

Finding solutions for the industry's hot issues

At DSM Composite Resins we are continually being challenged to find solutions to the hot issues faced by automotive OEMs and the SMC value chain as a whole.

As the recognised global technology leader in resins and low profile additives for SMC moulding, we work together with our partners to identify and resolve the issues that represent both challenges and opportunities for our industry.

In this issue we look at how DSM is tackling the challenges of specific industry concerns like emission reduction, weight reduction and recycling.

We also look at how Class A requirements are evolving and how our new Low Profile developments are giving excellent surface aesthetics while helping in the processability of SMC.



The new Mercedes CLK convertible has a Class A SMC decklid (picture DaimlerChrysler)

Special competence in Class A

DSM Composite Resins has developed a unique capability in Class A resin systems for exterior SMC automotive applications.

It began five years ago when DaimlerChrysler specified SMC (Sheet Moulding Compound) for the decklid of their prestigious Mercedes CL Coupe. At that time the main challenge to achieve was on-line paintability, since the decklid is mounted to the body in white before

E-coating. Taking up this challenge, DSM developed dedicated class A resin systems that allow the decklid to withstand the high baking temperatures of the E-coat process (190° C) – without losing surface quality or dimensional tolerances. These resin systems go under the names of Palapreg 0423, Palapreg P18.03 and Palapreg H2681.

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Partnering the automotive value chain

This newsletter, Global Solutions Automotive, is designed to keep you informed about the progress we are making in partnership with the industry. The challenges faced by the SMC automotive value chain will test the innovative capacity of our Competence Center in Ludwighafen. This Center is dedicated to Closed Moulding SMC/BMC and is committed to finding solutions to the many challenges in this important segment.

Together with our customers and other partners, we have the strength to build a sustainable business for SMC/BMC in automotive applications.

Egbert van Gorp, Business Manager Automotive

Special competence in Class A (continued)

Building on these Palapreg systems, we utilised our knowledge and expertise to further develop a large range of products meeting all processing, performance and aesthetic needs for such highly demanding applications. SMC grades based on the class A resin systems of DSM have proved very successful to the extent that, over the past five years, many similar applications have been introduced such as decklids for the Audi A4 convertible, BMW 6 series, Mercedes CLK convertible, Renault Magane cabrio and the top of the range Maybach.

During the same period, DSM Composite Resins invested heavily in Research and Development to continually improve our products, and to tackle key issues that were necessary to further grow the market. Much of this work has been carried out in conjunction with the whole supply chain.

These issues include consistency, recycling, reduction in VOC emission and weight reduction. We've responded with a range of new, innovative products as well as solutions that will help the value chain in its efforts to achieve sustainable growth in class A SMC for automotive applications (for example Triple C and Green label programmes).

DSM Composite Resins will continue to work on solutions and new innovative products for the automotive value chain. Over the coming period we will focus on continuous improvements in product consistency, and on developing next generation class A products with special focus on reduced system costs. Porosity will also be addressed since this is a significant factor in the cost of painting and therefore in the cost of the system.

Product name	Chemical nature	Application
Base resins		
Palapreg P18-03	Pure maleic	Premium Class A, Low emission
Palapreg P0423-02	Pure maleic	Premium Class A, shrinkage over ribs
Low Profile additives		
Palapreg H2681-01	Saturated polyester	Premium Class A
Palapreg H852-03	Modified sat. polyester	Low profile, improved flow
Palapreg H1080-01	PVAc	Low profile
Systems		
Palapreg G13-21	1-component system	Class A
New Products		
Palapreg H880-01	Modified PVAc	Low profile, improved surface quality
Palapreg H885-01	Modified PVAc	Premium Class A

Selection of premium Class A resin systems

New developments in PVAc based low profile additives

Solutions of polyvinyl acetate (PVAc) diluted in styrene are common low profile additives (LPAs) used in SMC formulations. In combination with an appropriate class A resin system they provide excellent shrinkage control and class A surface finish.

