

## Project: Precision-Moulded GRP Seed Pods for Therapeutic Environments

### Introduction

Initially designed as therapeutic spaces designed for challenging environments, such as youth rehabilitation centres or mental health facilities, the pods had to strike a unique balance between functionality, resilience, safety, and aesthetics. Once released into the market additional uses were found for these innovative units.



These considerations were central to a highly bespoke GRP manufacturing project undertaken by Quantum Mouldings: the creation of the Seed Pod, initially a modular therapy pod intended for use in secure institutional settings such as young offenders' institutions.

From initial design concepts through to advanced manufacturing and installation, the Seed Pod project demanded exceptional attention to detail, rigorous safety standards, and innovative thinking.

Glass Reinforced Plastic (GRP) fibreglass was the material of choice, selected for its strength, flexibility, light weight, and ability to achieve flawless finishes inside and out.

This case study explores the design, engineering, and manufacturing processes involved in creating these striking pods—focusing on how GRP enabled technical, aesthetic, and practical success in a highly complex and sensitive application.

### Project Overview

The Seed Pod was envisioned as a calming, private, and immersive space that could be installed in secure environments to support therapy, learning, and personal development. The pod needed to be highly durable yet visually appealing, with a non-institutional feel.

The requirements included:

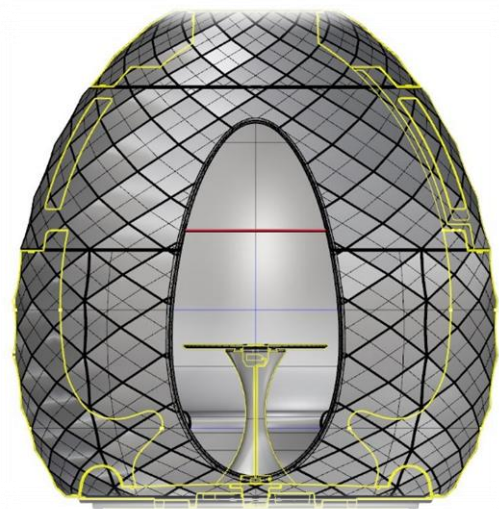
- A multi-faceted GRP form comprising modular interlocking blocks
- Bonded inner and outer skins for strength and insulation
- A high-gloss finish internally and externally
- Lightweight construction for ease of transport and installation
- 4 mm consistent panel gaps between modules for a refined aesthetic
- Integrated electrics, including remote-controlled lighting and speakers
- Use of Class 2 fire retardant materials to ensure public safety compliance
- High tolerance and dimensional accuracy verified through 3D scanning

Meeting this brief required a combination of craftsmanship, advanced GRP manufacturing techniques, and a precision-led approach throughout the design and build.

## Design Innovation

The visual concept of the Seed Pod was inspired by natural organic forms—requiring sweeping, curved surfaces that joined together as modular segments. Achieving the required symmetry and consistency across modules was particularly challenging due to the number of parts and their complex geometry.

To support exacting accuracy, Quantum Mouldings utilised 3D scanning technology early in the design phase. This allowed the initial design patterns to be digitally validated, corrected, and approved with confidence before tool-making commenced.



The verified CAD data enabled the team to:

- Develop high-precision moulds with minimum margin for error
- Ensure that each modular component would interface cleanly with adjacent panels
- Guarantee consistent 4mm shadow gaps, a critical design element that conveyed a sense of craftsmanship and quality

## Manufacturing Process

Due to the complexity and finish requirements of the Seed Pod, Quantum employed a hybrid GRP manufacturing strategy, combining both hand lay-up and spray lay-up techniques:

- **Hand Lay-Up:** Used for areas where high structural integrity was essential, and where precise control over fibre orientation and resin content was required. This allowed for reinforced sections around joints, fixing points, and stress areas.
- **Spray Lay-Up:** Ideal for efficiently covering the curved, free-form surfaces of the panels, spray lay-up helped reduce production time while maintaining surface smoothness and laminate consistency.

Once cured, each panel was trimmed to its final profile and checked against alignment templates to ensure interconnectivity with neighbouring panels.

## Challenges and Solutions

### Dual Skin Construction and Bonding

One of the most distinctive features of the Seed Pod was its bonded inner and outer skin. This approach provided several benefits:

**Structural Rigidity:** By creating a hollow laminate structure, the bonded skins acted like a monocoque shell, offering exceptional stiffness with reduced material thickness.

**Thermal and Acoustic Insulation:** The airspace between skins helped regulate internal temperature and absorb sound, important in creating a calming environment.

**Aesthetic Freedom:** With both skins independently moulded, internal and external geometries could be optimised for form and function separately.

Bonding was achieved using a high-performance structural adhesive applied in a controlled environment, with internal pressure jigs used to ensure even contact and alignment during the cure cycle.

### Finishing and Surface Quality

For this project, a high-end gloss finish was specified both inside and out, adding another layer of complexity. A smooth, polished surface not only enhanced the pod's visual impact but also made it easier to clean and maintain.

