# d² Dura Profiles

Twice as strong, or more cost-effective & compact vs. the competition

Unlike many traditional materials, GRP (Glass Reinforced Polymer) performs well under tension thanks to the high tensile strength provided by its glass fibres and the flexibility of its polymer resin matrix. GRP composites offer a favourable stiffness and strength-to-weight ratio, allowing them to perform effectively in demanding conditions where both strength and reduced weight are needed.

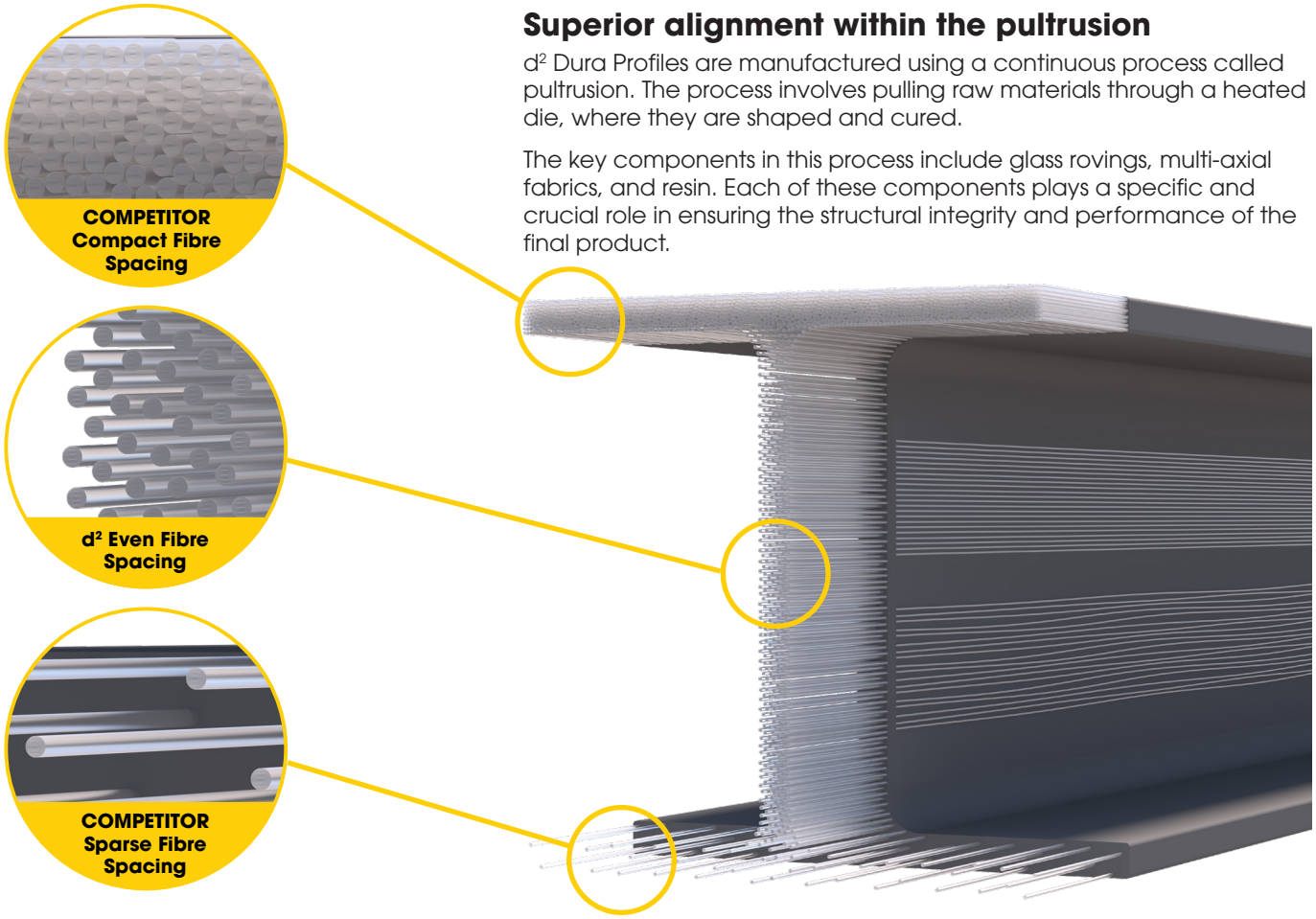
But here's the catch: not all composites are created equal. Literally thousands of factors influence their capability.