LOW VISCOSITY FOR IMPROVED PROCESS ABILITY AND SURFACE QUALITY

DSM Composite Resins has now enlarged its low profile additive portfolio with two new exciting products based on polyvinyl acetate

Product name	H880-01	H885-01	H1080-01
Viscosity mPAS	2400-3800	160-220	3780-5120

Solids content %	41-44	31-34	38-41
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Acid Value mg KOH/g	1,5-3,5	1-2	1,5-5,5
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Water content %	0,14-0,20	0,04-0,10	0,08-0,20
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Characteristics	Modified for better pigmentability and surface finish.	Optimized for use in premium Class A SMC.	Classic low profile additive.
	High solid content	Extremely low viscosity	High molecular weight

PVAc portfolio

(PVAc). Both these new grades, Palapreg H 880-01 and Palapreg H 885-01, have all the required properties for a high surface quality in the finished part.

Palapreg H 880-01, is a modified PVAc solution that enables better pigmentability and surface finish. The combination of high solid content with a relatively low viscosity results in improved processability.

Palapreg H 885-01, is optimized for use in premium Class A SMC formulations based on Palapreg resins and LPAs. It's extremely low viscosity permits improved processability even with very high filler loads.

For detailed information on this product and the other low profile poly vinyl acetates in our range, please contact your local sales representative.

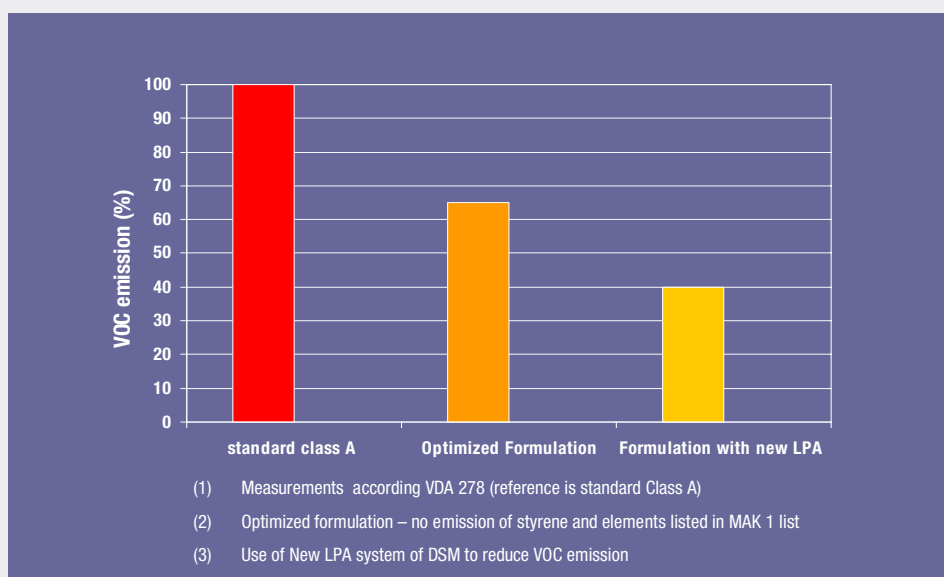
Tackling the VOC emission reduction challenge

A further reduction in VOC emission of class A SMC materials is urgently needed to comply with the requirements of the automotive industry regarding the emission of low volatiles in the interior of cars, and also to comply with the increasingly demanding environmental regulations - for instance the regulations prepared under the auspices of the Californian Air Resources Board (CARB).

Car manufactures will be forced to reduce any non-fuel emissions and will, therefore, demand further emission reductions for all parts that are likely to emit VOCs, SMC included.

DSM Composite Resins - together with one of the main European OEMs - is meeting this challenge by developing a class A system with significantly reduced VOC emission.

A two-step approach has been followed. In the first step we were able to achieve a 35 percent reduction in VOC emission compared to a standard class A recipe by optimising the composition of the formulation. Encouraged by this achievement, we then developed a new low profile additive for class A SMC which enables overall emissions of a class A SMC system to be reduced to just 40 percent of the original level. This new, innovative low profile system will be available by the end of this year.



New low profile additive to reduce VOC emissions of Class A SMC

THE CARB TEST

The CARB test is likely to become an American standard, which is why European car producers are preparing for compliance. The test is a simulation of a typical day in California. The entire car is placed in a chamber which is heated over 24 hours from 20°C to 40°C, and then cooled down to 20°C. At the end, the total emissions from the car are measured.

