MaterialMind - Material Recommendation Report

General Recommendations:

For a bookshelf able to bear a load of 700 kgs, it is recommended to use a combination of MDF, plywood, and steel. MDF and plywood can be used for non-structural components, while steel can be used for structural components like support legs and brackets.

Material	Properties	Application	Rationale
MDF (Medium-Density Fiberboard)	density: 0.8-1.2 g/cm³ tensile strength: 10-20 MPa thermal conductivity: 0.04-0.06 W/mK endurance limit: Not applicable (not a structural material) fatigue strength: Not applicable (not a structural material)	Shelf boards and back panels	MDF is a cost-effective, eco-friendly option for non-structural components. Its density and tensile strength make it suitable for shelves and back panels, while its thermal conductivity helps with heat dissipation.
Plywood	density: 0.5-1.0 g/cm³ tensile strength: 20-40 MPa thermal conductivity: 0.05-0.10 W/mK endurance limit: Not applicable (not a structural material) fatigue strength: Not applicable (not a structural material)	Shelf frames and support beams	Plywood is a strong, durable option for structural components. Its density and tensile strength make it suitable for shelf frames and support beams, while its thermal conductivity helps with heat dissipation.
Steel (A36 or equivalent)	density: 7.9 g/cm³ tensile strength: 400-550 MPa thermal conductivity: 50-60 W/mK endurance limit: 250-300 MPa fatigue strength: 100-150 MPa	Support legs and brackets	Steel is a strong, durable option for structural components. Its high tensile strength and endurance limit make it suitable for support legs and brackets, while its thermal conductivity helps with heat dissipation.