## We don't leave performance to chance. We engineer it into every d² profile:

Our d² composites benefit from superior manufacturing standards, using advanced techniques like optimal filament drawing speeds, careful selection of raw materials, precise fibre placement and arrangement, and intelligent design based on shape optimisation.

## Twice as strong, or smaller and cheaper. A compelling choice:

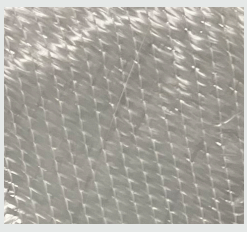
Our material, design and manufacturing know-how results in profiles which are on average 50% stronger than the competition, allowing for designers and engineers to use smaller or fewer components in major projects when using d², enhancing efficiency and cost effectiveness. In a nutshell, you can opt for profiles that are either twice as strong or 1/3 smaller when compared to GRP competitors.




## Superior alignment within the pultrusion

d² Dura Profiles are manufactured using a continuous process called pultrusion. The process involves pulling raw materials through a heated die, where they are shaped and cured.

The key components in this process include glass rovings, multi-axial fabrics, and resin. Each of these components plays a specific and crucial role in ensuring the structural integrity and performance of the final product.



## Uni-directional Glass Rovings

The specific arrangement and placement of d² profiles' unidirectional glass rovings provides high strength along the length of each profile. The addition of multi-axial fibre mats **enhances the structural integrity** and surface protection of each profile.

They provide additional reinforcement in multiple directions, improving the composite's ability to resist forces that are not aligned with the rovings, such as torsional and transverse loads. This is especially important in complex shapes or in applications where multi-directional loading occurs.

**Unlocking the Power of Composites™**



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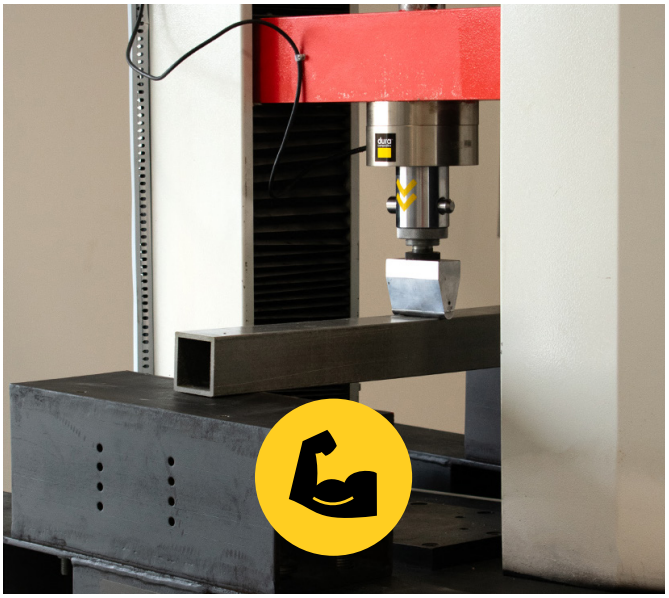
## Our d² Dura Profiles aren't just good; they're exceptional.

As you've seen overleaf, our d² composites benefit from superior manufacturing standards and intelligent design optimisation versus the competition, pushing the boundaries of what GRP pultruded profiles can achieve. They don't just offer a modest improvement; it's a revolution in performance.



### We exceed E23 Grade by 50%

BS EN 13706 - Reinforced plastic composites; specifications for pultruded profies, dictates minimum required values such as modulus, where an E23 grade is equivalent to 23 GPa for the flexural/tensile modulus of pultruded products.

From standardised coupon testing to examining fully pultruded profiles, we can demonstrate that on average, d² profiles exceed E23 Grade by an astounding 50%.


### Lighter & easier to move

Being able to use smaller or fewer components in your projects by choosing d² Dura Profile enhances efficiency.

Aside from the obvious manual handling benefits, there's also a reduction in health & safety risks, less need for mechanised plant equipment, a dramatic reduction in transportation requirements and lower overall project costs.

### 50% less carbon

Being up to 50% lighter than steel profile components that perform the same task translates to an equivalent 50% reduction in carbon footprint, making our profiles a sustainable choice for environmentally conscious projects.


