Hardware-Free Horizons Challenge - Resource Information

Background

Residential Internal doors are traditionally installed in a timber door frame using radius or square butt hinges which may or may not be of a loose pin construction. The doors are fitted with handles which activate the latch when turned. The latch engages and dis-engages from the escutcheon plate fitted to the lock stile of the frame when the door is in the closed & open position respectively. The door and frame installation is such that the door is able to swing open in one direction only. This is the traditional method of "hanging" and "latching" the doors.

Innovation Challenge

The innovation challenge is to move away from the traditional methods of "latching" the Internal doors i.e. create a cost-effective door system which is essentially "Hardware Free" whilst maintaining all the functionality.

Frame Construction

Typically, the frame consists of two jambs and a head. The jamb and head materials are either pine or MDF and the thickness is 18mm. An 11mm thick stop of the same material is attached to the jambs and the head which creates a rebate for the door to swing in. There is no sill in the internal frame. This frame is squared up and installed in the stud opening of the home being built. The internal width of the frame within the rebate is the door width + 6mm. There is a gap of 3mm between the top of the door and the inside of the rebate in the head of the frame.

Door Construction

There are three basic types of Internal door constructions.

Honeycomb Hollow Core Construction with Lock Blocks:

Light weight cardboard core with particle board lock blocks is contained within a 29mm wide x 28mm thick timber frame which forms the perimeter of the door. A door skin of 3mm to 6mm MDF or Ply is glued on both sides of the timber frame sub assembly to form a door.

Solid Core Construction

28mm thick Particle board or MDF is contained within a 29mm wide x 28mm thick timber frame which forms the perimeter of the door. A door skin of 3mm to 6mm MDF or Ply is glued on both sides of the timber frame sub assembly to form a door.

Joinery door construction is another type of construction wherein stiles, rails, mullions are framed together to form a rigid structure.

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Typical Door Sizes

Door Heights (mm)	Door Widths (mm)	Door Thickness (mm)	Approximate Weight based on 2040 x 820 x 35mm door
2340	420, 520, 620, 720, 770, 820, 870, 920, 1020	33mm minimum to 37mm maximum	Ranging from 15kg (Honeycomb Hollow core construction) to 50 kg (Solid core construction) Weights will increase or decrease proportionate to the size and construction of the door.
2040			
Any height between 2340mm and 2040mm	Any width between 420 and 1020		

Typical Frame Sizes

Door Heights (mm)	Jamb Length (mm)	Door Width (mm)	Frame Width - Internal between rebates (mm)
2340	2410	DW	DW + 6mm
2040	2110		

Functionality Requirements

The Modern internal door when installed should provide for all existing features that accompany an Internal door which is installed in a traditional manner using hinges and door latches.

- The door when opened should remain opened until there is human interaction to close the door.
- The door when closed should remain closed until there is human interaction to open the door.
- The opening and closing of the door should be possible from either side of the door.
- There should be no traditional hinges, handles, levers, and latching mechanisms.
- The system should be universal i.e. should support the entire size & weight range of the doors.
- System should cater for bow in the door, limits of which are prescribed in Australian Standard AS2688.
- The system should include a "Privacy" option where in the door can only be opened from one side and have a provision to "Override" the "Privacy" option from the other side in case of emergencies.
- The system should fit the current construction of the frame and door OR require minimal changes to the frame and door construction.
- Include ability for the door to be left and right-side opening.

Illustrations of Internal Doors

Honeycomb Hollowcore Construction Doors

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Solid core Construction Doors

