GRAFIL

PRECURSORS

CARBON FIBERS

CHOPPED FIBERS

CUSTOMER SOLUTIONS

Worldwide Leader

in Carbon Fiber Manufacturing

Vertically Integrated

to Ensure Quality

How have Grafil™ and Pyrofil® carbon fibers earned their reputation for market leading quality and economic performance?

Our comprehensive vertical integration of the manufacturing process uniquely enables Grafil Inc., together with our parent company Mitsubishi Rayon Co., LTD (MRC), to fully control every step of the carbon fiber production process.

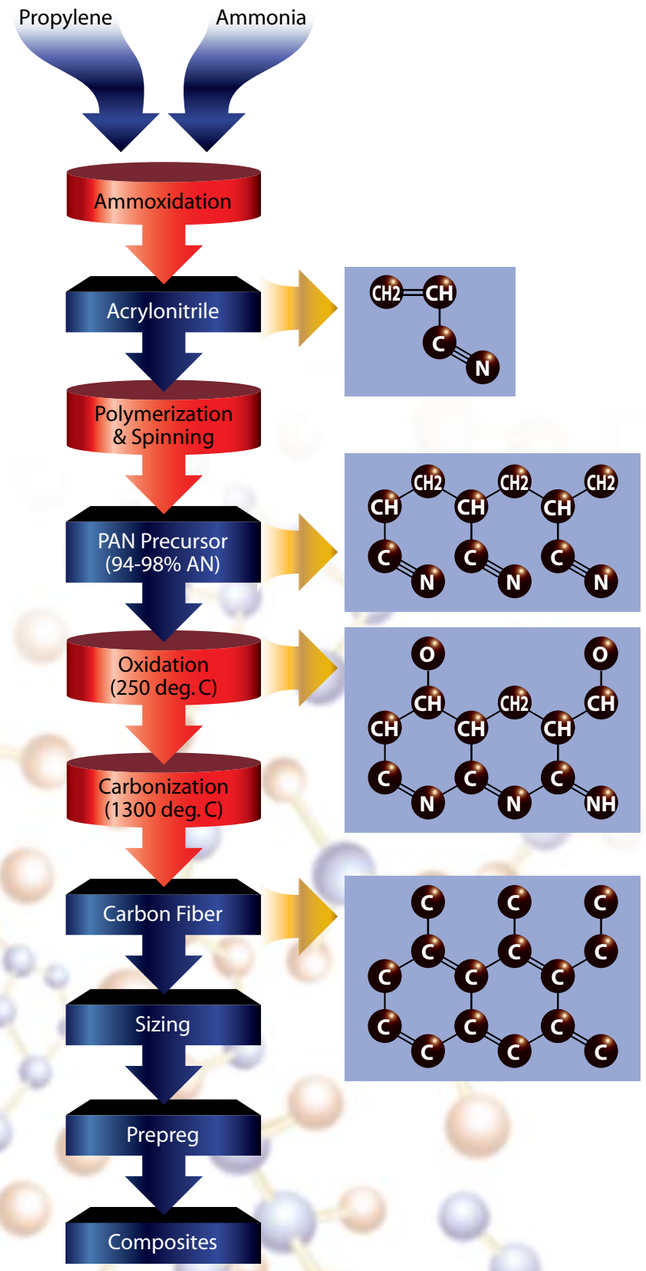
Our proprietary carbon fiber process begins in a world-scale synthetic fibers plant and concludes in highly sophisticated carbonization facilities in the USA and Japan.

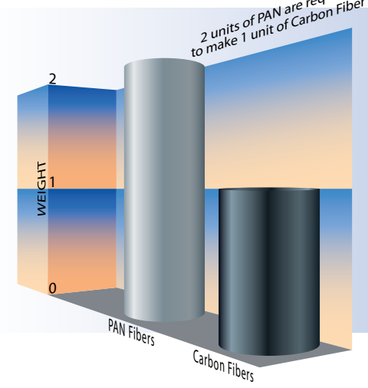
We start by combining commodity raw materials in a series of chemical reactions to produce acrylonitrile, which is then polymerized to form polyacrylonitrile (PAN). A solution of this PAN is then spun into a fiber precursor (white fiber). This intricate step ensures the maximum potential quality and consistency of the final carbon fiber.

