



ROCKWOOD  
COMPOSITES

Where does Rockwood sit in the wider composites industry.

What differentiates us from the rest.

What are the key advantages of Metal Tooling.

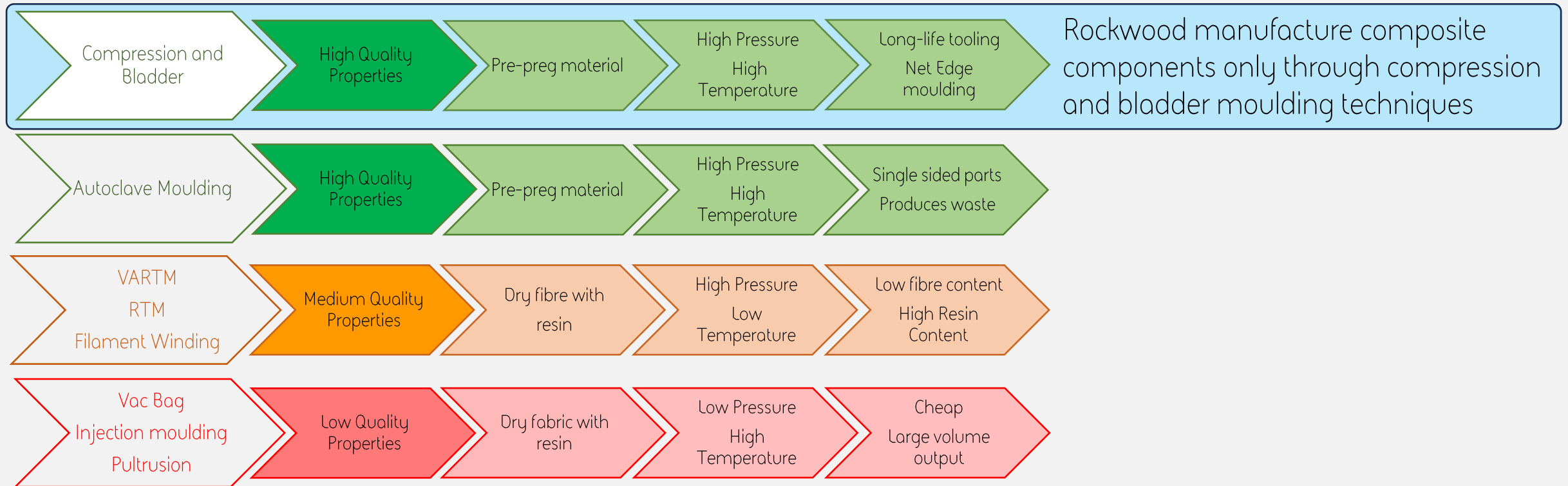
# The wider composite manufacturing world

There are many different types of composites structure, each combining fibre and resin in different way, and each has a unique place in the market, and each has a unique processing method.

Pre-preg, offers the highest level of mechanical performance for the minimum weight.

Pre-preg is converted to a structure through heat and pressure,

Heat and Pressure can be applied with an Autoclave or by our compression and bladder moulding techniques



# 'Pre-Preg'

## Pre-Impregnated Fibre with a resin matrix

The term "pre-preg" is derived from "pre-impregnated," indicating that the reinforcing fibres are already impregnated with a resin matrix before they are used in the manufacturing of parts.

Pre-preg materials consist of two main components: reinforcing fibres and a resin matrix.

**The fibres** typically carbon fibre, glass fibre, or aramid, which provide the appropriate strength and stiffness to the final composite part.

**The resin** typically thermosetting epoxy provides the matrix holding the fibre in place.,

One of the most significant advantages of using pre-preg materials is the precise control over fibre volume fraction and resin content.

This allows manufacturers to optimize the mechanical properties of the composite and achieve consistent results.



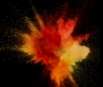
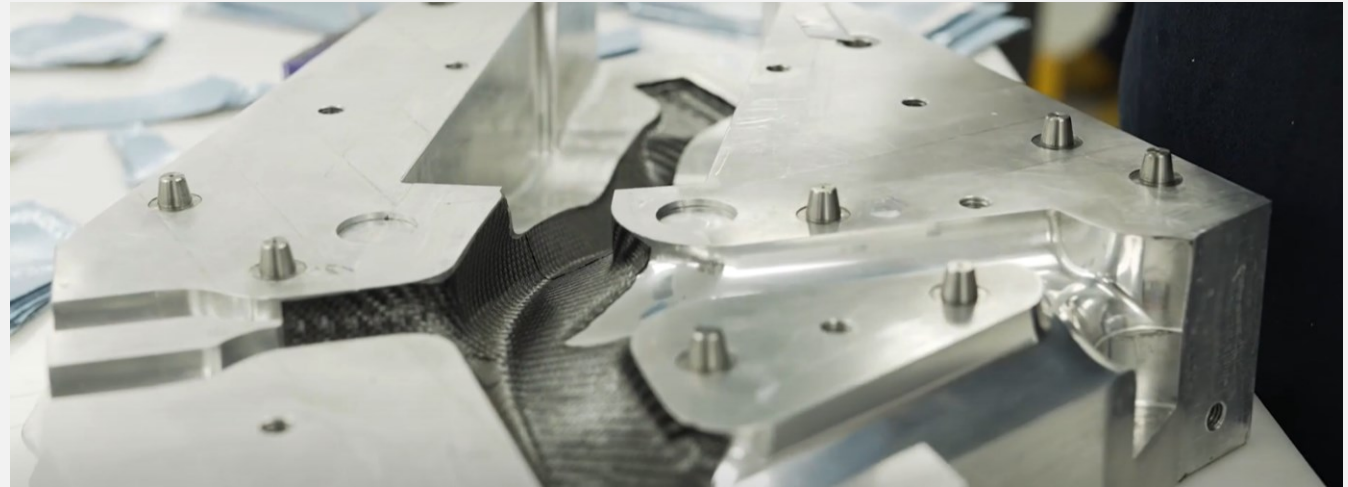
# 'Pre-Preg' Pre-Impregnated Fibre

