An engineering review, made visible.

Illustrative flat laminate | Model definition and analysis readiness | English

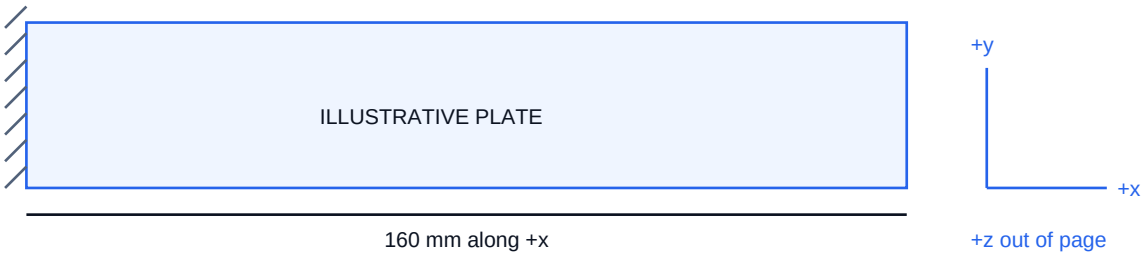
What this sample shows: how engineering inputs, assumptions and review gates can be documented. No solver run or physical test has been performed. This is a worked documentation example, not a customer case or an approved design.

01 / The illustrative brief

Define a flat, constant-thickness laminate so a reviewer can trace geometry, ply directions and the information needed before analysis. The reference shape is an unnotched rectangular plate; it does not represent a flight-ready UAV component.

Definition	Illustrative input
Reference geometry	160 mm (x) x 30 mm (y); no holes, ply drops or core
Laminate	[0/+45/-45/90]s; 8 identical-material UD plies
Thickness	0.250 mm per ply; nominal total 2.000 mm
Material status	No supplier, grade, elastic constants or strength allowables selected
Loading / support	A cantilever idealization is proposed for discussion only. Applied load, load distribution and fixture representation remain to be agreed.

02 / Geometry and coordinate convention



Schematic only. The hatched edge indicates a proposed restraint, not an approved fixture or boundary condition. See CMP-DEMO-LAY-001 for the complete ply order.

What is ready. What is not.

Analysis readiness is recorded separately from engineering conclusions.

Review item	Evidence / required next action	Status
Geometry & layup	Dimensions and all 8 plies are defined for this documentation example. No released CAD model is included.	Illustrative
Material data	Obtain traceable E1, E2, G12, nu12 and applicable strength data for the actual system, process and environment.	Not supplied
Loads & restraints	Agree magnitudes, directions, distribution, supports, interfaces and acceptance conditions.	Not defined
Model approach	Select shell / solid idealization. Check ply reference axis, shell normal, offsets, units and thickness mapping.	Not built
Numerical verification	Check equilibrium, mesh sensitivity, boundary effects and an appropriate analytical benchmark.	Not performed
Failure assessment	Select criterion and allowables for the intended failure modes. First-ply indication is not an ultimate-load claim.	Not performed
Physical validation	Agree coupon / component tests and acceptance criteria. Correlate the model against relevant measurements.	Not performed

03 / Checks actually completed in this example

The explicit sequence is 0, +45, -45, 90, 90, -45, +45, 0 degrees. It is symmetric about its mid-plane and has two plies at each listed direction. Nominal thickness is 8 x 0.250 = 2.000 mm. These are definition checks; they do not establish strength, stiffness targets or manufacturing suitability.

04 / Decision and release gate

Decision: not ready for design approval or manufacture. Resolve the missing material, loading and acceptance inputs; build and verify the model; then agree the validation and independent review needed for the application. There is no numerical stress, displacement, safety factor or pass/fail result in this sample.

Technical reference

A. T. Nettles, *Basic Mechanics of Laminated Composite Plates*, NASA RP-1351 (1994). Used for laminate mechanics and notation; this reference does not cover laminate strength. Example dimensions and ply thickness were chosen solely for this sample, not taken from a material datasheet.
ntrs.nasa.gov/citations/19950009349