

Plastics in automotive applications: Carbon fiber parts in 3 minutes or less

By Matt Defosse

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That's the claim being made by Dow Automotive executives who spoke to PlasticsToday about the company's recently introduced Voraforce material for use in resin transfer molding of carbon fiber reinforced parts. The company also offers adhesive and other material solutions that can be combined with Voraforce so that carbon fiber reinforced parts become a more regular sighting in passenger vehicles.

Voraforce is the brand name of a new resin developed by Dow Automotive, designed for use with carbon fiber reinforcement. Carbon fiber has been in the new a lot in automotive circles as two major OEMs, Daimler and BMW, both have announced separate supply agreements with carbon fiber suppliers. [Daimler is working with Japan's Toray](#), the market's largest supplier, and [BMW stayed closer to home to partner with Germany's SGL Carbon](#). Carbon fiber is, pound for pound, stronger than steel, but is much less dense, meaning carmakers can use carbon fiber reinforced plastics (CFRP) to lower a vehicle's weight significantly without giving up any safety.

Dow Automotive officials spoke with PlasticsToday at their stand at last week's Plastics in Automotive Engineering event in Mannheim, Germany, organized each year by the VDI, Germany's association for engineers. "(CFRP) parts aren't just an idea anymore, now it's reality," stated Eugenio Toccalino, global marketing manager at [Dow Automotive](#). When PlasticsToday spoke with Toccalino last year at the Mannheim event, he said his company was working on processing technology for carbon fiber reinforced epoxy to try to get cycle times to five minutes or less, a range he said is necessary for the estimated build rates of 50,000 - 100,000 vehicles/yr. He also said the company was developing the adhesives necessary for carbon fiber-reinforced epoxy parts. One year later, Dow Automotive now offers both.

The epoxy is [Voraforce](#), and the adhesives package is called Betaforce. Betaforce adhesives can be used to bond CFRP parts to steel, aluminum and sheet molding compound, said Orhan Imam, market development manager, automotive at the company. Currently the company is sure cycle times of 3-minutes or less are possible, and Imam said trials have been run with cycles of about 60 seconds. As we recently reported, Japanese plastics supplier Teijin claims it has developed a process for [compression molding CFRP parts](#) made in a minute or less. Teijin's technologies rely on thermoplastics as a matrix material instead of conventional thermosetting resins for CFRP parts. Imam said processing of the Voraforce parts is being optimized as Dow Automotive and some partners work on ways to speed the curing of the RTM parts via infrared heating, inductive heating, and other means.

CFRP parts look cool, but the noise...

Steel is better at keeping noise out of a car's passenger compartment than CFRP parts, said Michael Hierl, marketing manager EMEA at Dow Automotive. To help

complete its marketing pitch for the Voraforce and Betaforce products, the supplier also is optimizing ways to integrate its Betafoam polyurethane foam into CFRP parts. The foam can ensure that CFRP parts provide the same level of acoustic performance as steel/metal parts, he said, while also bringing additional safety and crash resistance to the CFRP parts. "So you get the acoustic properties of steel, at a lighter weight, with the same or better crash properties," he explained.

Dow Launches VORAFORCE™ Composite Systems – New Powerful Solutions for Demanding Needs

VORAFORCE epoxy- and polyurethane-based composite systems enable manufacturers to develop and produce innovative and effective solutions for a broad range of applications and industries including energy transmission, transportation, infrastructure, construction and marine

Hong Kong - September 13, 2010

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Dow Formulated Systems, a global business unit of The Dow Chemical Company (Dow), announced the launch of its brand new VORAFORCE™ Composite Systems. VORAFORCE Composite Systems offer both epoxy- and polyurethane-based solutions that significantly ease the innovation path for designers and manufacturers in applications including energy transmission, transportation, construction, infrastructure, marine, and many more.

“Stronger, lighter and more durable composites are possible with VORAFORCE Composite Systems,” highlighted Marcel Loyson, Industrial Composites Business Leader at Dow Formulated Systems. “It allows manufacturers to gain significant competitive advantage in a wide range of industrial productions and applications, in line with Dow’s strategy of always adding value to our Customers’ products and offering,” Loyson said.

“While exceptional thermo-mechanical properties and excellent compatibility with carbon fiber characterize our new VORAFORCE epoxy-based solutions, excellent toughness and fast curing are among the key strengths for the polyurethane-based VORAFORCE™ Composite Systems,” added Kenneth Chan, Commercial Director for the Pacific Area at the Alternative Energy and Composites business of Dow Formulated Systems. “The absence of styrene emissions during fabrication and low VOC are among the common advantages for our entire VORAFORCE Composite Systems range,” Chan remarked.