The impregnated fibres are then stored at a low temperature, typically -18 Degrees C this is because the resin has an 'out-life' which means it will go out of date in a certain timeframe, when stored at -18 the majority of pre-pregs have a 12-month life and within this 'life' the pre-preg needs to be moulded and cured into parts, these parts then no longer have an out-life and will last indefinitely.

When handling pre-pregs they are at room temperature, when at this temperature most pre-pregs have a 30 day out-life and must be moulded and cured within this time.

These 30 days can be spread out over the course of 12 months, for example the roll of pre-preg can be defrosted and amount used for 1 day and the rest put back into cold storage for the next parts to be made at a later date within the remainder of its 12-month frozen life span.

If the pre-preg is not used within the 12-month frozen or 30-day room temp timeframe the material will no longer be qualified to be used for manufacture.



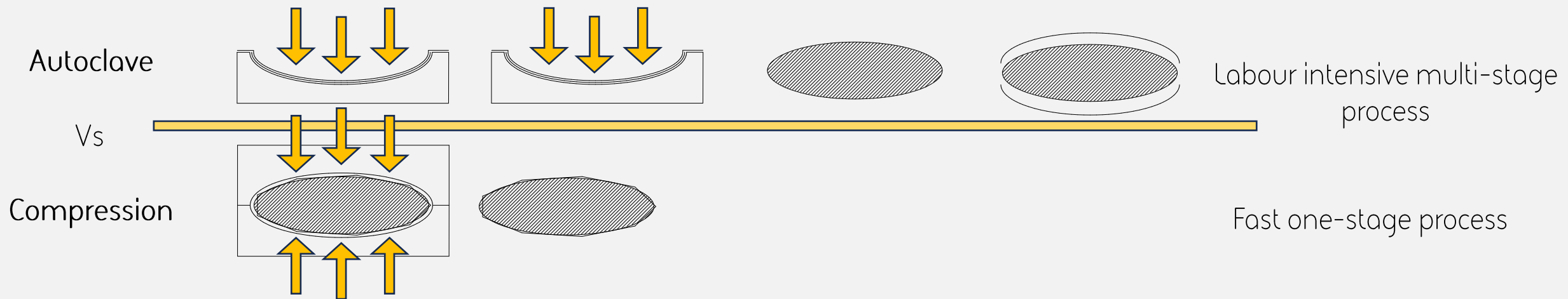
# Composite Superiority

Optimal Fibre and Resin content gives the best composites

Therefore, the pre-made option of 'Pre-Preg' allows for specific and tailored fibre and resin content ratios to suit requirements. Pre-preg forms the basis of nearly all manufacturing at Rockwood.

Pre-Preg is used primarily in the high-tech industries such as Aerospace and Defence

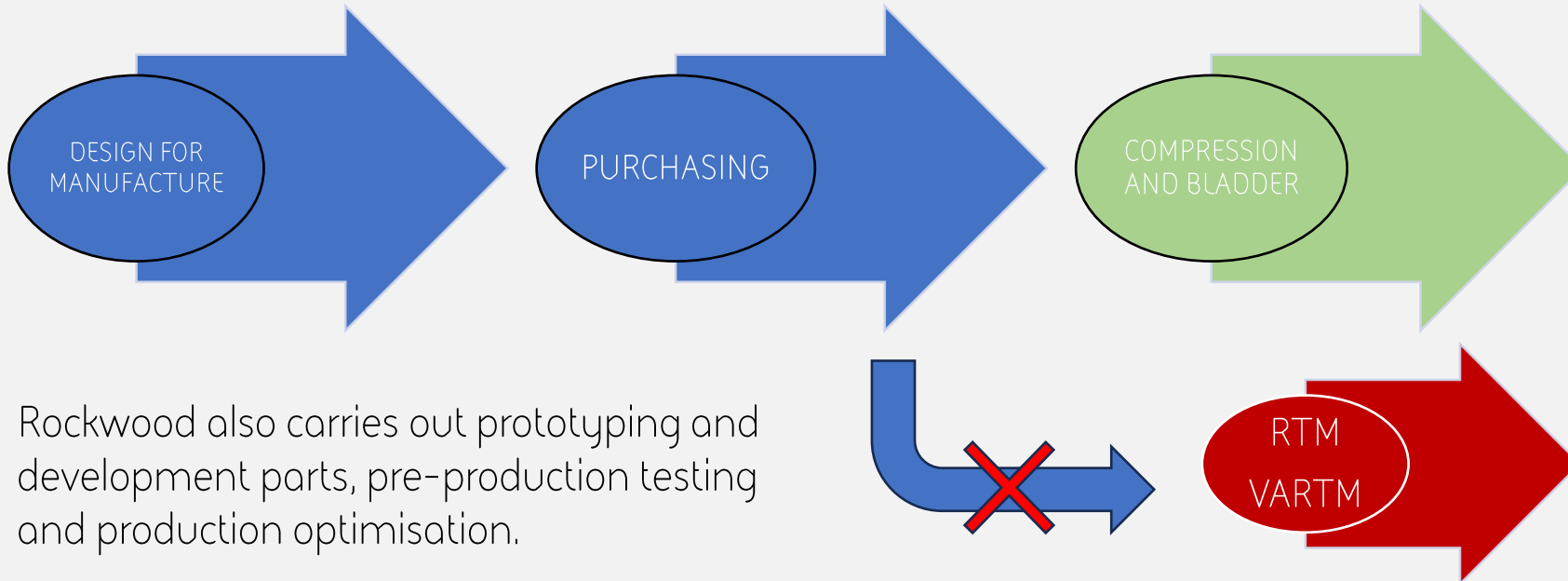
## Why Compression and Bladder Moulding Technique can produce parts Autoclave and Vac Bag cannot