### Fully recyclable

In an industry first, if you have GRP waste materials from your on-site installation, or if your d² Dura Profile product is end of life – it will be repurposed into the production of new materials at our UK HQ. A unique real-world solution to a real-world problem.

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## Design with complete confidence thanks to d² Dura Profiles' extensive test results:

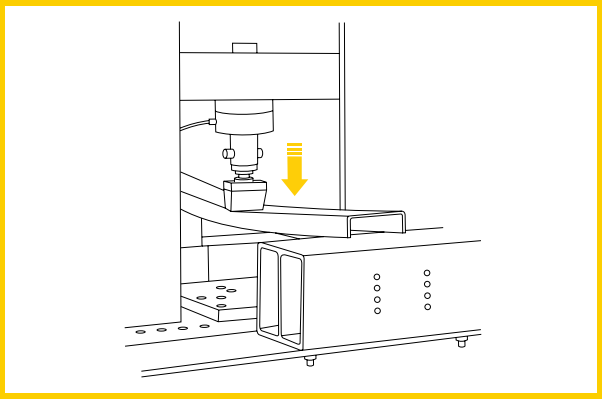
To unlock the full potential of GRP, especially in structural applications, we recognise you need up-to-date and comprehensive data reflecting its performance across diverse loads and spans. Relying on outdated information from unreliable sources can lead to compliance issues and potentially unsafe designs.

Our d² composites are backed by data from over a million testing operations. Through rigorous in-house testing and advanced data modelling, we meticulously analyse the properties of all of our composites. When it comes to GRP profiles, our products are evaluated against BS EN 13706 – the specification for Pultrusions.

### Full Profile Testing:

Full profile testing is primarily used to verify the modulus (stiffness) of our products, to understand their load and deflection capabilities.

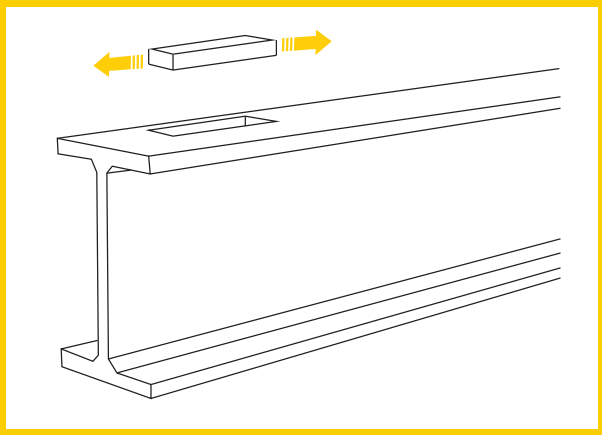
This test data can then be used to drive specifications based on span/load applications.



The d² flexural modulus averages ±45 GPa for full section flexural testing, with some select profiles achieving over 65 GPa for a given span.

### Coupon Testing:

Coupon testing is used to validate the mechanical properties of materials such as strength & modulus. Standardised test procedures exist to ensure all data is reported equally. We follow these guides to provide us with verified properties for our products.



The d² range averages ±36GPa, which is **50% stronger** than what the standard market offers.

### Real World Example:

The added strength and carbon savings of d² Dura Profiles provides you with a choice that can transform your fabrication projects and financial bottom line.

Our I-Beams and Channel sections achieve over 65 GPa (Gigapascals) at larger spans, surpassing the GRP pultrusion standard BS EN 13706 by more than 3 times!

