

# PULTRUSION TECHNOLOGY DELIVERS PERFORMANCE ENHANCEMENTS IN FIBERGLASS DOOR AND FRAME CONSTRUCTION

By Roger Stempky

**Being relevant to your end user's** needs requires a sales team to stay informed of the unique products available in the market today. As a salesperson in the door and hardware industry, it is important to develop your product knowledge, thus allowing you the ability to provide solutions to your customers' issues.

Providing value will ultimately reward you for the time you have invested in the form of higher margins and repeat business. Conversely, only pedaling products results in the continued frustration of having to win with the best price.

An opportunity for "solution selling" happens daily when a salesperson is asked to come out and look at a customer's problem door, which may be subject to abuse from moving objects, chemicals, people, the elements, and the like. Whether you realize it or not, an upsell opportunity with a better margin is right in front of you.

Understanding fiberglass doors and frames will increase your opportunity to sell solutions to your customers. These incredibly durable doors and frames continue to see exciting growth with commercial customers who have become tired of the "money pit" that comes from taking the same old approach to solving corrosive and high-abuse entrance problems.

Innovation within the fiberglass door manufacturing industry continues. Today, the commercial fiberglass door offers meaningful differences

in various performance characteristics based on the type of door construction.

The most recognized Fiberglass Reinforced Polyester (FRP) doors continue to be the fiberglass hybrid door, constructed with an FRP face sheet secured within an aluminum door chassis. These face sheets are also used to create a fiberglass composite door which eliminates the aluminum, and instead uses fiberglass framing and chemically welds the face sheet to a fiberglass substructure.

Another approach to producing a fiberglass door is through a Resin Transfer Mold (RTM) process. In this process, the materials used to construct the door (gel coat, fabric, core and framing infrastructure) are placed in a closed mold with resins introduced under pressure.

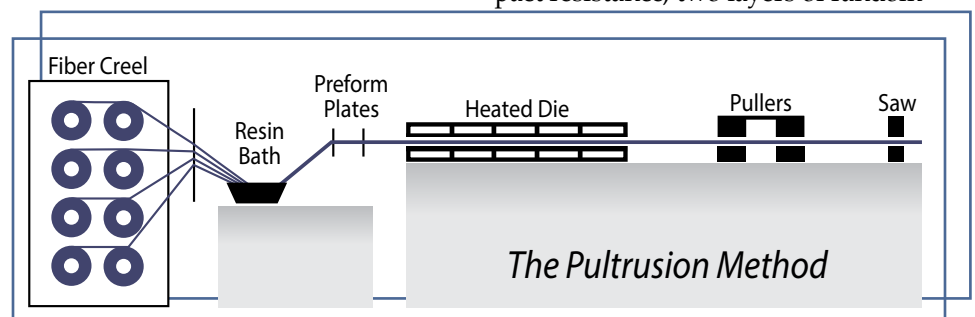
Finally, many of you I suspect are familiar with the pultrusion manufacturing process for its history in producing FRP door frames. Today, this approach, with its high fiber-to-resin ratio, is used in the production of the toughest fiberglass doors on the market.

## What is the Fiberglass Pultrusion Process?

To better understand the benefits of a pultruded fiberglass door and frame, it is important to know how it is produced. The pultrusion process is similar to extruding, with a few key differences. With extruding, a homogenous raw material is forced through a profile die. With pultruding, raw materials (in this case glass fiber reinforcements and resins) are drawn into a profile die by a mechanical pulling force. These fibers are injected with resins while under tension where they are combined and cured.

The same technology is now used to create an entirely pultruded door panel. In this process, a high-density, closed cell polyurethane foam core accompanies the woven rovings, woven knits, veil and resins into the die. This core reduces the weight of the door without diminishing its strength and also delivers outstanding thermal performance.

Multiple layers of glass fiber reinforcing fabrics envelop both sides of the core panel as it moves through the process: A woven layer for impact resistance, two layers of random



continuous filament for flexural strength, and a thin veil top layer to provide a smooth surface finish. These glass reinforcements wrap around the panel edges from both sides to improve the door's structural properties. This combination of reinforcing fabrics is necessary to consider, as it is this high fiber-to-resin ratio that gives the fiberglass door such impressive strength.