# Design for Manufacture



Rockwood assists in fibre and resin selection and composite layup to optimise strength and stiffness.



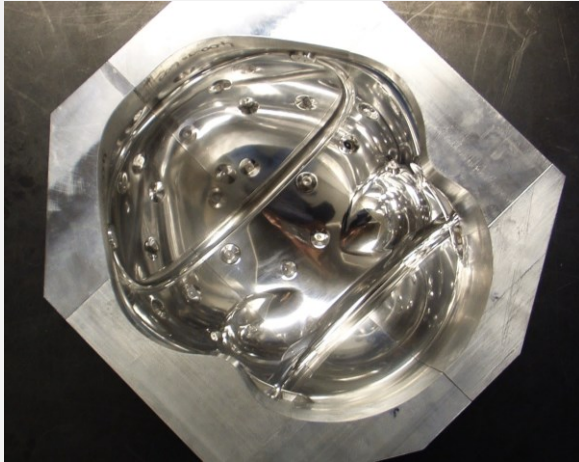
Rockwood also carries out prototyping and development parts, pre-production testing and production optimisation.

At the design stage of all projects, the manufacturing method must be confirmed early, this ensures that 'Design for Manufacture' results in **Success** otherwise failures at the manufacturing stage can occur

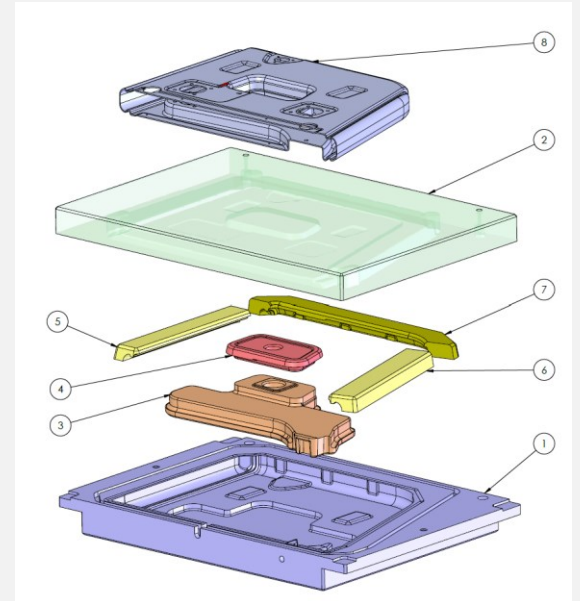


# ROCKWOOD COMPOSITES

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Rockwood's "Unique Selling point"  
is composite manufacture with  
"Metal Tooling"



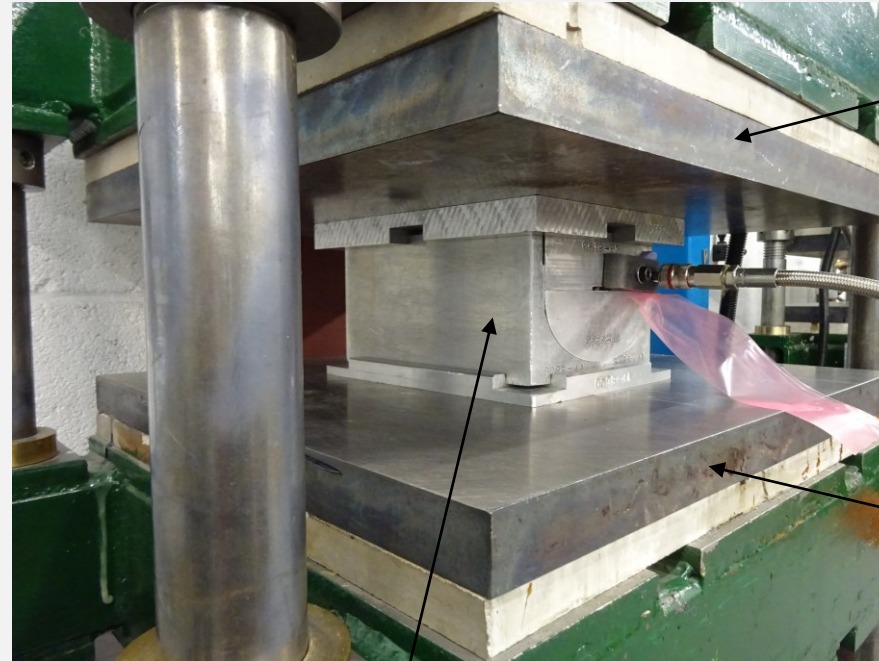
# This presentation illustrates the many, key advantages of metal tooling over traditional “vac bag” or “autoclave” processing

Fundamentally, composite pre-preg materials only require heat and pressure to form a consolidated composite structure.

