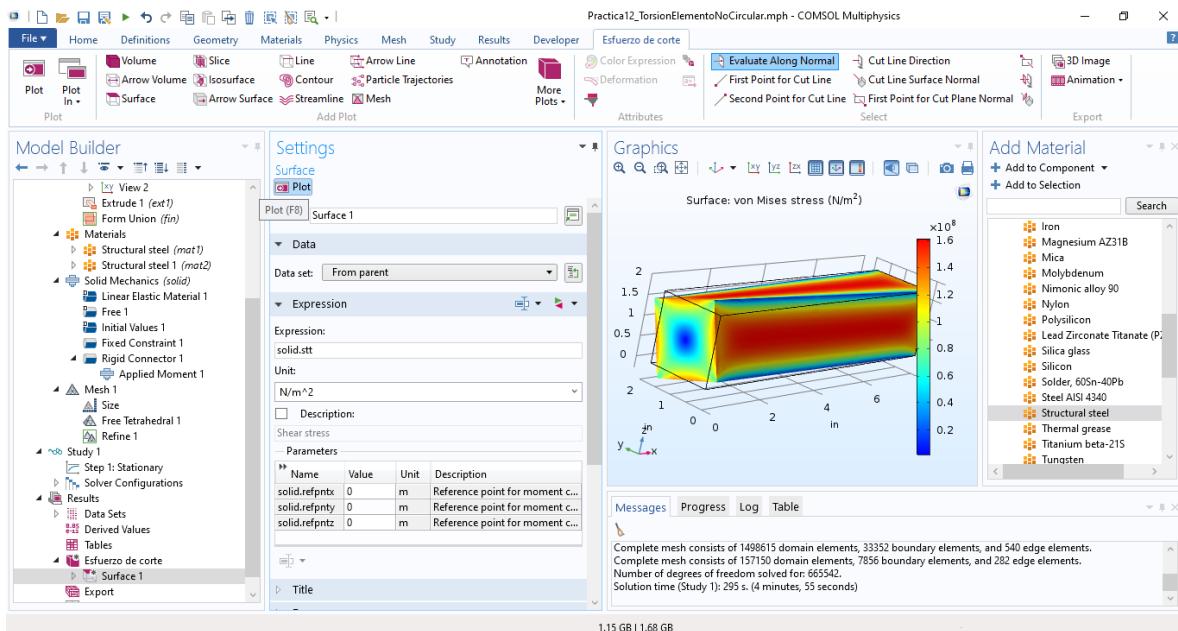


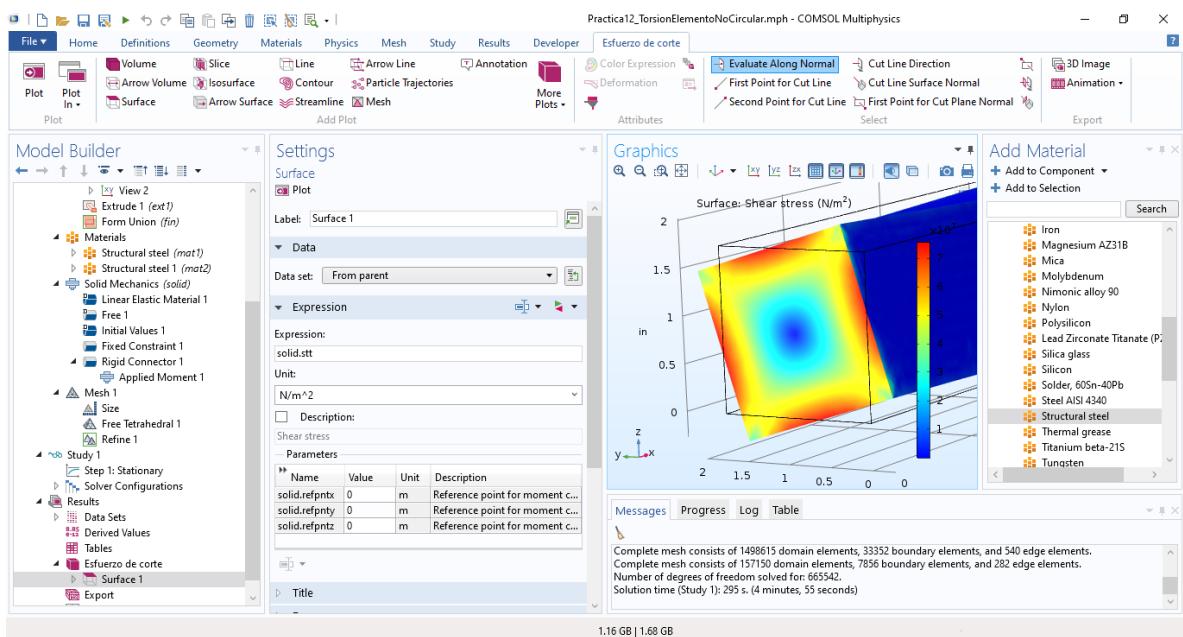
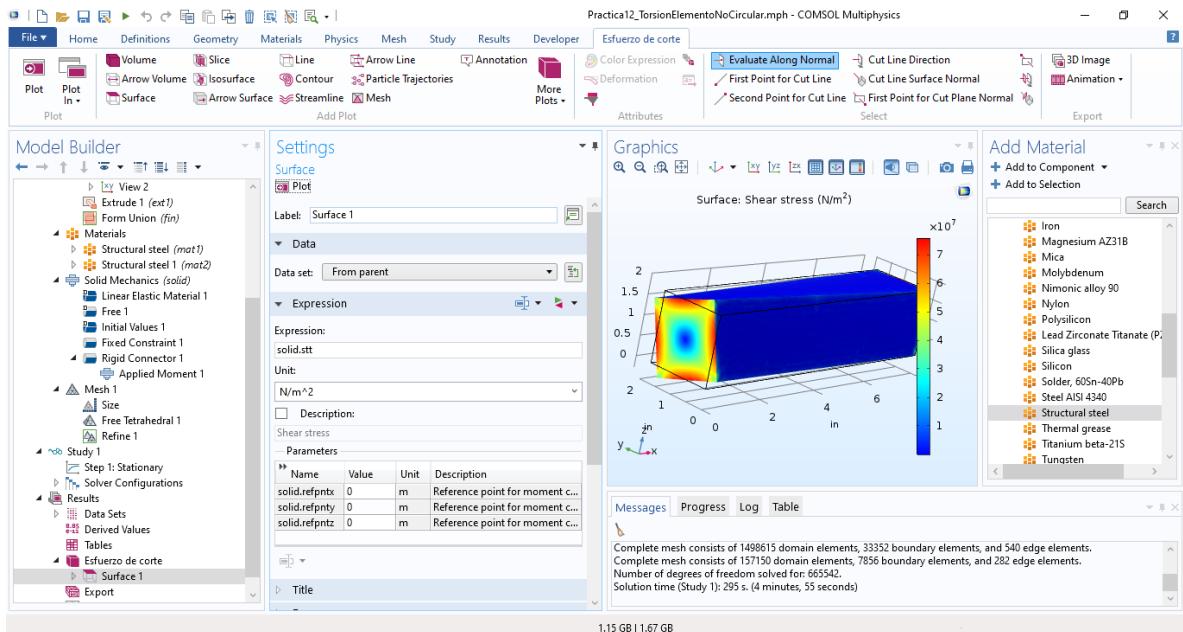
Podemos ver que el esfuerzo se concentra en las partes centrales del elemento, esto solo se puede calcular por medio de un modelo, ya que el cálculo analítico tiene la limitante de que el área de sección transversal debe ser redonda.