Joinery Construction Doors

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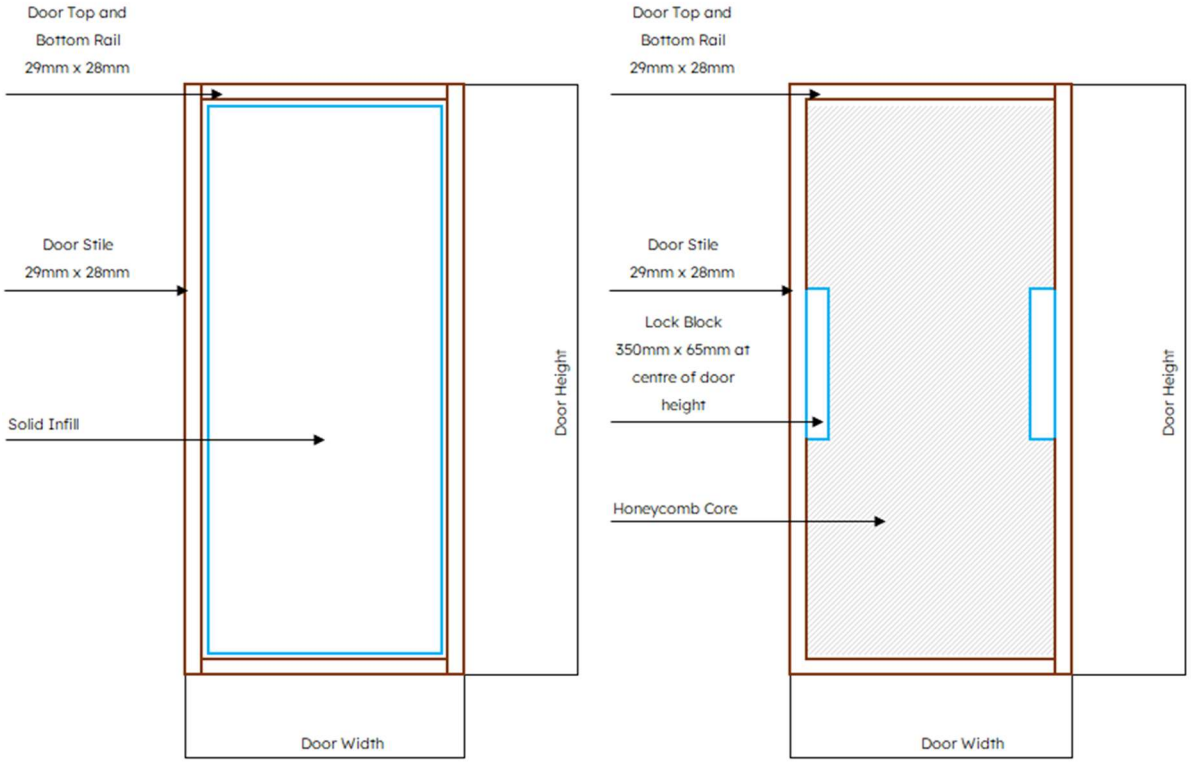
Traditional Door Installation