The Rockwood moulding process applies heat into mould tool via heated platen presses which are kept closed with hydraulic rams.

Pressure is applied via “**compression moulding**” or “**bladder moulding**”.

These two process can be used independently for different structures, or they can be used together.



Top heated Platen  
(Typically, 120-  
160°C)

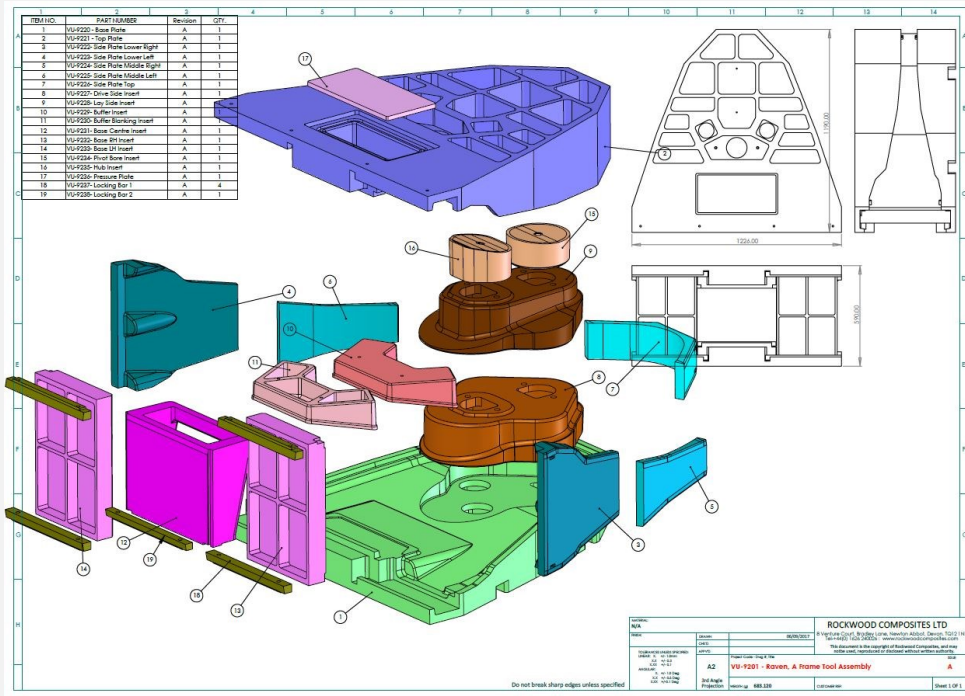
Bottom heated Platen  
(Typically, 120-  
160°C)

Bladder Mould tool

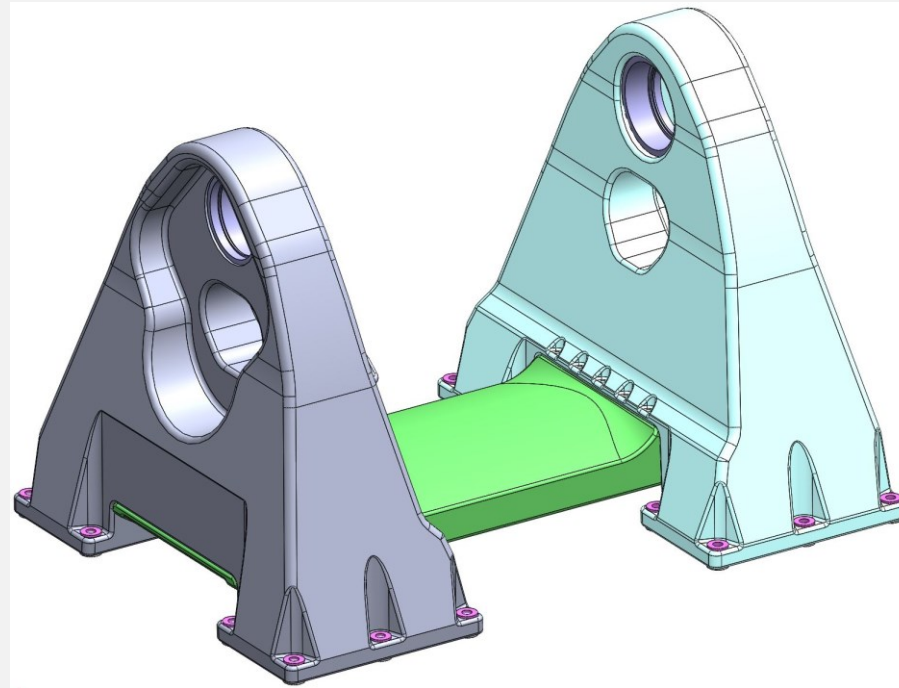




# Modular Metal Tooling



Rockwood can design modular tools which provide flexibility to produce non-identical sister parts from the same base mould tool or give the ability to incorporate local design upgrades with different tooling inserts