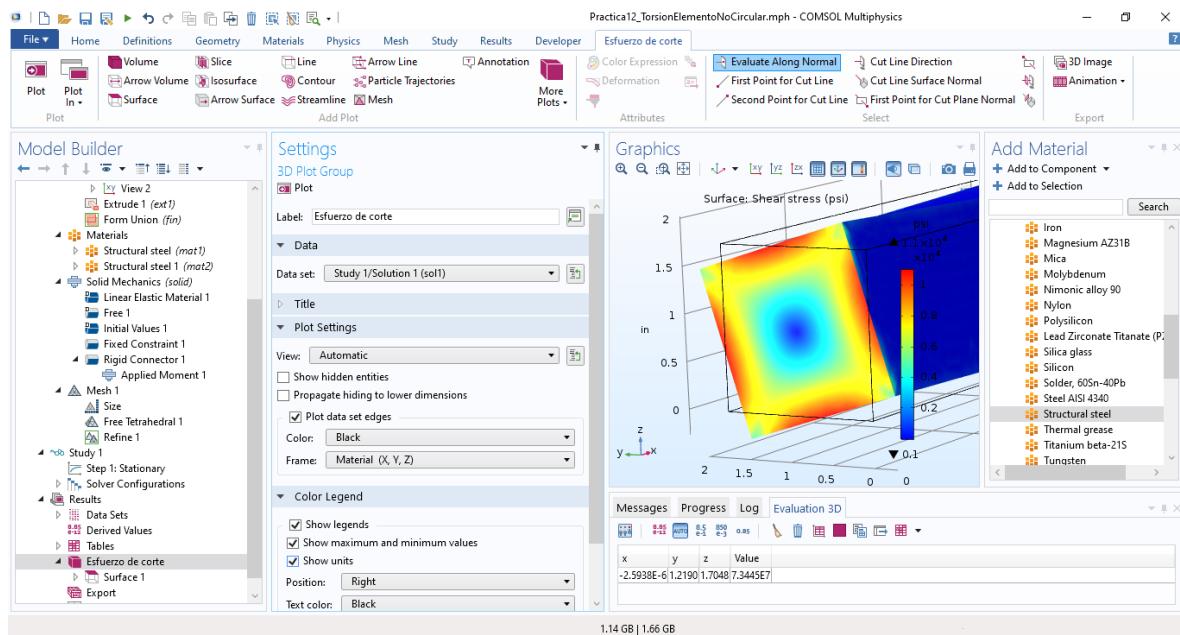
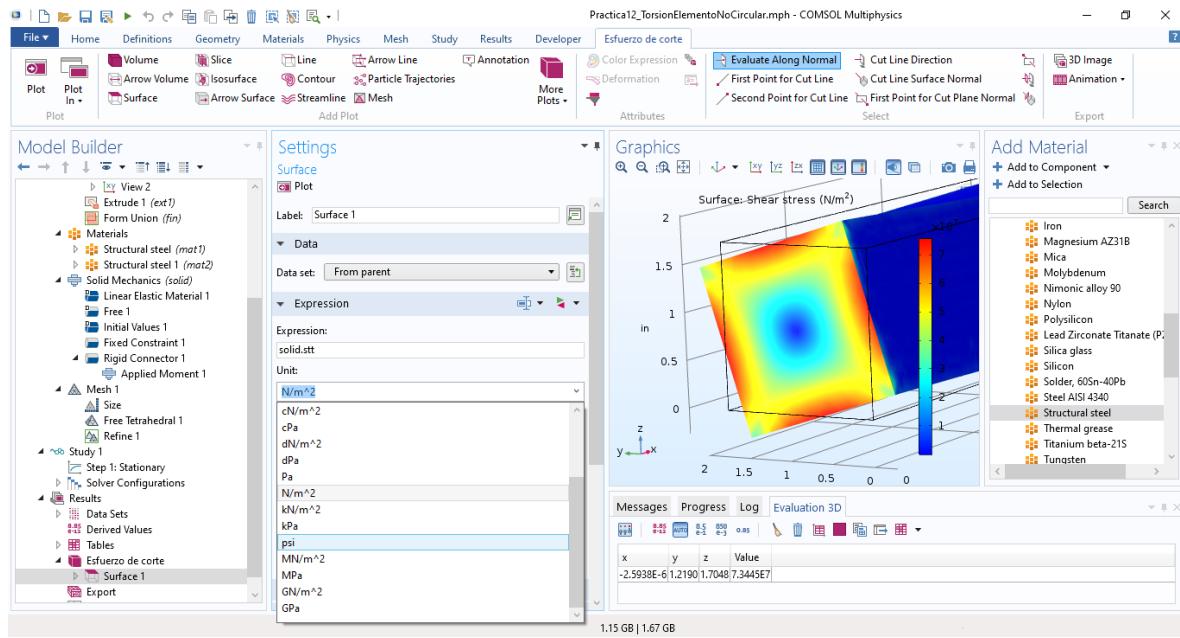


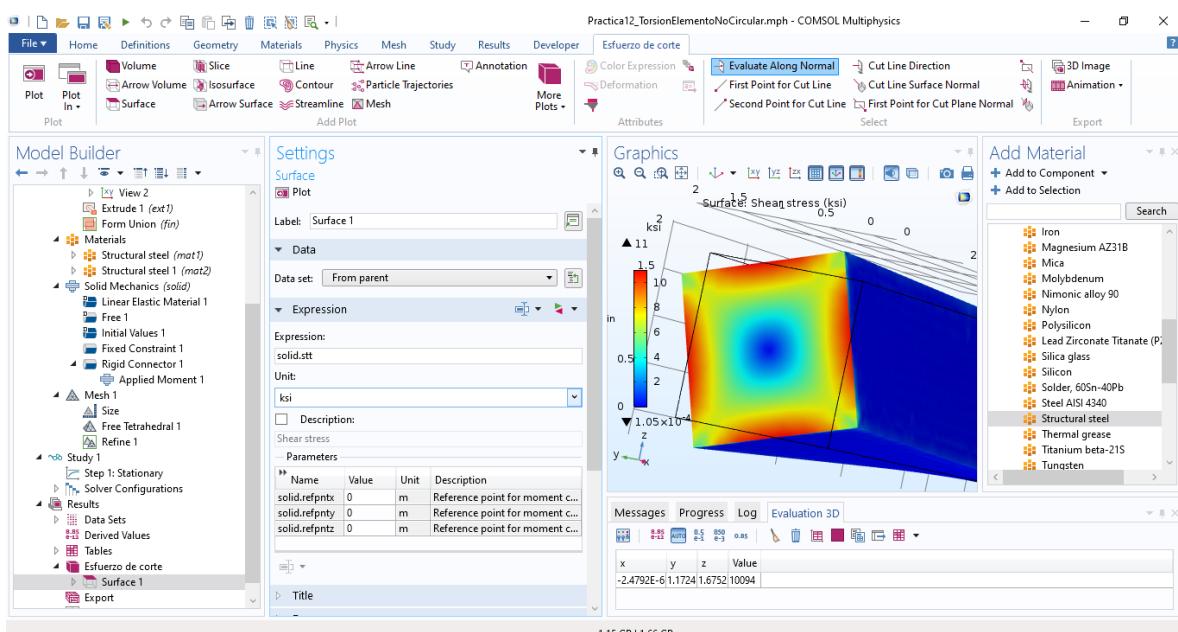
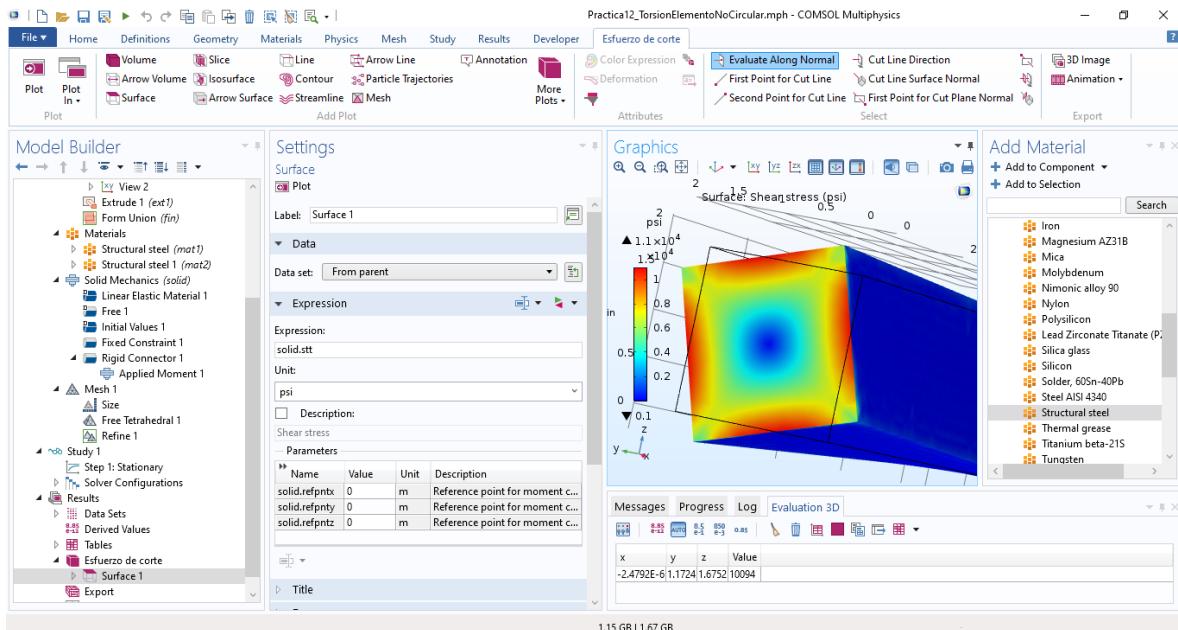


