

The 10-Point Modular Frame Design Checklist

A fast preliminary review for aluminum-extrusion frames, guards, carts, fixtures, and test stands.

Use this before detailed modeling or quoting. It will not replace load calculations, code review, guarding validation, or professional engineering where required. Its purpose is to expose expensive assumptions while they are still easy to change.

1 Define the job before selecting profile

Record overall dimensions, supported equipment, payload, operating forces, duty cycle, environment, access needs, and acceptable movement. A frame cannot be optimized against requirements that exist only in someone's head.

☐ CHECK: Are the loads, constraints, environment, and success criteria written down?

2 Draw the real load paths

Trace weight, push/pull forces, acceleration, impact, and operator loads from their source to the floor or mounting points. Watch for brackets or joints carrying unintended moments.

☐ CHECK: Can every significant force reach a support through an intentional path?

3 Orient profiles for the critical direction

Profile size alone does not determine stiffness. Place the section's stronger axis against the dominant bending direction and confirm that slots, panels, and connections remain usable.

☐ CHECK: Is each profile oriented for the load it actually sees?

4 Check span and deflection - not just strength

A member may be strong enough yet flex too much for doors, sensors, tooling, or operator confidence. Identify the longest unsupported spans and the locations most sensitive to movement.

☐ CHECK: Have you defined an acceptable deflection and checked the worst spans?

5 Match the joint to the demand

Separate positioning joints from structural joints. Consider shear, tension, moment, vibration, repeat assembly, access, and whether the connection depends on friction or positive mechanical engagement.

☐ CHECK: Does every critical joint have a clear structural job and suitable connector?

Project notes

PROJECT / APPLICATION		DATE	
PRIMARY OBJECTIVE		REVIEWED BY	
CRITICAL LOAD OR MOTION		NEXT ACTION	

Complete the review

The first five checks establish the structure. These five determine whether it can be built, operated, serviced, and purchased without avoidable surprises.

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Control racking before upsizing everything
Rectangular frames often fail through joint rotation and racking rather than member strength. Add triangulation, shear panels, gussets, or fixed planes where lateral stability matters.
☐CHECK: What prevents each open rectangular plane from becoming a parallelogram?
- 7

Resolve feet, casters, anchors, and center of gravity
Base conditions govern stability. Check caster capacity under uneven loading, leveling range, anchoring, floor irregularity, braking, push forces, and tip risk during operation or transport.
☐CHECK: Is the base stable in the worst operating and moving condition?
- 8

Protect interfaces and clearances
Allow for door swing, panel thickness, hinges, latches, cable routing, sensors, fastener heads, tooling access, and neighboring equipment. Include adjustment and realistic assembly tolerance.
☐CHECK: Can everything move, adjust, and be serviced without interference?
- 9

Design for cutting and assembly
Reduce unique lengths and connector types. Standardize repeated subassemblies, provide tool access, identify tapped or machined ends, and avoid sequences that trap fasteners or panels.
☐CHECK: Could a new assembler build it correctly from the drawings and BOM?
- 10

Audit the BOM against the model
Verify quantities, lengths, machining, hardware, end treatments, panels, doors, feet, anchors, and spares. Flag long-lead or sole-source items and confirm that revisions propagate everywhere.
☐CHECK: Do the model, drawings, cut list, and purchasing BOM tell the same story?

Quick decision

8-10 checks	Ready for detailed design or a focused technical review.
5-7 checks	Promising concept, but resolve the open items before quoting or release.
0-4 checks	Pause. Requirements and architecture need attention before more CAD work.

RED FLAGS	Long unsupported spans Tall narrow mobile bases Open rectangles with no shear control Critical joints loaded in moment Doors or tooling requiring precise alignment BOMs built manually from memory
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Build to a better standard before buying the aluminum.

Next from The Frame Standard: the Modular Frame Planning Toolkit - calculators, requirement worksheets, joint-selection aids, and BOM templates.