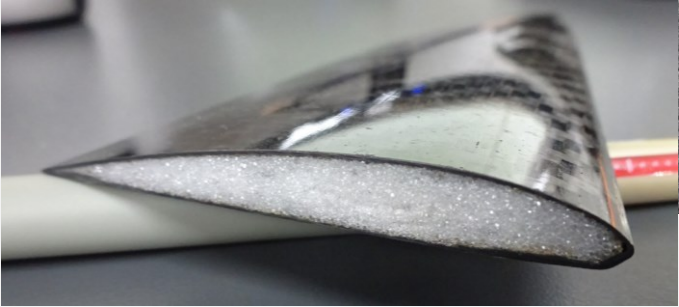


# Compression and Bladder Moulding

Rockwood Composites specialises in Compression and Bladder moulding which can be utilised individually or combined within the same tool

In the following slides we will show the alternative techniques, pictures of how they work independently and how a combination of techniques can produce complex one-piece structures

Compression Moulding



Bladder Moulding



# Compression Moulding in Metal Tooling

## “Compression moulding”

Produces a solid structure, either solid composite or with a foam core or combination of both:

Fully tooled, moulded surfaces

No bag surfaces

No edge filling required

Very good surface finish all over

Fine detail

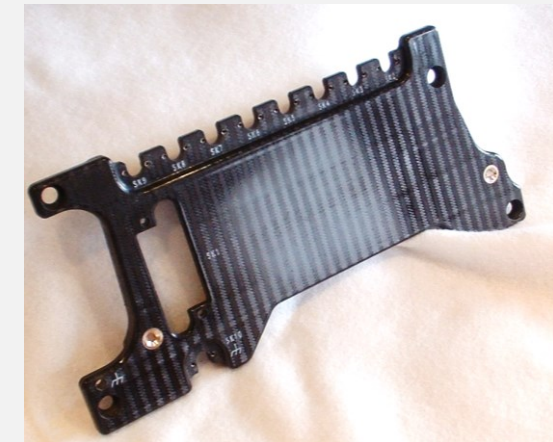
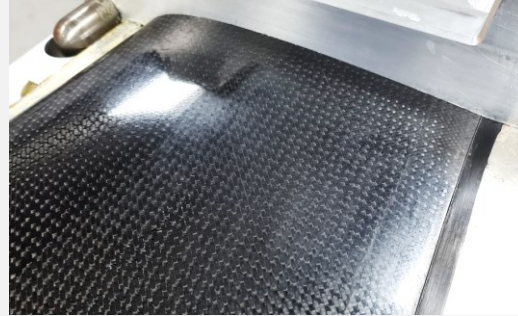
Typically used on:

Propellers

Wings

Wing tip Electronics

Structural components



# Bladder Moulding in Metal Tooling

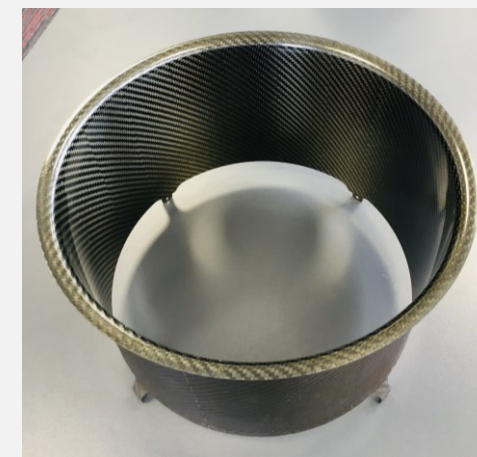
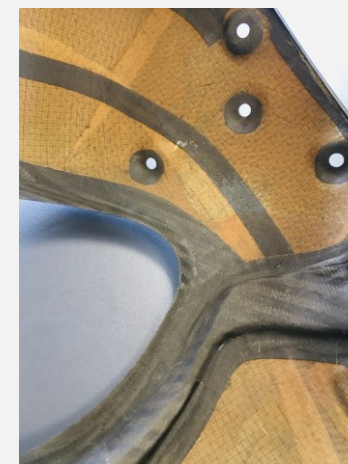
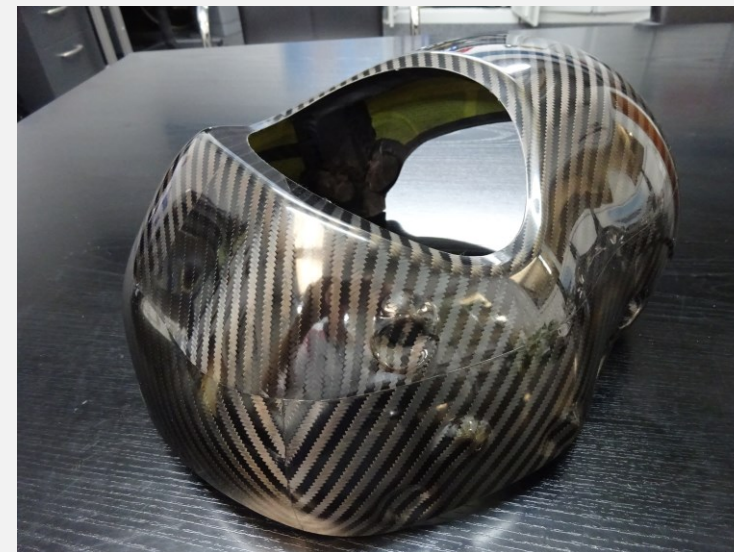
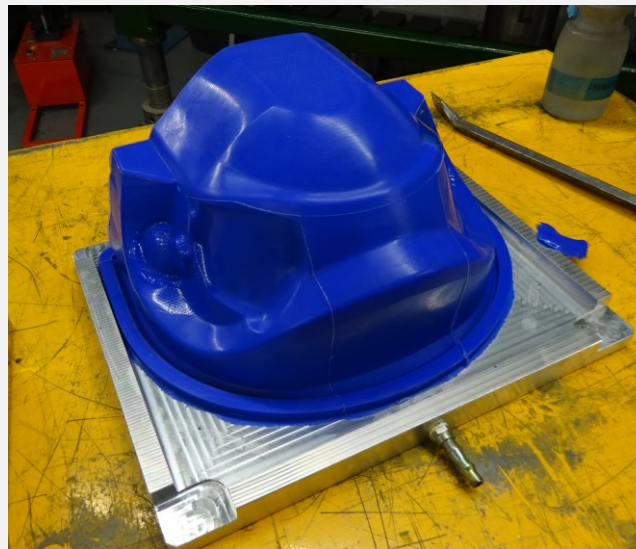
## "Bladder moulding".

