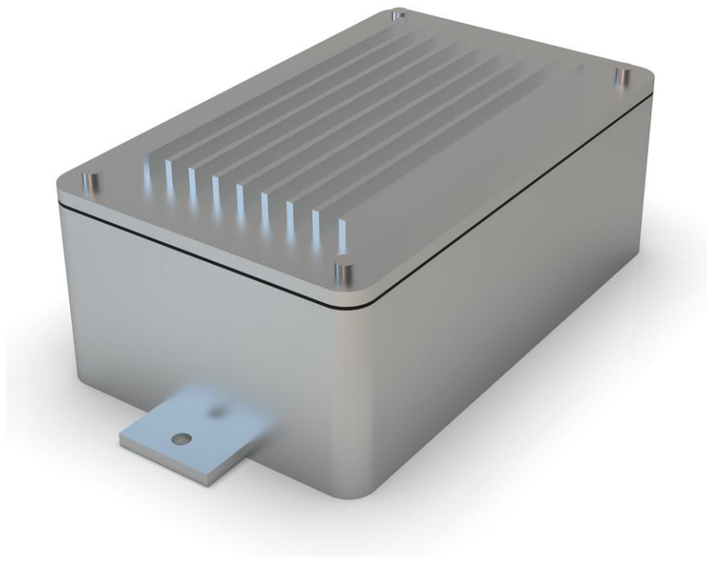
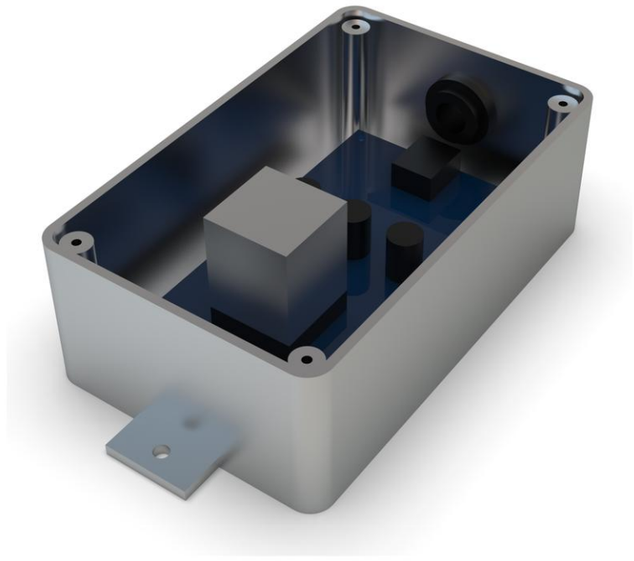
IP65 electronics enclosure with heat path to a finned lid

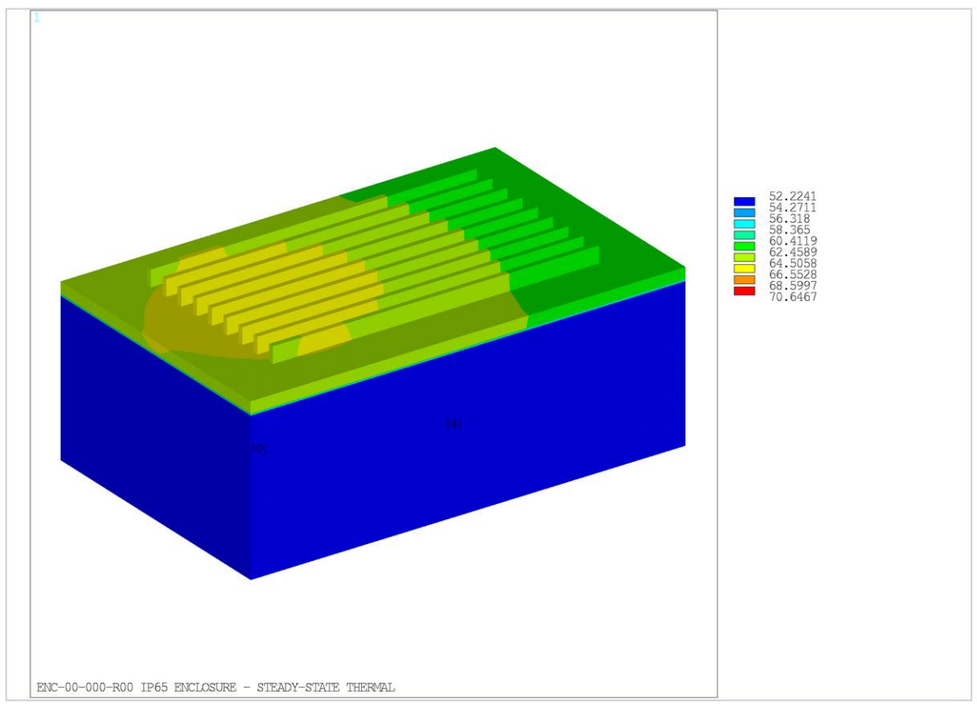
Concept design · parametric 3D CAD · thermal network in MATLAB · thermal FEA





Design data

Size	160 x 100 x 66 mm
Material	aluminium EN AW-6061
Wall / lid	3 mm / 4 mm
Sealing	1 mm silicone gasket, lid lip, 4 x M3 screws
Cable entry	M20 gland
PCB	132 x 72 mm on 4 posts
Heat source	power module, 10 W
Heat path	aluminium bridge to lid
Cooling	9 fins, natural convection



Thermal results at 40 °C ambient

	FEA	Hand (MATLAB)
Power module	70.6 °C	67.6 °C
Finned lid	61 to 66 °C	63.1 °C
Body	52 to 53 °C	52.9 °C
Heat through lid		5.4 W
Heat through body		4.6 W

Method

Steady-state conduction model with 62,000 elements. Natural convection and radiation are lumped into h = 8 W/m²K on the outer surfaces. Internal air and the PCB are not modelled, which is conservative. Without the heat bridge and the body, the lid alone would reach 83 °C.