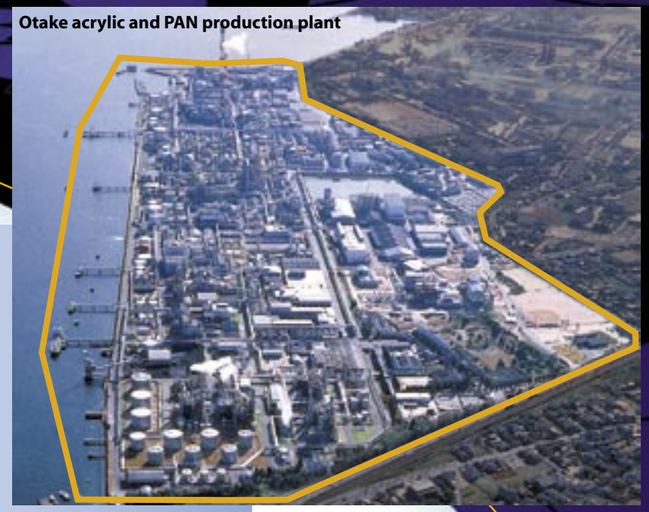
This potential is realized during the carbonization process, a precisely controlled pyrolysis of the PAN precursor to form carbon fibers.

All of our manufacturing facilities maintain ISO 9001 certification which enhances our continuous improvement programs. All of our Grafil fibers are tested to ASTM test methods, while Pyrofil fibers are tested to the JIS standard.

We have the ability to seamlessly manufacture high performance and high quality carbon fiber from dual production sources giving Grafil and Pyrofil fibers the best performance economics for today's markets.







World Scale

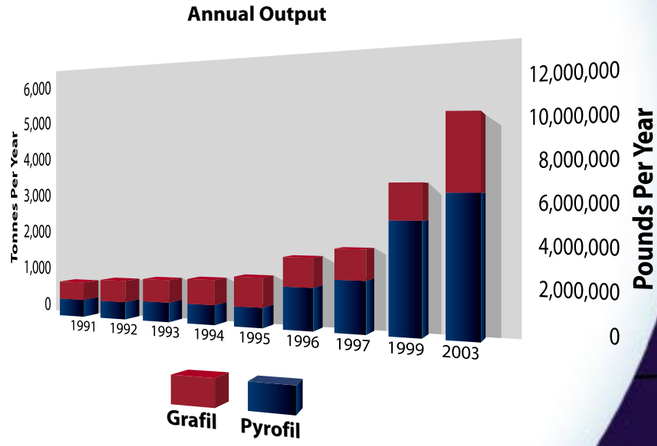
to Lead Economically

Price vs. Performance drives the composite industry, and economies-of-scale drive the cost of carbon fiber. Our group has invested the necessary resources to operate the world's largest acrylic and PAN production plant (Otake) owned by any carbon fiber manufacturer today.

The cost of PAN precursor is the major component in the total carbon fiber cost, because two pounds of precursor must be manufactured in order to yield one pound of carbon fiber.