Produces hollow or single sided parts with only one tooled surface:

Component can have negative draft and undercuts

Large and small parts

Bag can be fully enclosed giving light-weight parts with excellent surfaces

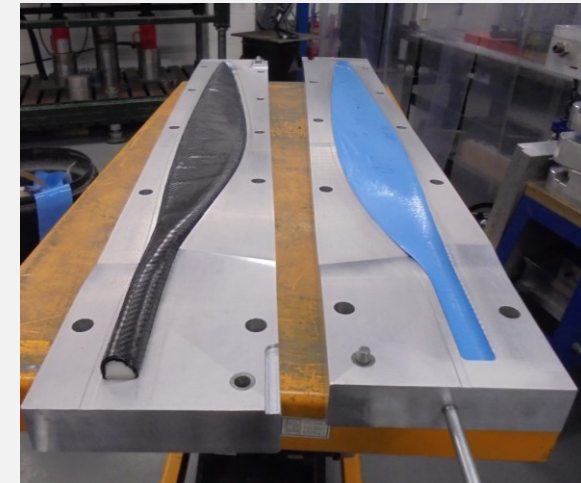
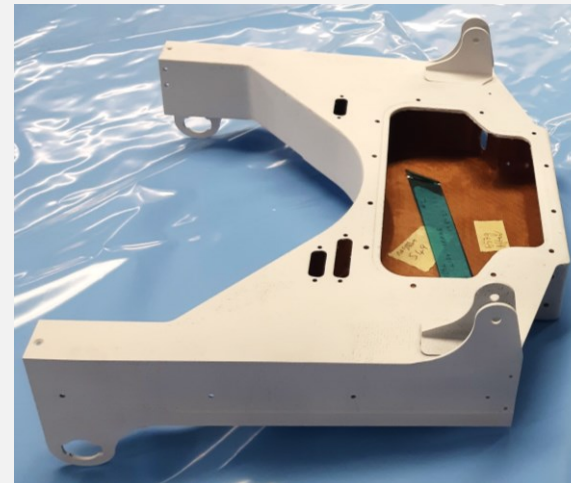
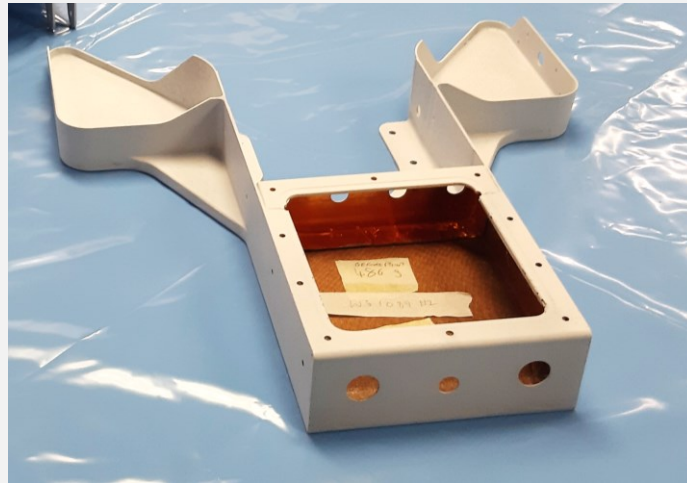


# Key Advantages of Metal Tooling

Metal tooling can take advantage of multiple pressure bags, vacuum pulls and compression moulding to achieve complex internal and external features in singular parts

Thus, reducing part/assembly weight, adding strength and reducing labour time and therefore cost, paramount for the aerospace industry