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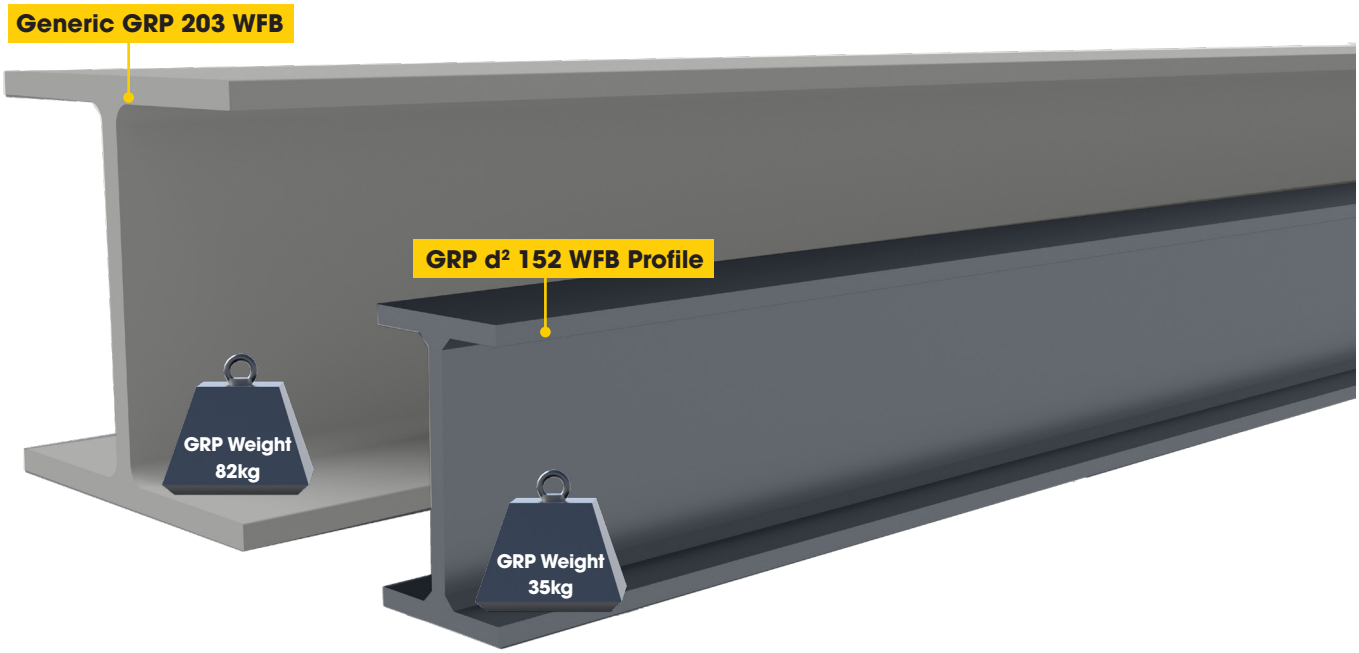
## 152 Wide Flange Beam (WFB) versus a competitor's 203 WFB:

In this example, test data shows that a d² Dura Profile Wide Flange Beam can be used in place of a competitors 203 GRP Wide Flange Beam to achieve the same performance.

Major efficiencies can be easily achieved, not just from a structural design perspective, but also from a 50% embodied carbon saving versus the competitor beam.

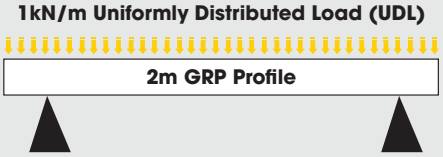
And what's more, a 6-metre-long 152 Wide Flange Beam at 35kg can be manually handled into position with a two-person lift versus the competitor beam at 82kgs!




## Uniformly Distributed Load: d² vs Generic

When UDL tests are conducted on both profiles, using a 1kN/m load on 2m profile lengths, the results are as shown in the table below:

| | Deflection (mm) | Flexural Modulus (GPa) |
|---|---|---|
| **Generic GRP 203 WFB** | 4.6mm | 17 |
| **GRP d² 152 WFB Profile** | 3.9mm | 65 |




## d² 152 WFB Point Load & UDL Data:

Below is a data table summarising the point loads and uniform distributed loads (UDL) for d² Dura Profile Wide Flange Beam 152.

Full profile information is available at visit www.powerofcomposites.com.

| | | Span (mm) | | | |
|---|---|---|---|---|---|
| | | 1000 | 1500 | 2000 | 2500 |
| | | Flexural Modulus (GPa) | | | |
| | | 23 | 28 | 33 | 38 |
| **Point Load (PL)** | **2.0** | 0.8 | 2.1 | 3.2 | 4.6 |
| | **4.0** | 1.6 | 4.2 | 6.4 | 9.2 |
| | **6.0** | 2.4 | 6.3 | 9.6 | 13.8 |
| **Uniformly Distributed Load (UDL)** | **1.0** | 0.8 | 2.1 | 3.2 | 4.6 |
| | **3.0** | 1.6 | 4.2 | 6.4 | 9.2 |
| | **5.0** | 2.4 | 6.3 | 9.6 | 13.8 |





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