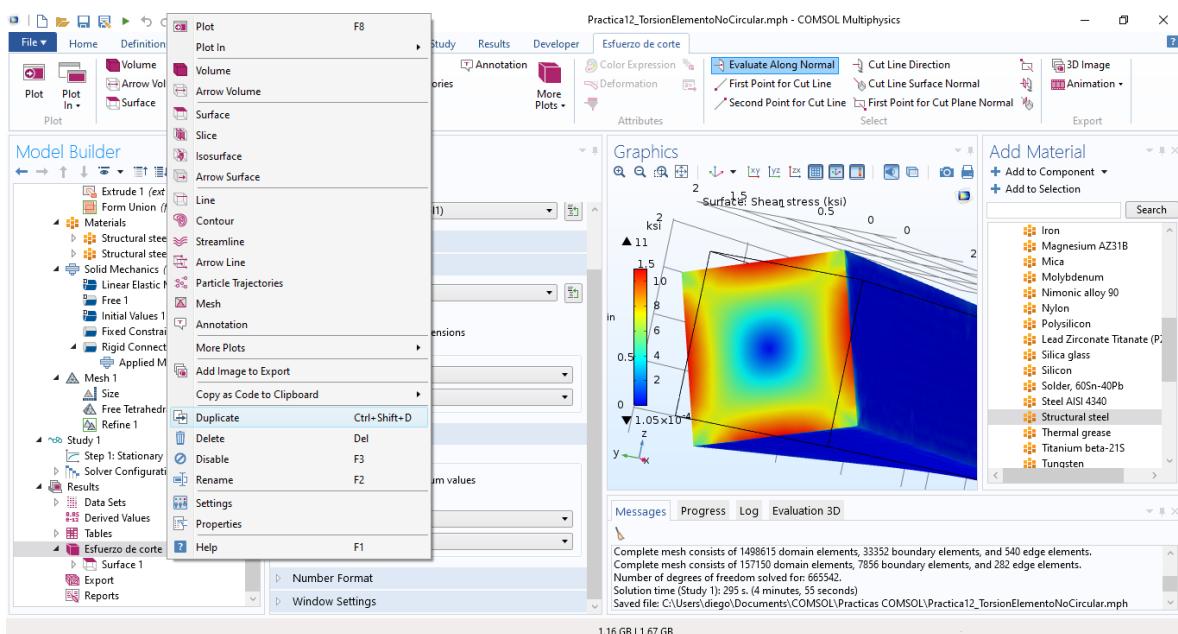
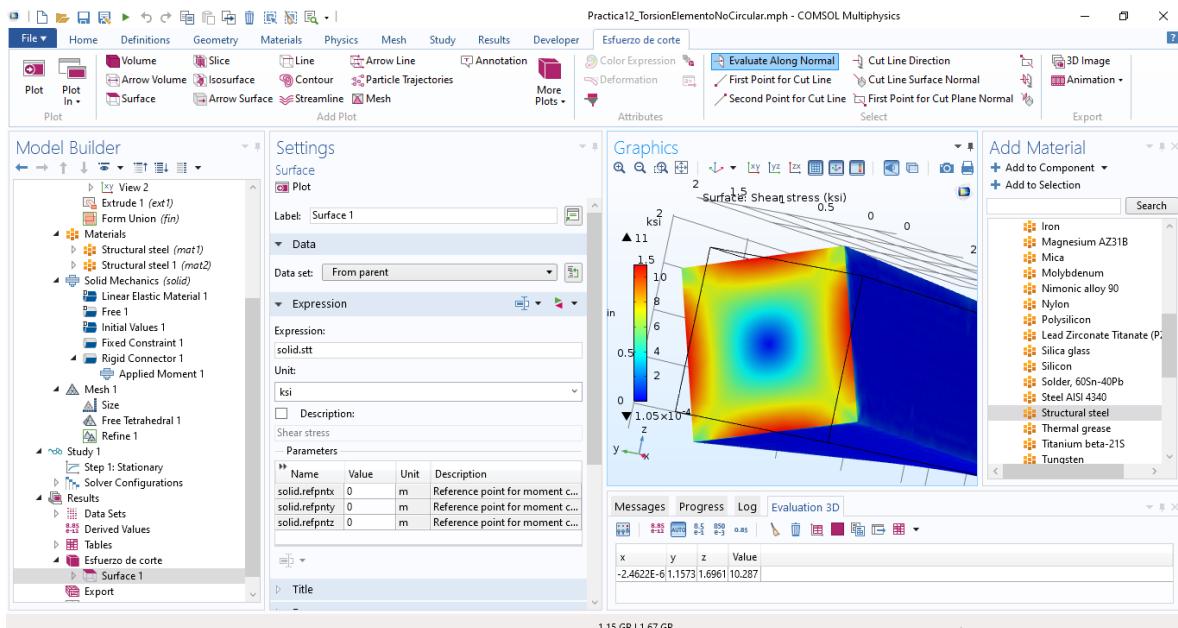
Para ver el esfuerzo de corte de la pieza se utiliza el código: solid.stt



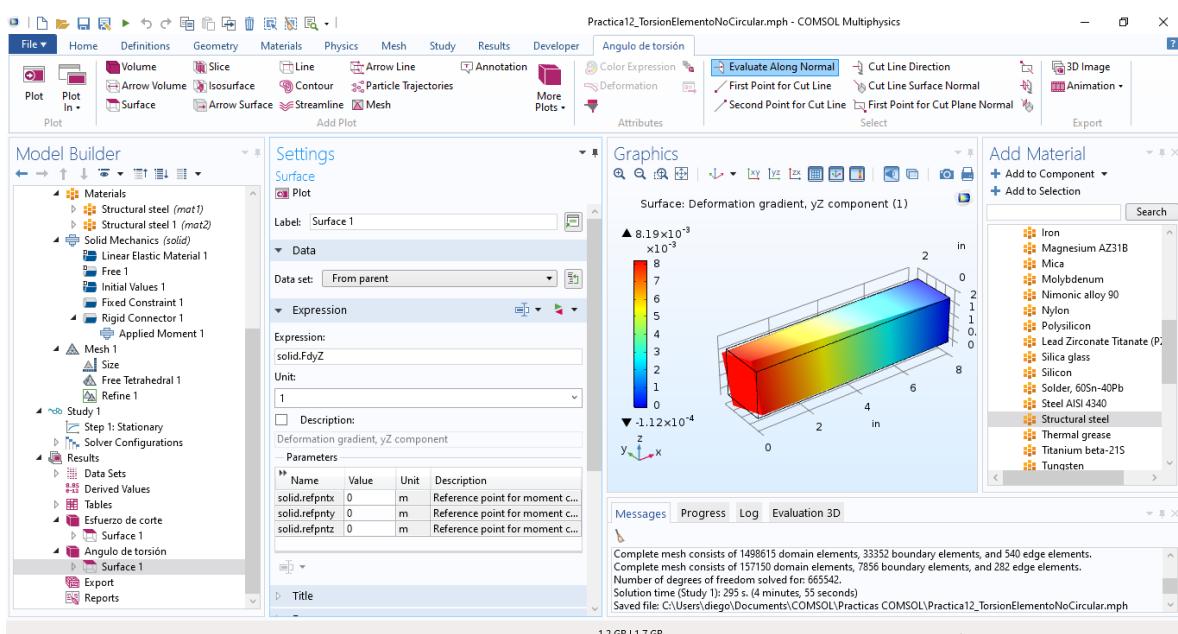