“Combined with Dow’s material science, our exclusive DOW™ eCURE modeling suite and enablers, including toughening agents, offer unique advantages to our customers,” explained Nikhil Verghese, Global technology leader at Dow Formulated Systems. “The unique modeling suite of DOW eCURE leads to efficient development of formulations with excellent thermo-mechanical and productivity performance,” Verghese added.

VORAFORCE Composite Systems are conceived to be used with many fabrication technologies, from the most advanced to the more traditional ones. These include Filament Winding, Pultrusion, Resin Transfer Molding, Long Fiber Injection, Hand Layup and Composite Spray. VORAFORCE Composite Systems also leverage Dow’s experience and leading techno-commercial positions in the wind industry for Infusion.

About Dow Formulated Systems

Dow Formulated Systems, a global business unit of The Dow Chemical Company (Dow) is a global industry leader in the development and formulation of fully-formulated polyurethane and epoxy systems, focused on providing its customers worldwide with innovative tailor-made solutions through its Energy Efficiency, Alternative Energy & Composites, Infrastructure Life Preservation, Leisure & Lifestyle and Industrial Castings and Adhesives businesses. Dow Formulated Systems manufactures and markets custom formulated rigid and semi-rigid, flexible, integral skin, and microcellular polyurethane foams and fully-formulated systems as well as coatings, adhesives, sealants, elastomers and binders used in applications ranging from residential and commercial construction, infrastructure repair, wind energy solutions, oil and gas, automotive, appliance, furniture, and shoe soles to

decorative molding and athletic equipment. Striving to meet the specific needs of its customers in their local geographic regions, Dow Formulated Systems operates a global network of 30 system houses.

About Dow

Dow combines the power of science and technology with the “[Human Element](#)” to passionately innovate what is essential to human progress. The Company connects chemistry and innovation with the [principles of sustainability](#) to help address many of the world's most challenging problems such as the need for clean water, renewable energy generation and conservation, and increasing agricultural productivity. Dow's diversified industry-leading portfolio of specialty chemical, advanced materials, agrosociences and plastics businesses delivers a broad range of technology-based [products and solutions](#) to customers in approximately 160 countries and in high growth sectors such as electronics, water, energy, coatings and agriculture. In 2009, Dow had annual sales of \$45 billion and employed approximately 52,000 people worldwide. The Company's more than 5,000 products are manufactured at 214 sites in 37 countries across the globe. References to "Dow" or the "Company" mean The Dow Chemical Company and its consolidated subsidiaries unless otherwise expressly noted. More information about Dow can be found at www.dow.com.

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陶氏推出 VORAFORCE™ 复合材料系统

强大的新型解决方案，满足客户的更多要求

环氧和聚氨酯基的 VORAFORCE™ 复合材料系统使生产商能够开发和生产出创新有效的解决方案，并广泛应用于输电配电、气体运输、轨道交通、基础设施、建筑和船舶等应用

香港 - 2010 年 09 月 13 日

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陶氏化学公司（简称陶氏）旗下的陶氏配方系统全球业务部宣布推出一新的 VORAFORCE™ 复合材料系统。VORAFORCE 复合材料系统提供环氧和聚氨酯解决方案，为输电配电、气体运输、交通、基础设施、建筑和船舶等诸多应用领域的制造商扩阔创新之路。

“使用 VORAFORCE 系统能够生产出更坚韧、更轻便、更耐用的复合材料。”陶氏配方系统工业复合材料业务部的全球经理马乐辰 (Marcel Loyson) 说，“VORAFORCE 复合材料系统能为制造商们在工业生产和应用领域带来显著的竞争优势，这与陶氏‘不断为客户的产品和服务增值’的一贯战略方针保持了高度一致。”

“VORAFORCE 系统的环氧基部分提供优异的热机械性能，与碳纤维完美兼容；而其聚氨酯基的部分则提供非凡的韧性和快速固化的特性。”陶氏配方系统替代能源及工业复合材料亚太区商务总监陈昌喜补充道，“整个 VORAFORCE 系统的共同优点是在制造过程中不会排放苯乙烯，也较少产生挥发性有机化合物。”

