

Worked Example 3

Contact temperature

The engineering question

Sliding converts frictional work into heat over the solved contact patches. The thermal calculation partitions heat between the two bodies and returns their temperature-rise and heat-flux fields.

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	Contact Temperature
Normal load	1 N
Friction and speeds	Include Friction; COF 0.10; v1 = 3.26 m/s; v2 = 0
Thermal properties	k = 45 W/(m K), cp = 440 J/(kg K), rho = 7800 kg/m3, both bodies
Macrogeometry	Point Contact; radius 5 mm
Grid	64 x 64

Supplied input: `contact-temperature.tribo.json`
SHA-256: 8d0d48ce87dbed919261253f68af7176f80297fa473c3d5c0c3b9c69e3667e86

Set up and run the story

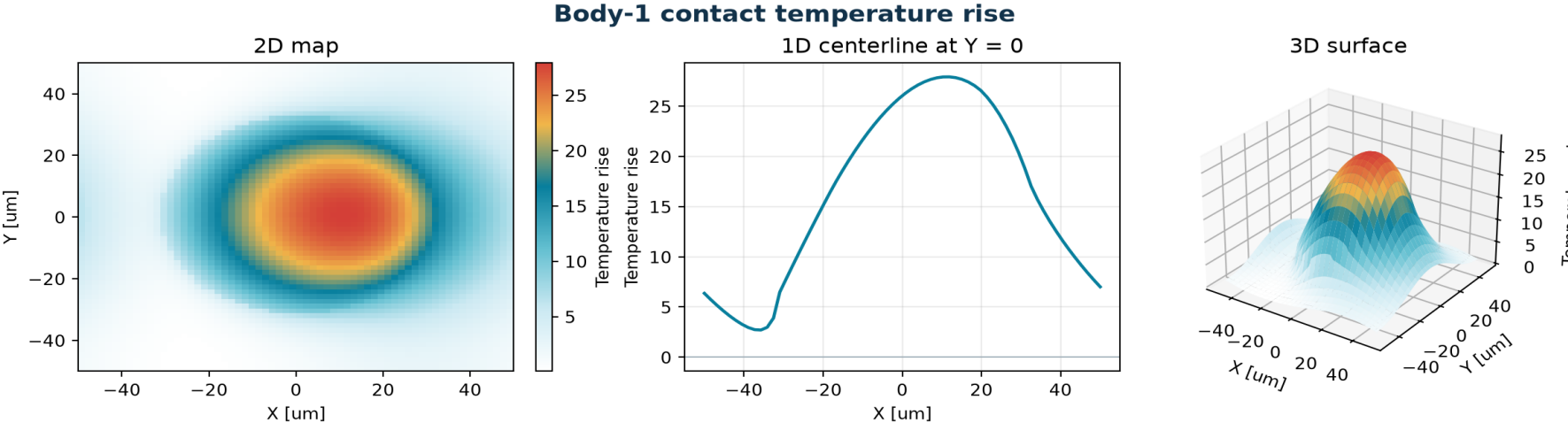
Step	Tab	What to do and why
1	Simulation Type	Choose Contact Temperature. The Include Friction option is enabled automatically.
2	Solid Material Model	Enter the elastic properties and the thermal conductivity, heat capacity and density for both bodies.
3	Contact Conditions	Set Load = 1 N, COF = 0.10, body-1 speed = 3.26 m/s and body-2 speed = 0.
4	Contact Grid	Set X = 64 and Y = 64.
5	Macro/Micro Geometry	Use the point-contact geometry and leave microgeometry disabled for this validation case.
6	Run	Press Run Calculation. The status first reports the contact stage and then the thermal partition iteration.

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.

coupled dry-contact pressure | partition iterations 44 | residual 7.94449e-06 | maximum rise 27.9272 K

Calculated result



Reproduced calculation: coupled dry-contact pressure | partition iterations 44 | residual 7.94449e-06 | maximum rise 27.9272 K

The partition calculation converged in 44 iterations with a residual of 7.94e-6. The maximum body-1 rise is 27.93 K. The temperature map identifies where frictional heating is concentrated; the centerline shows the temperature gradient along a chosen path, and the 3D view shows the hot-spot prominence and asymmetry.

Selected calculated scalar outputs

Output	Value	Unit
Calculated contact load	1	N
Contact area	3.225e-09	m^2
Rigid body motion	0.2037	um
Average contact pressure	0.3101	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: contact-temperature-results.tribo-results.json
SHA-256: 6da917931ab9624a94c962e88584f202d28f52ba192483eb0dd1f7c16cdc9c0c