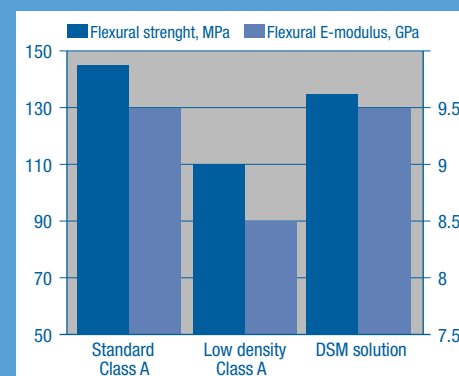
Significant progress in low density SMC

The automotive industry is continually striving to reduce vehicle weight for greater fuel saving efficiency. Low-weighting is now a pre-requisite for major OEMs. SMC is already a step forward compared to steel but further weight reduction is required. DSM Composite Resin is making substantial progress, in close cooperation with its customers, by developing new concepts for low density SMC.

Today SMC has to not only compete with steel but also with known low weight materials like aluminium and magnesium on the metal side and thermoplastics materials on the plastic side. Further reduction in the weight of SMC parts can

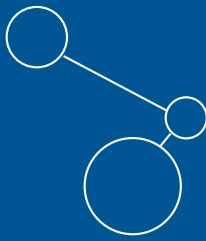
be achieved by either reducing the wall thickness of the part or reducing the density of the material itself – or a combination of both approaches.

Using low density fillers, for example hollow glass beads, can reduce the density of SMC from 1.9 g/cm³ to a level of 1.45 g/cm³. But because this negatively affects mechanical properties, (see table), engineers have to increase wall thickness which can negate the low weight advantage. Thanks to an extensive and on-going R&D programme, we can now offer a dedicated and price competitive solution which makes it possible to increase the mechanical properties of low density SMC to a level comparable with standard SMC – without losing surface quality.



DSM has made significant developments in solutions for low density class A SMC

For detailed information on this solution please contact our Competence Center Closed Moulds.



Egbert van Gorp

Egbert van Gorp, 53, is a graduate in Chemical Engineering, who started his career with DSM 18 years ago. Since early 2002, Egbert has been involved in closed mould applications (SMC and BMC), through our Competence Center In Ludwigshafen, Germany. Egbert not only has the dual roles of Business Manager Automotive and R&D Director for DSM Composite Resins, but he is also President of the European Alliance for SMC and a member of the Technical group of the European Composite Recycling Concept.

ECRC is now officially incorporated

The latest waste directives, defined by the EU have posed a growing challenge for the European FRP industry. In order to comply with these regulations, manufacturers involved in this sector have been prompted to come up with new concepts of waste management.

In the short time since formation, with the guidance of its founding members, ECRC has made large strides in developing viable waste management methods. It has been supported in these efforts by the automotive community. ECRC has also been successful in recruiting new members across Europe to participate in the concept.

The companies involved in the FRP market initiative have announced, that their organisation is now officially incorporated. Titled as a co-operative company, the 'European Composite Recycling Services Company,' abbreviated as 'ECRC' is registered at their Brussels office.

The motivating factor to form a company was the reality that the composite FRP business needed to move away from traditional waste management techniques. Specific policies have been developed by the EU-Waste Directives (a part of the EU Environmental Program) that regulate how the industry should manage this process, which include:

- Landfill 1999/31 states that, landfills with composites waste will be forbidden by most EU member states at the end of 2004.
- End-of-Life-Vehicles 2000/53 directive will begin in 2005; it has set strong objectives on the level of reuse and guidelines for all suppliers involved in the life cycle.
- Waste of Electrical and Electronic Equipment 2002/96 focuses on avoiding production waste and sets recycling targets for all suppliers involved in the life cycle.

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EVENTS

7TH INTERNATIONAL AVK-TV CONFERENCE	September 28-29, Germany	www.info@avk-tv.de
IWW - KOLLOQUIUM 2004	October 5-6, Germany	www.iww-kl.de
K' 2004	October 20-27, Germany	www.k-online.com
VISION PLASTIC CAR BODY 2010	November 17-18, Germany	www.tuk-verlag.de
JEC COMPOSITES SHOW	April 5-7, 2005, France	infojec@globalcomposites.com
AUTOTEC CONGRESS	25-28 January, Germany	www.autotec-aktuell.de

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