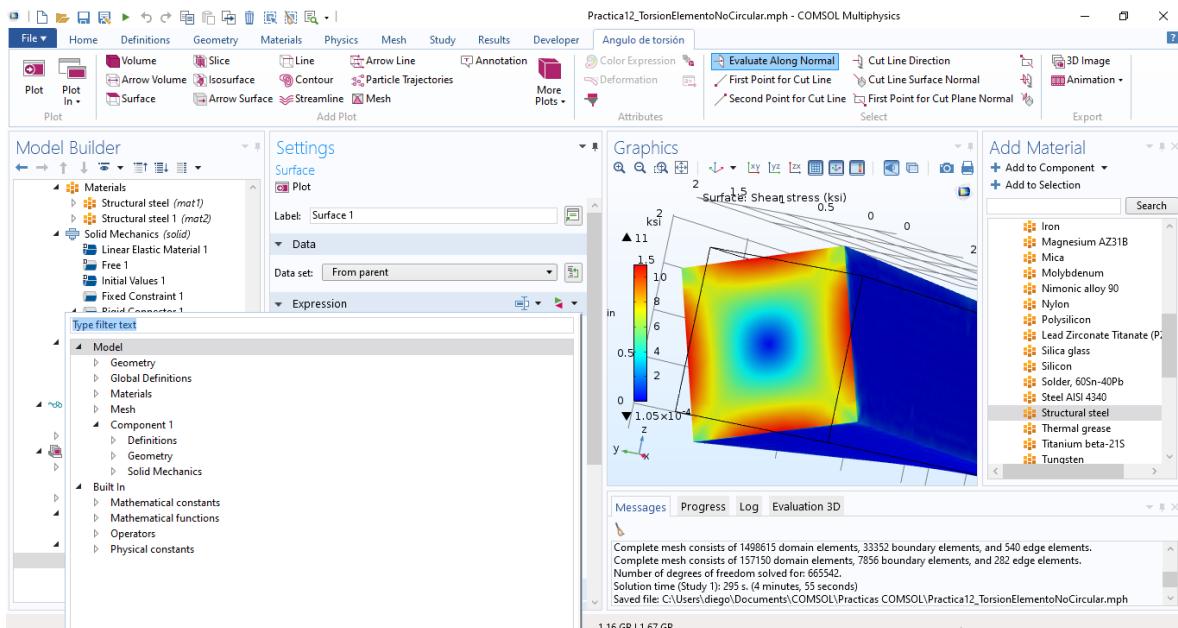




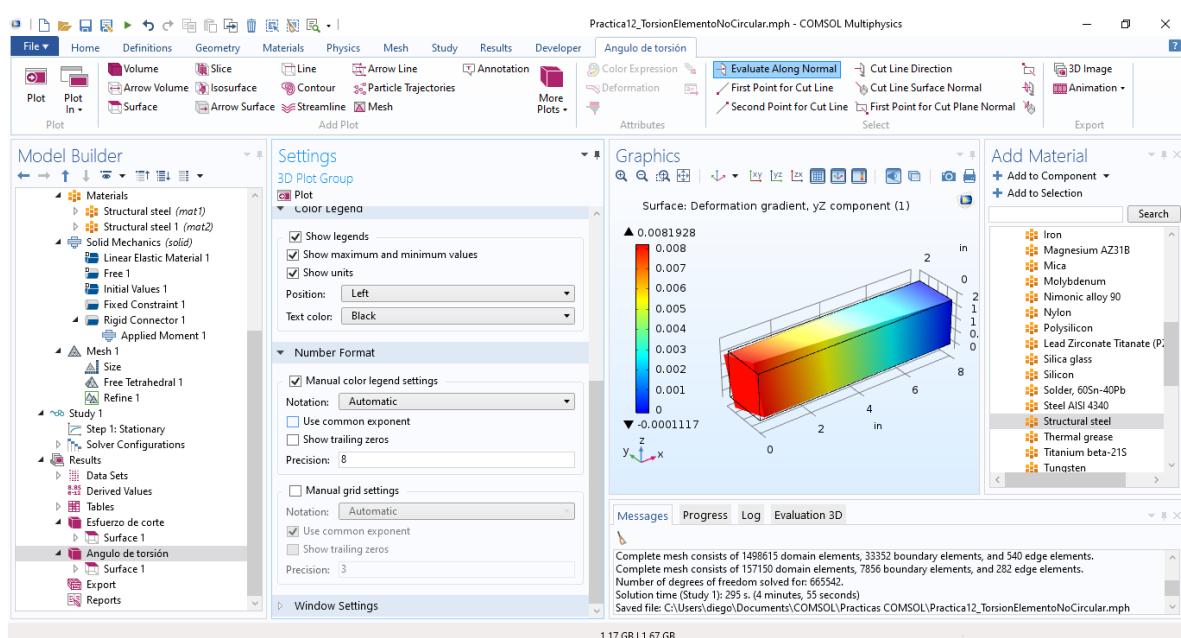
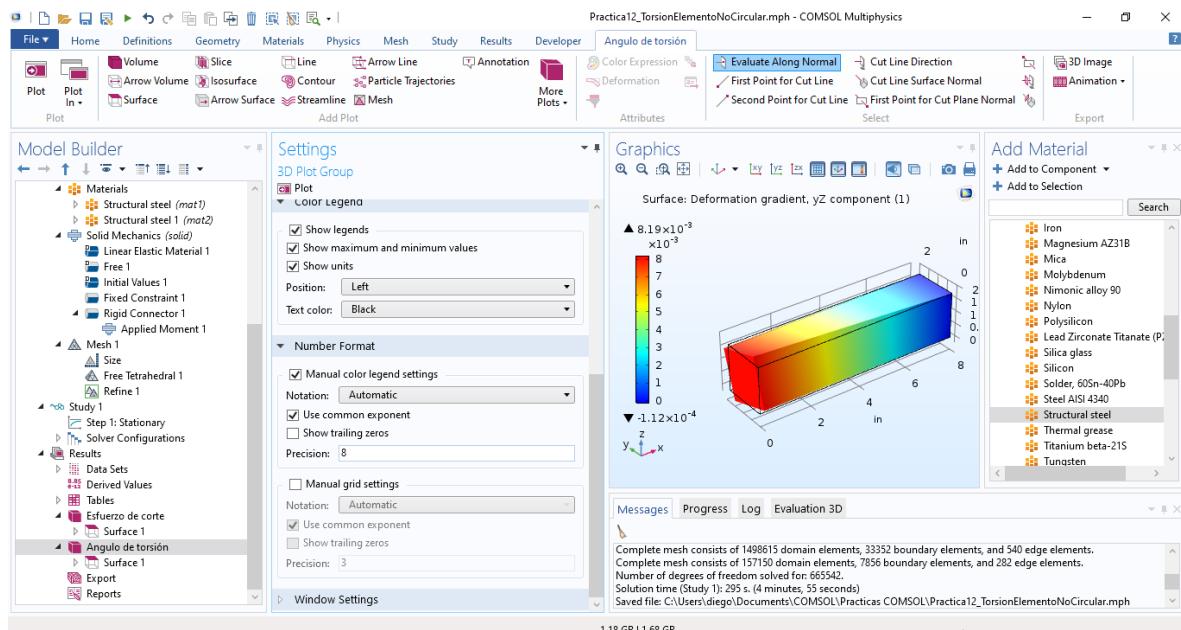


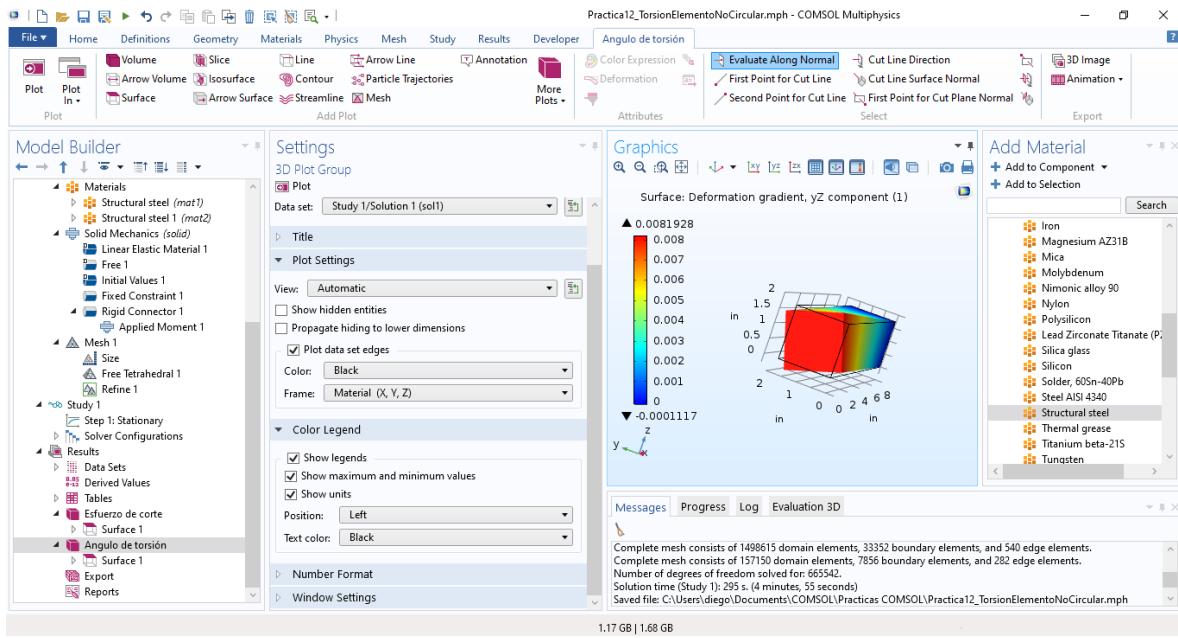


Para saber cuál es el ángulo de torsión dentro del programa COMSOL Multiphysics nos debemos introducir a la opción: Results → Esfuerzo → Surface → Expression (Flecha de hasta la derecha) → Component → Solid Mechanics → Dentro de esta opción se muestran todas las cosas que se pueden medir del modelo, desde velocidad, desplazamiento, **esfuerzo (llamado como tensión dentro del programa)**, etc.



Para encontrar el ángulo de torsión del elemento el comando que debo usar es: ***solid.FdyZ***





BIBLIOGRAFÍA:

INGENIERÍA MECÁNICA ESTÁTICA (12VA EDICIÓN) – RUSSELL C. HIBBELER.