Traditional Lever & Escutcheon Plate on Jamb

Illustration of Door & Jambs Construction



Solid Core Door

Honeycomb Hollow Core Door

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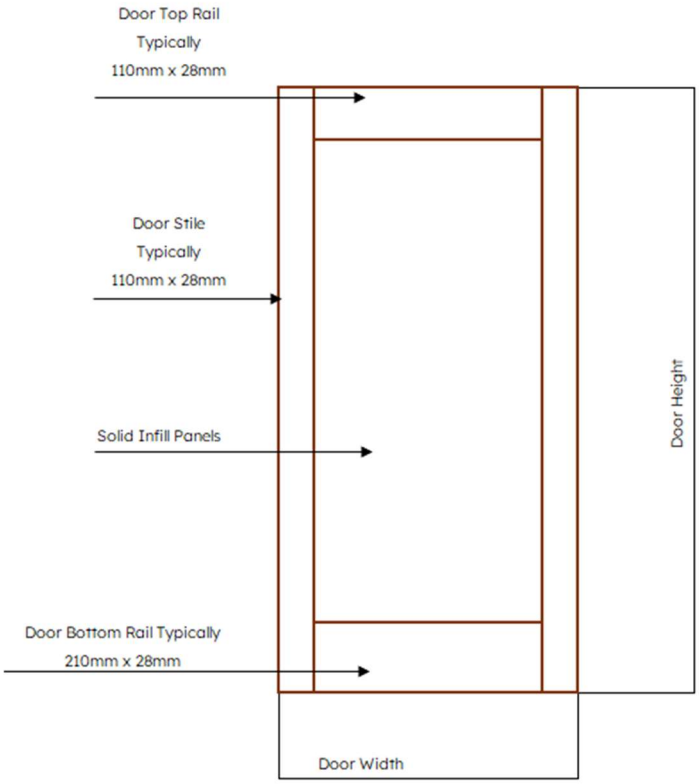
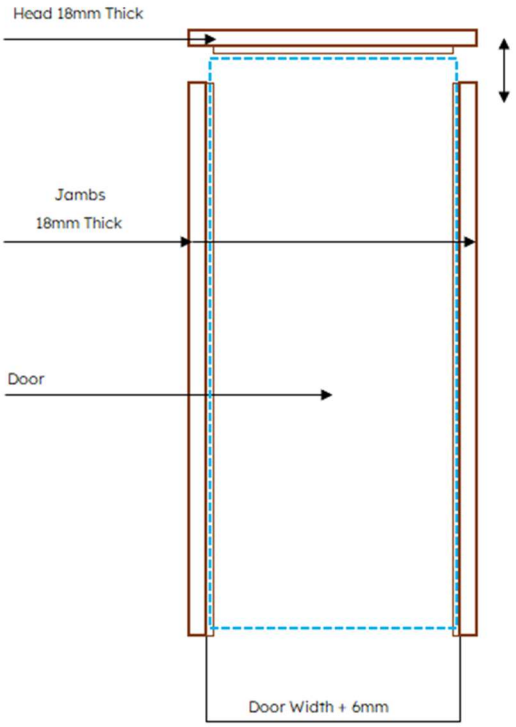
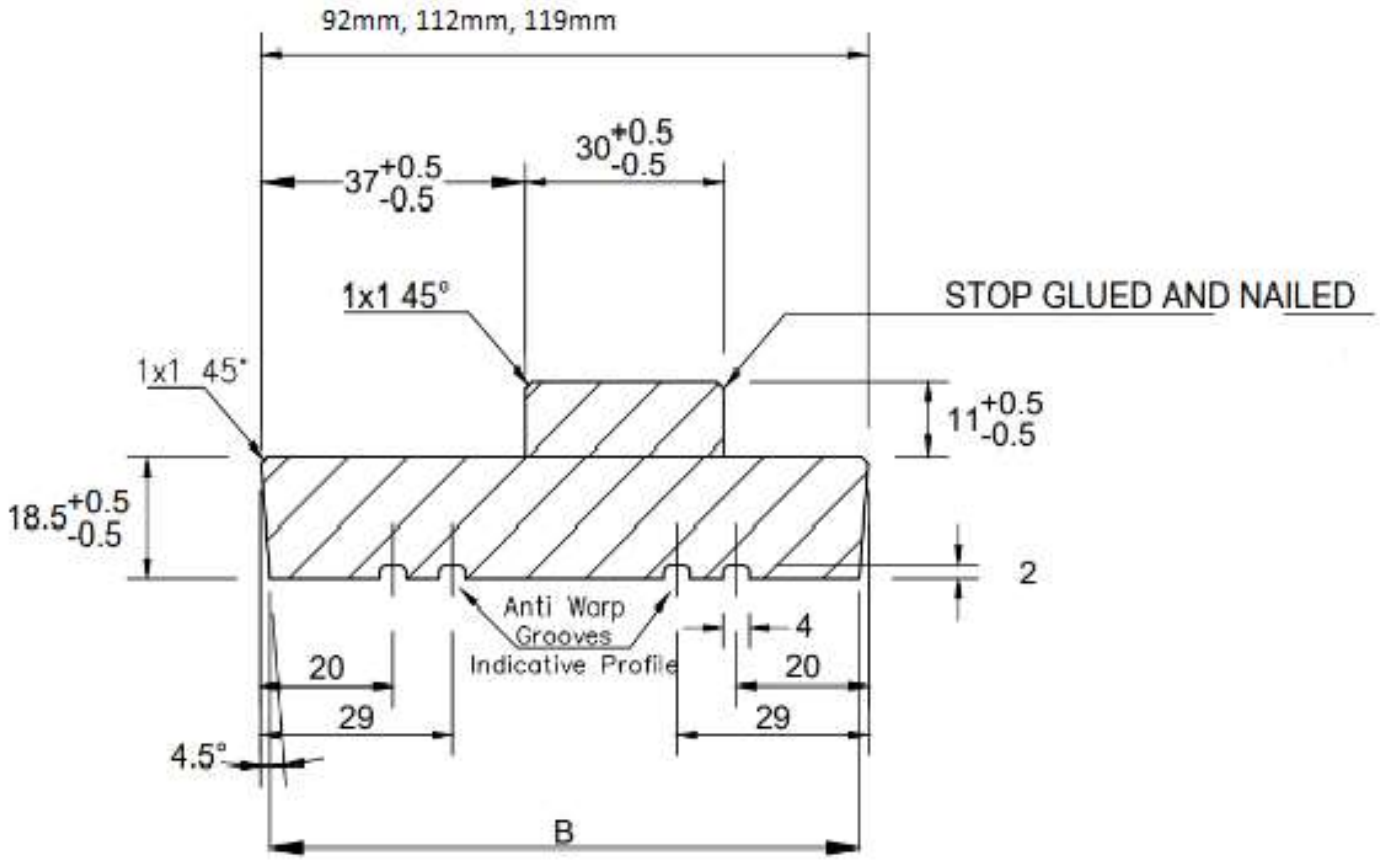


Joinery Door



Jambs & Heads + Door

Jamb and Head Profile



Pre-existing Methods - To be excluded from "New to Market" Ideas

Door Handles:
Handles routered in face of doors
Flush Pull Handles
Finger Pull Handles
Levers and Knob Handles
Fixed Handles
Push Pull - Face Plates

Door Operation & Latch Mechanism:
Push to Open - Catch
Magnetic Latch
Roller catch
Spring Loaded Mechanical Tubular Latch
Sliding Cavity Latch

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Door Handles Illustrations: (Examples of Exclusion from Design Challenge)

Levers

Knobs

Fixed Handle

Flush Pulls

Finger Pulls

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Push Pull Plates

Integrated Handles

Face Routered Handle

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Door Operation & Latch Mechanism Illustrations: (Examples of Exclusion from Design Challenge)

Mechanical Tubular Latch

Roller Catch

Push to Open

Magnetic Latch

Cavity Slider Latch