陶氏配方系统全球技术总监魏奕信 (Nikhil Verghese) 指出：“陶氏的材料科学、和 DOW™ eCURE 模具技术平台包括增韧剂在内，能提高配方开发的效率，让我们能研制出具有卓越热机械性能和生产性能的配方，为我们的客户提供了独一无二的优势。”

VORAFORCE™系统适用于多种由传统至最先进的制造工艺，包括缠绕配方、拉挤、树脂传递模塑配方、长纤注射配方、手糊成型和灌注工艺。

关于陶氏配方系统业务部

作为陶氏化学公司的全球性业务部门，陶氏配方系统业务部致力于开发和制备全配方聚氨酯与环氧系统组合产品，重点面向能源效率、可替代能源与合成物、基础设施维护、休闲与生活方式、工业铸件与粘合剂等业务领域，为世界各地的客户提供量身打造的创新解决方案，在行业中享有领导地位。陶氏配方系统业务部生产和销售的产品包括定制配方的硬质、半硬质及弹性整皮泡沫、微蜂窝状聚氨酯泡沫和全配方系统，以及涂料、粘合剂、密封剂、弹性体和黏结剂，适用于住宅及商用建筑、基础设施维修、风能解决方案、石油与天然气、汽车、器具、家具、鞋底、装饰塑型、运动设备等多个领域。陶氏配方系统业务部在全球拥有 30 家系统公司，致力于满足各地客户的特定需求。

关于陶氏化学公司

陶氏是一家多元化的化学公司，运用科学、技术以及“人元素”的力量不断改进推动人类进步的基本要素。公司将可持续原则贯穿于化学与创新，致力于解决当今世界的诸多挑战，如满足清洁水的需求、实现可再生能源的生产和节约、提高农作物产量等。陶氏以其领先的特种化学、高新材料、农业科学和塑料等业务，为全球 160 个国家和地区的客户种类繁多产品及服务，应用于电子产品、水处理、能源、涂料和农业等高速发展的市场。2009 年，陶氏年销售额为 450 亿美元，在全球拥有 52,000 名员工，在 37 个国家运营 214 个生产基地，产品达 5000 多种。除特别注明外，“陶氏”或“公司”均指陶氏化学公司及其附属公司。有关陶氏的进一步资料，请浏览陶氏网页：www.dow.com/greaterchina/en/或 www.dow.com。

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NEWS RELEASE

Toho Tenax Strengthens Carbon Fibers Business in Asia

Tokyo, Japan, Aug 2, 2010 --- Toho Tenax Co., Ltd., the core company of the Teijin Group's carbon fibers business, announced today that it has established a Singapore office and added personnel to its Shanghai office, aiming to strengthen its carbon fiber business in the fast-growing Asian market.

The Singapore office will lay the groundwork for market development by conducting research to identify demand and cultivate customers in Singapore, Thailand, Malaysia and Vietnam, plus India and Oceania.

The Shanghai office, which has been operating since 2003, will reinforce market research activities in China with personnel added as of June 1.

Demand in Asia for carbon fibers, particularly for industrial applications such as wind-turbine generators, is expected to double between now and 2015. With this trend in mind, Toho Tenax expects to incorporate its offices in Singapore and Shanghai in the foreseeable future as part of its strategy to strengthen carbon fibers business in Asia.

Toho Tenax Shanghai Office

Location: Room 1612, Shanghai International Trade Center, 2201 Yan An Road (West), Shanghai 200336, PRC

Head: Ryotaro Hiroshima

Toho Tenax Singapore Office

Location: 13 Lorong 8 Toa Payoh, #06-01 Braddell Tech Park Singapore, 319261

Head: Khoo Boo Keong

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About Toho Tenax

Toho Tenax is the core company of the Teijin Group's carbon fibers business. The Toho Tenax Group is a leading carbon fiber manufacturer worldwide with an annual production capacity of 13,500 tons in Japan, Germany and the USA.

About the Teijin Group

Based in Tokyo and Osaka, Japan, Teijin is a global technology-driven group operating in six main fields: synthetic fibers (aramid fibers and carbon fibers); polyester fibers, plastics and films; pharmaceuticals and home health care; trading and retail; and IT and new products. Teijin Limited, the holding company for the Teijin Group, is listed on the Tokyo and Osaka stock exchanges. The group had consolidated sales of USD 8.5 billion (JPY 765.8 billion, USD 1=JPY 90) in fiscal 2009 and employs 18,778 people

worldwide, with 156 companies around the world. Please visit www.teijin.co.jp/english