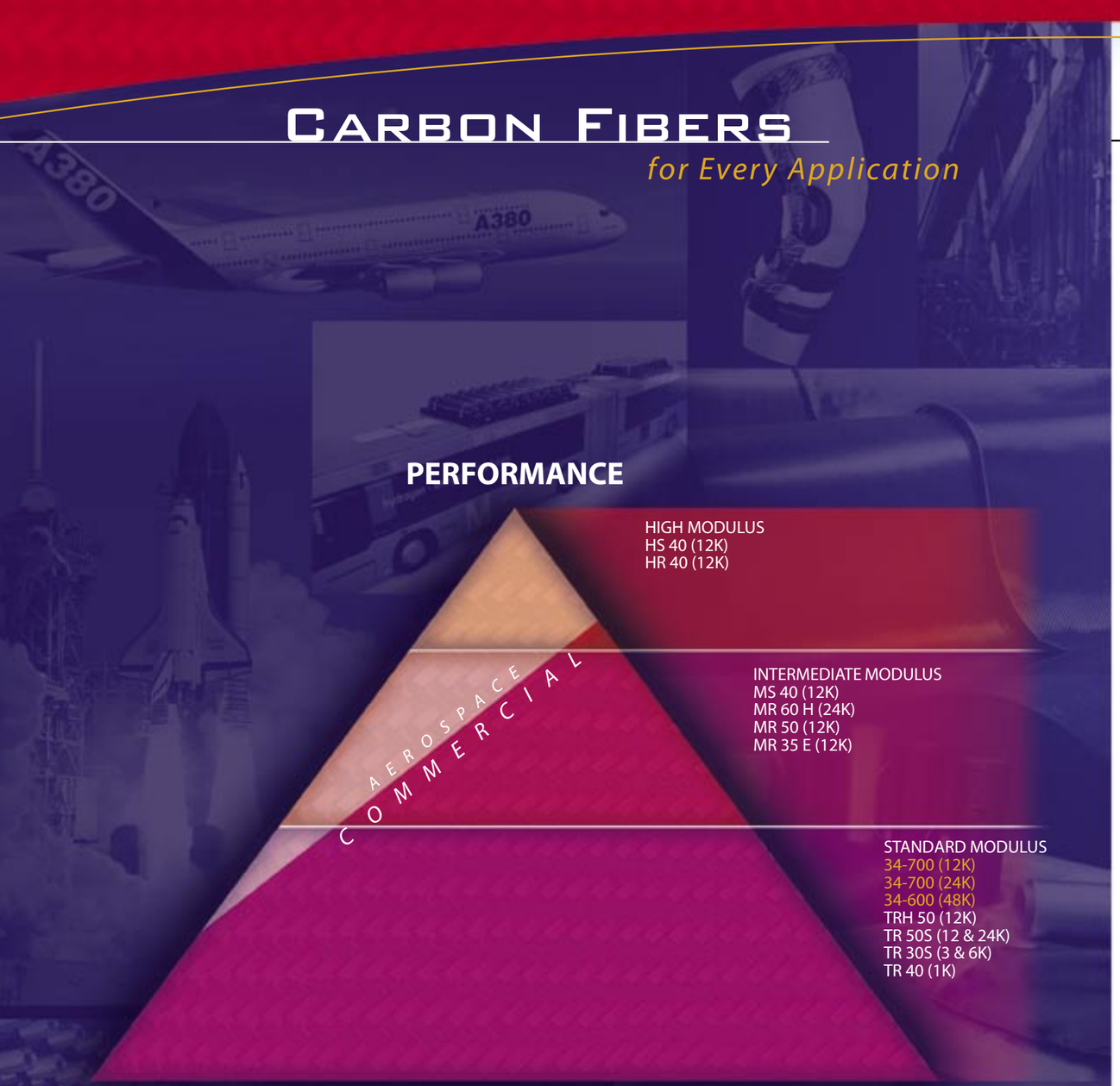
Our world-scale capacity enables our group to uniquely support emerging high-volume applications, such as wind energy, offshore oil, and automotive, while maintaining the highest level of quality.

To complete our commitment to the carbon fiber industry, Grafil and MRC's carbonization capacity has been rapidly expanded in recent years. This underscores our mission to supply the most competitive carbon fibers available in the market, today and in the future.



Carbon Fibers

for Every Application



Note: Grafil is a trade name for carbon fibers produced by Grafil, Inc.
Pyrofil is a trade name for carbon fibers produced by MRC.

Grafil
Pyrofil

Market Driven

to Strengthen Customers

Carbon Fiber Markets

The driving force behind the development of carbon fibers in the 1970s was the aerospace industry.

Once carbon fibers became commercially available, entrepreneurs started to exploit this unique material in a variety of creative ways, using it to make very high performance, yet affordable products, such as golf clubs, fishing rods, and tennis racquets.

This trend has continued to the present day with new applications appearing at a rapid pace. Oil & gas, wind energy, fuel cells, infrastructure, electronics, medical and musical instruments…the list grows longer and more diverse daily.

Market Driven

As entrepreneurs discover new ways to use carbon fibers, Grafil becomes their natural research and development partner every step of the way. Our advanced vertical integration system allows us to design, prototype, produce, test, and certify competitive fiber formats for any promising application.

We are excited by the enormous potential of this versatile product and look forward to supporting your innovative applications. We have a wide range of high quality, competitively priced products that can be uniquely tailored to fit your existing or emerging application.

Our flexibility of supplying carbon fibers from dual production facilities enables us to rapidly respond to changing world market conditions.

Grafil Inc.