To achieve this:

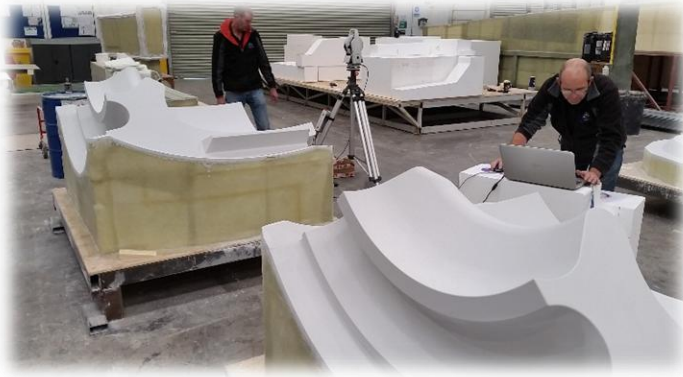
- Specialised mould preparation ensured that surfaces came out of the mould with minimal defects.
- Post-mould polishing was carried out on both skins to remove any micro-imperfections.
- A bespoke paint system was developed, with particular attention to environmental control, to ensure consistent gloss levels without orange peel or overspray blemishes.

- Significant investment was made in facilities, labour and processes to support the flawless finish.
- The final result was a series of panels with mirror-like gloss, free from blemishes or surface distortion—helping convey the pod’s therapeutic and high-value aesthetic.

## Precision Panel Gapping

One of the most important visual cues of the Seed Pod was the consistent 4mm panel gap between the modular blocks. This subtle detail had a major impact on the overall perception of craftsmanship and quality.

Maintaining this tolerance throughout:



- Required pattern validation and tightly controlled moulding processes
- Involved CNC trimming and jig-based assembly to minimise cumulative error
- Was continually monitored during both dry-fit and final installation stages

The result was a seamless, sculptural form that looked monolithic yet retained the modularity needed for transport and on-site construction.

## Integrated Systems: Light and Sound

The Seed Pod was more than just a structure—it was designed to be an immersive experience. Each pod was fitted with:

- Remote-controlled LED lighting, integrated into the inner skin
- Bluetooth audio speakers, pre-wired into moulded recesses
- Electrical conduits embedded between the inner and outer skins for safe, hidden routing

These features added a sensory dimension to the space, allowing users to control mood lighting and background sounds without visible wiring or access panels.

## Fire Safety and Public Use Compliance

Given its installation in public institutions, safety was a critical consideration. Quantum Mouldings ensured full compliance with Class 2 fire retardancy by:

- Using certified fire-retardant resins and gelcoats
- Maintaining traceability for all raw materials
- Undertaking sample testing and documentation to support client safety audits

This gave the end client confidence in the pod's long-term safety in institutional settings, especially where vulnerable individuals would be using the space.

## Why GRP Fibreglass Was Ideal

GRP allowed the project team to deliver on a wide range of demands:

- The complex geometry was achievable thanks to GRP's mouldability
- The bonded dual-skin construction was lightweight and stiff
- Fire-rated formulations ensured safety compliance
- The high gloss aesthetic was made possible with custom finishes
- Integrated features such as lights and cables were supported by the material's versatility

Compared to traditional joinery or metal fabrication, GRP offered superior performance, design flexibility, and an unbeatable finish.

## Outcomes and Benefits

The final Seed Pods delivered on all technical and aesthetic fronts:

- **Lightweight Construction:** Facilitated transportation and on-site assembly without specialist equipment
- **Modular Design:** Enabled phased installation, scalability, and reconfiguration
- **Precision Fit and Finish:** 4mm gaps, high gloss, and symmetry made the pods visually impactful and professional
- **Enhanced User Experience:** With lighting and audio built in, each pod became a complete sensory space

Client feedback highlighted both the elegance of the final product and the smoothness of the manufacturing process. The investment in high-quality tooling, advanced finishing techniques, and proactive communication made Quantum Mouldings a standout partner in the delivery of this forward-thinking solution.

The Seed Pod project stands as a leading example of what's possible when technical ambition meets material innovation. With GRP fibreglass at its core, the pod demonstrates how complex, immersive spaces can be delivered with architectural integrity, practical functionality, and uncompromising safety.



Quantum Mouldings' ability to execute high-precision, high-finish composite structures played a vital role in the success of this project. As public spaces continue to evolve to support well-being, rehabilitation, and learning, this project proves that GRP composites can do far more than just perform, they can transform.

## About Quantum Mouldings

Quantum Mouldings is a UK-based manufacturer of high-quality GRP components, offering a various Production methods to suit a wide range of industries.

With a focus on quality, innovation, and collaborative engineering, Quantum delivers reliable composite solutions tailored to each client's needs.

Specialising in higher volume Production within the following markets:

- Industrial
- Marine
- Renewable Energy
- Leisure
- Healthcare
- Automotive