An FDA- and USDA-compliant resin fully saturates the glass fiber fabrics before the door enters the profile die, where the reinforcements are compressed around the core panel. The resin fully cures around the core as the panel passes through the heated portion of the die. This process produces a hermetically sealed, incredibly tough door panel free of voids. The FRP has as much as a 65 percent glass content and provides excellent impact resistance and screw holding strength.

Commercial fiberglass doors have become widely used to address the rust and rot of metal and wood doors. With the introduction of full door panel pultruding and changes to composite and finish technology, its use presents additional benefits and opportunities to solve customers' problems.

#### Performance Beyond Avoiding Rust and Rot of Metal and Wood Doors

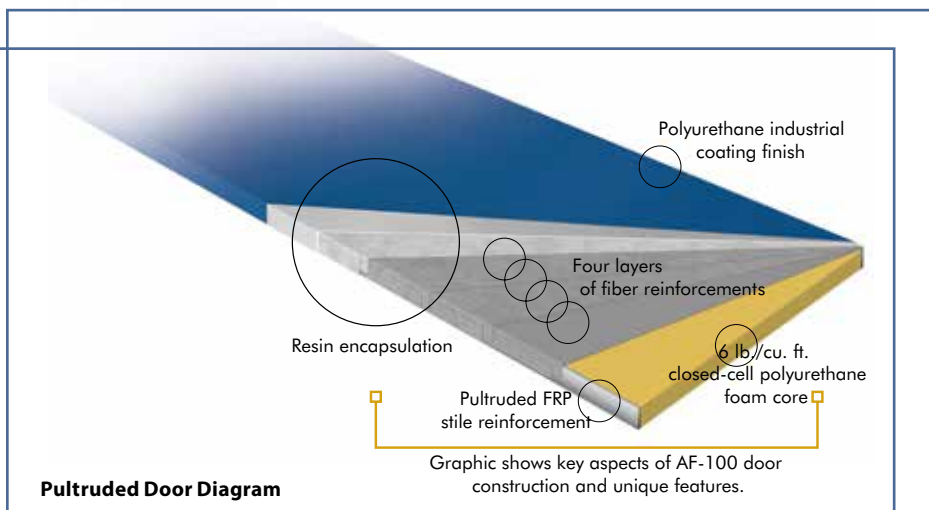
While fiberglass doors have gained favor in both the commercial and residential markets, it is important to point out key opportunities for

improved performance that a fiberglass pultruded door is capable of delivering (which ultimately advances sales opportunities). The benefits go far beyond the avoidance of rust, rot, and the replacement cost of using wood and steel doors.

#### Constructed with Materials that Last

There is no door built to last like a fiberglass door. Fiberglass boasts impressive strength-to-weight ratio. This lighter weight allows the hardware attached to have a longer life as well. All fiberglass doors, so long as they are sealed, are impervious to moisture, chemicals, seawater and salt solutions. A fiberglass pultruded door delivers extraordinary performance.

The pultrusion process works without the use of a mold and therefore does not require the use of a gel coat. A fiberglass pultruded door is prime coated and finished with a two-part urethane finish that delivers superior UV protection. Various core materials can be fed into the die, with a bias toward the use of a closed cell polyurethane foam core to enhance its structural performance. This process allows doors that are in constant contact with water or in areas of high humidity to avoid the constant expansion and contraction that can quickly deteriorate a metal or wood door, and even do damage to the physical properties of a fiberglass door. Pultruded doors are hermetically sealed and therefore





avoid this damaging expansion and contraction.

## Structural Security

If you open the papers or turn on the news, the media reminds you that people who work or visit our educational environments, workplaces, places of worship, entertainment and recreation are often singled out. These events have become an unfortunate fact of life. Those of us in the business of providing architectural products, especially building entry products, need to look for ways to solve this challenge our customers face. Building security starts with doors not being degraded and rusted and the hardware remaining firmly and structurally intact.

Today, pultruded doors can be made with cores that deliver outstanding bullet and blast resistance. Some of these doors and frames have been tested and passed the National Institute of Justice ballistic standard with Level IIIA ballistic rating and meet the Department of Defense Minimum Antiterrorism Standards for Buildings regarding blast resistances in accordance with UFC 4-01-01 and ASTM F2927.

Most would acknowledge that keeping those in the building safe, while still providing an architecturally appealing structure that doesn't have a prison-like appearance is difficult. This dilemma is where fiberglass doors present a real opportunity.