There is no question that Grafil offers one of the most diverse carbon product ranges on the market today. Our high strength carbon fibers are available in filament counts ranging from 1K to 48K with moduli between 34 Msi (235 GPa) and 60 Msi (450 GPa)

Each and every one of our products has been designed and tested to match its target application. As a result, our fibers are the fibers of choice in a wide range of conversion processes including prepregging, weaving, filament winding, braiding, SMC and pultrusion.

Grafil has been particularly successful in forming a partnership with industrial markets. Our 12K, 24K, and 48K fibers have become the industry standards for such commercial applications as filament wound pressure vessels, oil risers, and industrial rollers. In SMC and prepreg tape forms, Grafil fibers have a leading position in automotive, wind energy and infrastructure applications.

Grafil and Pyrofil products are also qualified in a diverse range of traditional and developing aerospace applications.

Whatever your application, whatever your fiber requirement, we at Grafil understand the need to support existing customers and to help develop emerging markets. We look forward to the opportunity to work side-by-side with your technical team to deliver a cost effective solution for you.

Global Team

for Rapid Solutions

Grafil Team

The staff at Grafil Inc. is committed to providing our customers with fibers and service of the highest quality available in the marketplace at a competitive price.

Our customer service team is responsive, attentive, and fully committed to being your "on-time" supplier. Grafil's team of technical and customer support professionals is eager to provide you with industry-leading personal service and support.

Application Development

Grafil Inc. actively seeks out new applications, supports the development of new production processes, and invests in resources to remain the leading carbon fiber supplier on the market today.

If you have an application or an idea that can benefit from Grafil's advanced vertical integration, world-scale production plants, market-driven carbon fiber formats, and industry-leading solutions, then Grafil will put our application development team and our resources to work for you.

Technology

The key to our success is our people. Our premier R&D centers are staffed with highly skilled and experienced engineers, whose expertise ranges from precursor, carbon fibers and prepregs, to composites themselves.

Their hands-on experience with filament winding, pultruding, injection molding, RTM, curing and other production activities makes them a great resource for fine tuning your products and processes.

Our experts will not only provide you with fibers designed for your needs, but will also assist in providing you with the technical service required for your commercial success.

Resin

MRC is a world authority when it comes to resins, prepregs, and composites. From epoxy to polyester and vinyl ester, from phenolics to coating resins and acrylics of all types, our experts can design, prototype and test sizings and resins to support fibers in virtually any application.

Application Development Team: North America: 1-888-575-4556 or project@grafil.com
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Grafil, Inc. CF History

1982 *Hysol-Grafil CF established (50/50 JV Courtaulds and Dexter Corp.).*

1984 *Sacramento plant start-up. Capacity 800,000 lbs per year.*

1988 *Courtaulds gains 100% ownership (Courtaulds Grafil Inc.).*

1991 *Courtaulds Grafil Inc. purchased by Mitsubishi Rayon Co., Ltd. and changes name to Grafil, Inc. Capacity 1,000,000 lbs per year.*

1992 *Sacramento plant modernized to utilize Mitsubishi Rayon manufactured precursor resulting in substantial quality and productivity increase. Capacity 1,750,000 lbs per year.*

1998 *Additional productivity increase. Capacity 2,000,000 lbs per year.*

2000 *Completed ISO 9002 Certification.*

2002 *Plant capacity expanded to 3,200,000 lbs per year.*

2002 *Completed ISO 9002 Certification of European Operations.*

2003 *Transitioned to ISO 9001:2000.*

Mitsubishi Rayon Co., LTD CF History

1965 *R&D activities on carbon fiber and related materials started.*

1976 *Carbon fiber prepreg production started at Toyohashi.*

1977 *PAN precursor production began at Otake.*

1982 *Carbon fiber production started at Otake.*

1989 *Carbon fiber production started at Toyohashi.*

1991 *Acquired Courtauld's carbon fiber business. Grafil, Inc. established.*

1992 *MRC prepreg capacity doubled.*

1996 *Acquired Asahi Chemicals CF capacity and relocated it to Toyohashi.*

1998 *Toyohashi production capacity increased. CF and prepreg certified to ISO 9002.*

2002 *Increased carbon fiber capacity in both Sacramento & Toyohashi.*

Grafil's Quality Statement

Grafil, Inc. is committed to providing products that consistently meet or exceed the requirements of our customers. We will strive to operate our business in a cost effective, safe, and environmentally sound manner.

Grafil, Inc. is dedicated to the concept of continuous improvement and the long-term benefits this will provide to our customers, shareholders, and employees.

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