Developing a Thin Concrete Interior Wall Panel with an Ultrafiltration Membrane for Air Purification

PPMI Top Down

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Abstract

Concrete chairs are still **heavy**, while published thin concrete furniture is **1.5 to 2.5 cm** thick. We designed a **1 cm Loop curved chair** in glass fiber reinforced concrete in three stages, a slab, a stool, and a curved chair. In the slab stage, **fiber content changed the color and texture of the surface**.

Keywords: thin furniture, thin concrete, design performance, curved chair, Research through Design

Introduction

Thin concrete furniture is still **1.5 to 2.5 cm** thick [1], [2], while the Nantes chair (**48 kg**) and the Odos stool (**52 kg**) [3] exceed the **23 kg lifting load for one person** [4].

> **Can a curved concrete chair stay usable when its section is only 1 cm thick?**

Stage 3

Curved chair

Loop form
Thickness 10 mm
Curved in two directions

Side view

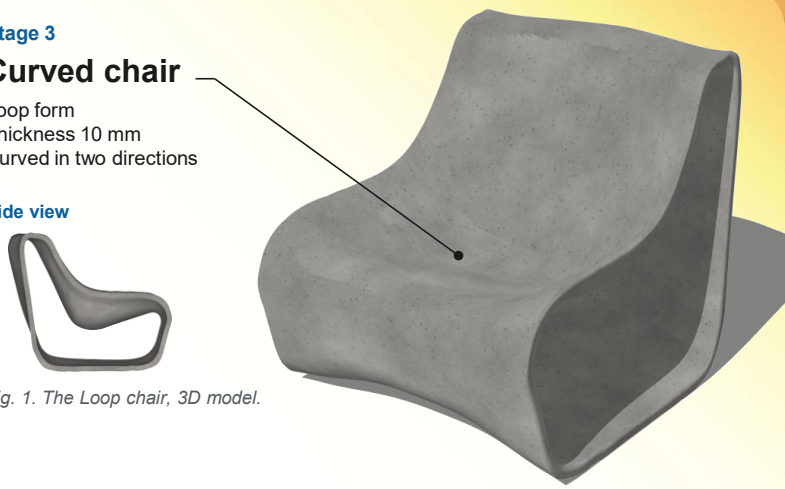


Fig. 1. The Loop chair, 3D model.

Research Method

Research through Design [5] | **Considered feasible when** ✓ Section filled without defects ↓ Deflection ≤ l/360 [6]

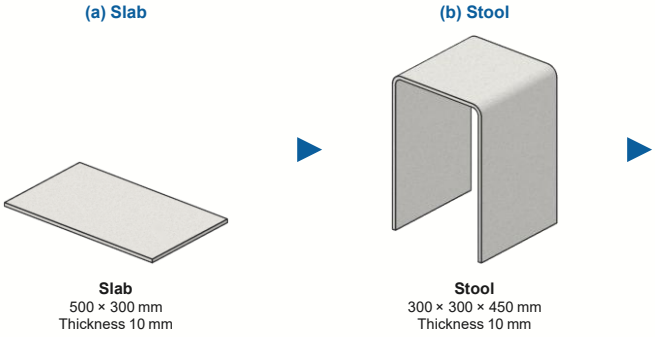


Fig. 2. Three stages of the chair.

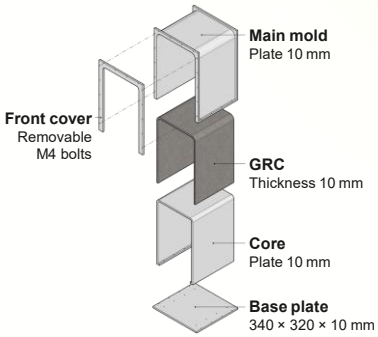


Fig. 3. The stool mold, exploded view with concrete.

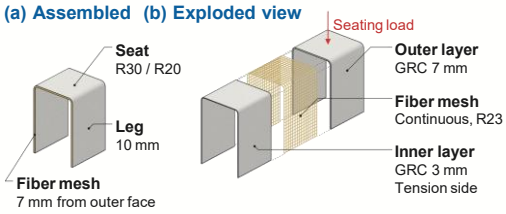


Fig. 4. The stool at stage 2, assembled and exploded.

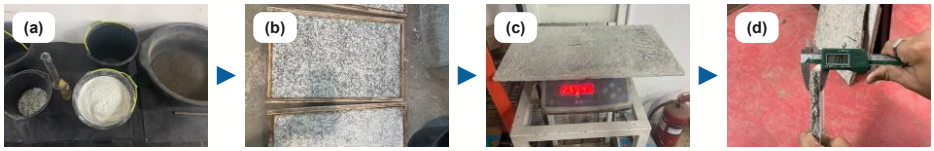


Fig. 5. Making the 50 × 30 × 1 cm slabs, V1 (0.88% fiber) and V2 (3.0% fiber).



Fig. 6. Mix materials.

Results and Discussion

V1 and V2 were stiff, so **the slabs were not evenly thick** (Fig. 5d). The **V1 slab looks light and fine**, while **V2 looks darker and densely packed with fiber** (Fig. 7).



Fig. 7. (a) Surface of a V1 slab. (b) Surface of a V2 slab. (c) A slab on the testing machine.

Conclusion

Fiber content sets the **color and texture** of a 1 cm surface, so the mix and the casting are part of the **design decisions**.

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