## Design and Aesthetics Considerations

Pultruded doors and frames offer clean lines and a smooth, elegant painted finish. The frames are constructed with mitered corners and no exposed fasteners, providing a uniform appearance.

With pultruded doors, there is an option for a painted finish of the architect or end-users choosing. Finishes also exist with other textures, and in some cases, even having the potential to receive a faux wood coating. A set

of standard colors exists, however, custom finishes and having the opportunity to change a finish in the field often finds favor with architects.

A full-lite glass kit can be integrated into a door as well, creating a stile and rail appearance and allowing light to flow freely through the door. Finally, the pultrusion process can allow for custom sizes, especially with extended height doors further providing architects with design freedom.

The biggest aesthetic consideration is that a door retains its elegance—not merely days, weeks, and months after installation—but for years to come. Let's face it—doors take abuse, and no architectural element negatively affects the look of buildings more than doors full of rust, scratches, and dents. The ability for a door to retain its appearance might be the most important design consideration for both the architect and the end-user.

While this article is about the benefits of pultruded doors, it is worth mentioning that a fiberglass composite door quickly and efficiently addresses most other finish options your customer or architect may need to support their design intent or branding effort.

## Energy Efficiency

Fiberglass has insulating properties, whereas metals such as steel and aluminum are conductive. When we think of improving the insulation in our homes, we quickly think of classic pink fiberglass insulation. Steel or aluminum architectural products short of any thermal breaks would quickly whisk the outside temperatures inside—hot or cold! Of course, most aluminum or metal door and frame companies are continuing to work diligently to enhance the thermal performance of their products. In these efforts, they may use a pour and de-bridge approach or thermal strut to prevent the temperature transference. Some companies rely on a fiberglass strut to create the thermal break in their metal framing.

A fiberglass pultruded door and frame assembly has only a foamed urethane core at the center, making this door the most energy efficient door and frame assembly on the market. The added benefit of its construction approach, which eliminates warp and bow, ensures a consistent fit.

## Serviceability and Lifecycle Costing

Of course, any door can be serviced or maintained; it simply comes down to the investment and frequency. To that end, you can help your customer avoid the repair "money pit" with all fiberglass doors, which is a benefit a facilities manager will appreciate. I can't think of a single facilities department I have had the opportunity to visit that has not been tasked to do more with less—including less staff and or reducing the ongoing maintenance costs of their facilities.

Understanding a product's ability to provide a lower lifecycle cost for your customer with improved serviceability enables you to arm them with information that will help them make a favorable and informed decision. The reason for a decision varies by customer or influencer, but being able to provide a product that delivers a better return on investment, either short- or long-term is often a top priority.

Lifecycle costs always include the first cost and the subsequent maintenance cost. Consider for a moment the various frames you have seen affixed to buildings anywhere in the country. How many of them were rusted, corroded, dented and abused from the elements, as well as from carts, transport dollies, shovels, and cleaning tools? These frames are not quickly and easily detached. They require significant labor to replace and are often the reason your customers consider a costly cut and weld, auto body filler, capping, or some other approach to fixing these dented, rusted or damaged doors and frames.

Fiberglass fully pultruded doors and frames deliver an outstanding return on investment. These doors and frames are remarkably durable,

guaranteed against corrosion, and perform well in high traffic areas. Door frames are subject to some of the most significant abuse. To withstand this abuse, pultruded frames are readily available in an extremely durable 1/4" wall thickness as well as a lower-cost 3/16" wall thickness.

The first hurdle your customer potentially will face in buying a fiberglass door is cost. It is important to evaluate the application and the elements it will encounter to determine what the door's real cost is over its lifetime. It is important to estimate with the customer the number of times they will replace the product, the service work to maintain it, and the nuisance it is on the facilities management team.

Time and again, I have always been struck by something that I have experienced in sales. Customers knew what their "points of pain" were; they counted on my knowledge as a sales person, to address them with the best products.

Some of the greatest industrialists of all time understood this all too well. Henry Ford remarked, "If I had asked people what they wanted, they would have said faster horses." We would have never expected the following statement from great consumer products creator Steve Jobs, commenting on product development, "It's really hard to design a product by focus groups. A lot of times people don't know what they want until you show it to them."

The broad mix of various products from different manufacturers large and small, as well as your in-depth knowledge of them, will allow you always to be that "go-to" sales person when your next customer's problem arrives.



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**Example of hollow metal frame rusted and corroded from the elements**

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