We specialise in making components that are "feature rich" - That is to say when it makes economic sense, we incorporate features that would otherwise be contained in other parts

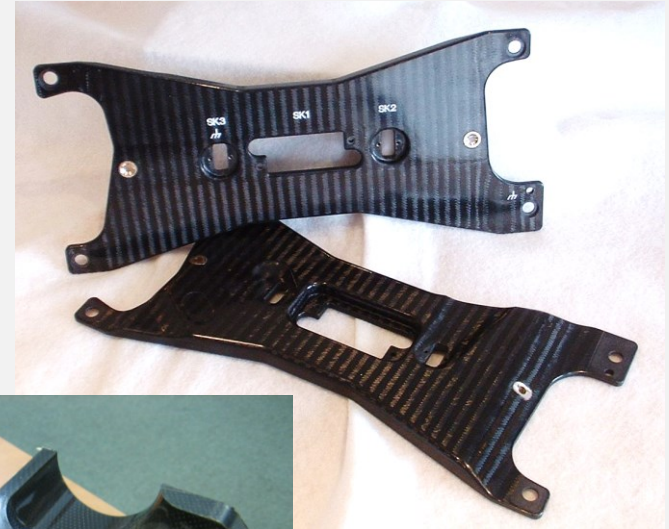
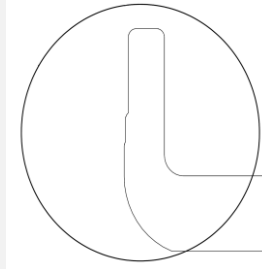
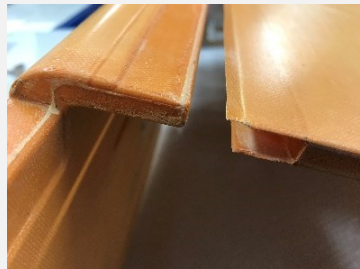
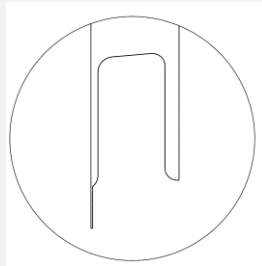


Combined compression and bladder moulding with sandwich construction in key areas



# Advantages of Metal Tooling – Complex Surfaces

Metal tooling can incorporate complex surface detail, for example tongue and groove edge features for quick and aesthetic bond lines and can accommodate undercut surfaces and fine detail.



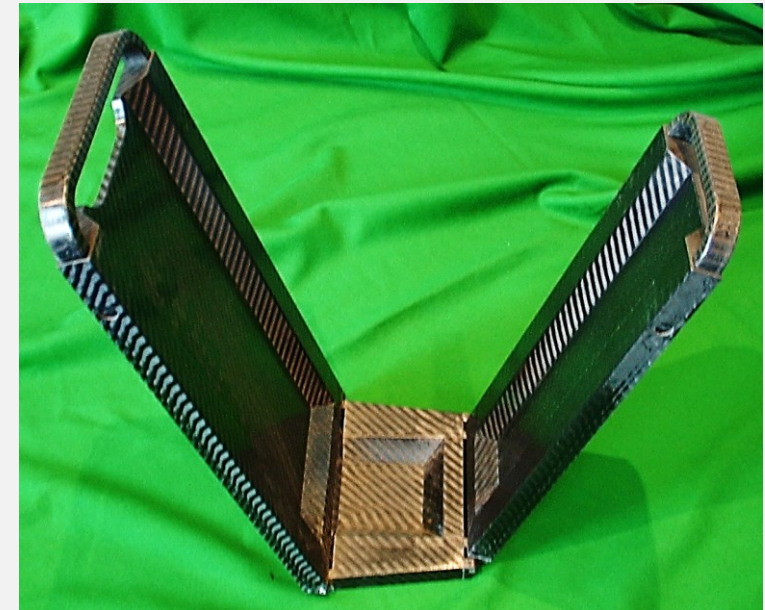
Structural attachments:  
Tongue and Groove Assembly with I-ply detail

## Key Advantages of Metal Tooling – “Net Edge Moulding”

All sides, surfaces and edges are formed and finished during moulding resulting in less machining and ‘A’ surfaces all round

Metal tooling allows machining datum points to be incorporated into the part for flawless repeatable alignment on complex curved parts

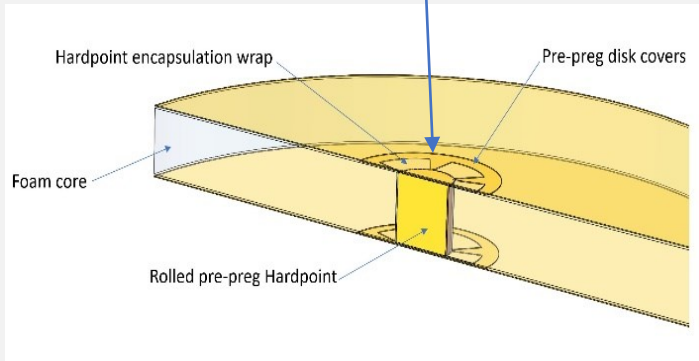
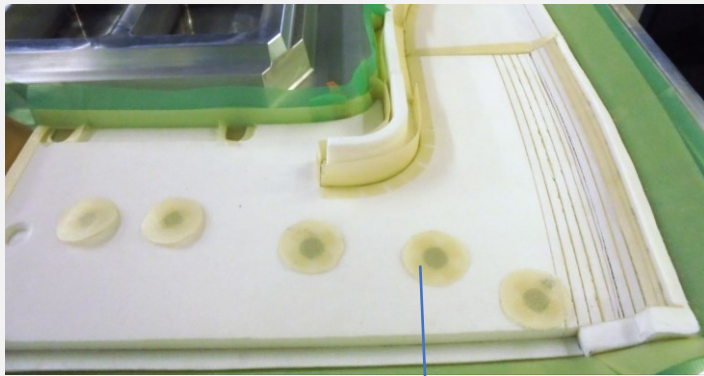
Very high-quality parts, straight out of the mould tool



