

Worked Example 2

Coated point contact

The engineering question

A 1 um elastic coating is applied to body 1. The purpose is to quantify how the layered compliance changes pressure, displacement and contact size compared with the corresponding homogeneous contact.

What the model represents

This example uses the production model selected by the supplied input. The governing theory and assumptions are described in the TriboSolver Manual; here the emphasis is on setting up, reproducing and interpreting one complete calculation.

Input or control	Reproducible value
Simulation type	Dry Contact
Normal load	1 N
Substrate	Steel; E = 210 GPa, nu = 0.30
Coating body 1	E = 100 GPa, nu = 0.28, thickness = 1 um, 32 depth points
Macrogeometry	Point Contact; radius 5 mm
Domain and grid	100 x 100 um; 64 x 64

Supplied input: `coated-contact.tribo.json`
SHA-256: 3172cc8ca1d92e4289e2274284e00793607be33cb641cfd7aec8961298e03bd0

Set up and run the story

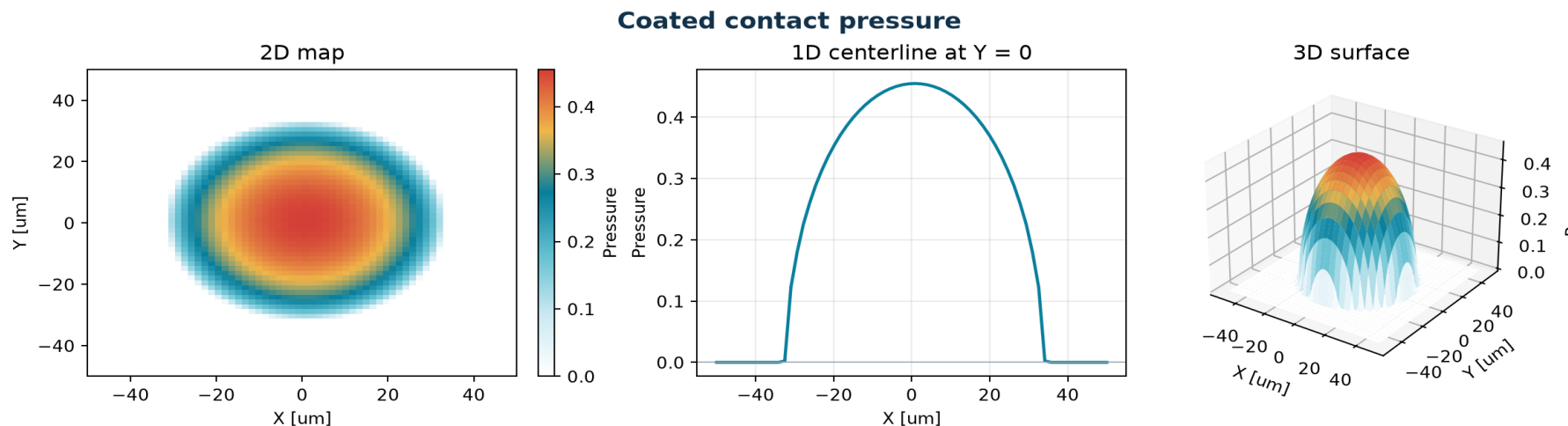
Step	Tab	What to do and why
1	Simulation Type	Choose Dry Contact.
2	Solid Material Model	Check Add coating to Body 1. Enter coating modulus, Poisson ratio, hardness and 1 um thickness. Leave body 2 uncoated.
3	Contact Conditions	Set Load to 1 N and leave friction disabled.
4	Contact Grid	Set X = 64 and Y = 64.
5	Macro Geometry	Choose Point Contact and enter the 5 mm body-1 radii.
6	Micro Geometry	Leave Micro Geometry clear for this validation case.
7	Run	Run once with the coating enabled. Save the result. For comparison, save a copy of the input, disable the coating and rerun.

Run checkpoint

Do not interpret a field until the status reports success. Compare the summary below with your run; it was read from the retained result set created from this exact input.

iterations 26 | residual 4.52995e-07 | recovered load 1 N

Calculated result



Reproduced calculation: iterations 26 | residual 4.52995e-07 | recovered load 1 N

The layered solution converged in 26 iterations with a 4.53e-7 residual and recovered 1 N. Interpret the 2D footprint together with the centerline: a coating can change both the peak and the width. The 3D plot is especially useful for detecting shoulders or edge amplification that are easy to miss in a single scalar KPI.

Selected calculated scalar outputs

Output	Value	Unit
Calculated contact load	1	N
Contact area	3.352e-09	m ²
Rigid body motion	0.1754	μm
Average contact pressure	0.2983	GPa
Nominal contact area	1.000e-08	m ²
Applied nominal pressure	0.1	GPa

How to explore and explain the result

In 1D, start with the default center cross-section. Choose X or Y only when the engineering question requires a different direction, then move the location control. The grid and cursor readout give the plotted value and its unit. In 2D, use the colorbar to locate high and low regions and read the numerical X/Y axes. In 3D, rotate the same matrix to understand peak prominence and orientation; the X, Y and Z directions are references, not a different calculation.

View	Question it answers	Reading rule
1D	What happens along one selected line?	Start at the center; use the grid and cursor value to quantify peaks, widths and gradients.
2D	Where are high, low or active regions?	Read the colorbar and X/Y units; compare runs only with their numerical scales visible.
3D	How prominent and oriented are the features?	Rotate for shape and orientation; use 1D/2D or export for exact values.

What to report

State the input filename and hash, simulation type, material and geometry, grid and surface definition, prescribed load, solver status, iteration or balance measure, selected output name and unit, and the engineering meaning of the plotted pattern.

A useful engineering explanation states the prescribed load and geometry, identifies the active physical mechanism, checks convergence or force balance, and only then interprets the spatial field. Keep the supplied input and retained result together so a colleague can reproduce every number and plot.

Retained result: coated-contact-results.tribo-results.json
SHA-256: 1b2579c63b9fc994aea7b17457376da8dce3574f391d0351dba3d9c6dc73ea8c