Excellent consolidation giving smooth surfaces and crisp edges

# Advantages of Embedded Hardpoints

Sandwich construction accommodates hardpoint areas during moulding giving stronger mounting points  
No hardpoint potting post moulding required  
Lighter weight



Embedded rolled hardpoints



Embedded ply-stacked hardpoints



Moulded Machining Datum positioning



Advanced mounting points





# The way forward - Engineering

Rockwood looks carefully at the proposed design and can offer 'Design For manufacture' engineering assistance to ensure parts are designed in a way that coincides with the manufacturing method.

This results in the lowest possible manufacturing cost and complexity.

In parallel with detailed component design comes mould tool design. This ensures that tooling design is not left to the last minute and provides feedback into the component design.

ITEM NO.	PART NUMBER	Revision	QTY.
1	WS-4010, Top Plate	A	1
2	WS-4011, Top Cavity Plate	A	1
3	WS-4012, Side Bag Retainer	A	2
4	WS-4013, Side Caul Plate	A	2
5	WS-4014, Outer Retaining Plate	A	2
6	WS-4015, Back Cavity Plate	A	1
7	WS-4016, Front Cavity Insert	A	1
8	WS-4017, Front Cavity, LH Side Action	A	1
9	WS-4018, Front Cavity, RH Side Action	A	1
10	WS-4019, Left Cavity Insert	A	1
11	WS-4020, Right Cavity Insert	A	1
12	WS-4021, Left Lower Cavity Insert	A	1
13	WS-4022, Right Lower Cavity Insert	A	1
14	WS-4023, Bottom Cavity	A	1
15	WS-4024, Bottom Plate	A	1
16	WS-4030, Lift Frame Moulding	A	1
17	DME Taper MT20-21		2
18	DME Taper FT20-21		2
19	WS-4025, Side Pressure Bag	A	2
20	Bag nozzle 2	A	2

Do NOT break sharp edges unless specified

Drawing Type / Status : **PRODUCTION**

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 Tel: +44(0) 1432 340026 - www.rockwoodcomposites.com  
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**A2 WS-4000, Lift Frame Mould Tool Assy**

Issue **A**

Sheet 1 OF 1

## Further Advantages of Rockwood Composites

Proven track record in delivering exceptional production products into the aerospace industry

SME business means fast to react and implement design changes

No autoclave heating times, press moulding allows for one-off parts to be cured quickly for rapid development

Excellent surface quality is achieved straight out of the tool, no lacquer required

Short lead times from design agreement to first parts

Metal tooling means fast turnaround, in large and small batches and long-life tools

Leaders in Quality Control





This is to certify that the holder of this certificate:

Rockwood Composites Limited

Has satisfied all the requirements to become fully registered on the JOSCAR supplier accreditation register, as set out by participating buying organisations.

*Colin Maund*

Colin Maund  
CEO, Helios Information

Renewal Date:  
23 February 2024



JOSCAR is supported by



### Certificate of BSI Membership

This is to certify that **Rockwood Composites Ltd** is a BSI Subscribing Member

Membership Number **47909479**

Start date: 1 June 2023  
End date: 31 May 2024  
For and on behalf of:

*Scott Sheehan*

Scott Sheehan, CBE FRSG, Director General, Standards

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bsi.



## Certificate of Registration

QUALITY MANAGEMENT SYSTEM - EN 9100:2018 AND ISO 9001:2015

This is to certify that:

Rockwood Composites Ltd  
Long Road  
Paignton  
Devon  
TQ4 7BB  
United Kingdom

Holds Certificate Number: FM 717883

and operates a Quality Management System, which complies with the requirements of EN 9100:2018 (technically equivalent to AS9100D and JISQ 9100:2016) and ISO 9001:2015 and is assessed in accordance with EN 9104-001:2013 for the following scope:

**The manufacture of composite materials, including the assembly of structures from composite materials and additional components.**

For and on behalf of BSI:

*Matt Page*

Matt Page, Managing Director Assurance - UK & Ireland

Original Registration Date: 2020-05-13  
Reissue Date: 2023-05-13

Issue Date: 2023-05-13  
Expiry Date: 2026-05-12



Page: 1 of 1

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CERTIFICATE NAME **ROCKWOOD COMPOSITES LIMITED**



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Date of certification: 2023-01-06  
Valid to: 2024-01-06 (Expires in a year)  
Status: **Active**  
Visibility: **Public**  
Scope: **Whole organisation**

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ISSUED ON  
2023-01-06

CERTIFICATE ID  
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# Thank you