TM-CONCEPT

TM-CONCEP

A COMPREHENSIVE STUDY ON POLYMER INNOVATION IN THE AUTOMOTIVE ENGINE INDUSTRY Helping CO₂ reduction



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Introduction to TM concept

TM is a virtual engine concept which has been developed in cooperation with IAV.

Our goal was to come up with is a small scalable engine architecture with 4, 3 or 2 cylinders while using **SBHPP** Compounds and composites materials (short fiber, long fiber, phenolics, epoxies,...). This engine could be usable as primary engine or as range extender (APU).

- High power density/ downsizing (low weight with high performance)
- Maximum integration of functions in the composites parts
- Good Noise, Vibration, and Harshness (NVH) characteristics
- Price/performance

An other important topic is the ecological foot print for making parts out of SBHPP Compounds. The energy – directly related to CO² emission - required for making part of equal stiffness is very favorable for SBHPP compounds.

Recycling is also considered with a patented chemical recycling technology developed by SBHPP and ongoing material development with renewable resin resources (Green materials).



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SPURRING INNOVATION

SBHPP's Innovative Compounds and Composites materials has helped establish more than a few automotive conventions, while inspiring designers to forever challenge the boundaries of what's been done before.

The range and versatility of performance properties inherent in our extensive portfolio of automotive materials offers solutions for the most demanding applications.



Structural Casing

POROPHEN® long glass fiber reinforced phenolic (LGFPF) can be molded into thinwall structural parts, enabling reduced weight with integrated functions.

Main engine housing



Engine brackets

Lateral engine cover with integrated engine brackets The information presented in this document is provided in good faith, but no warranty is given or is to be implied regarding its accuracy or relevance to any particular application. Users must satisfy themselves regarding the suitability and safety of their use of the information and products in the application concerned Nothing herein is to be construed as advi-sing or authorizing the use of any invention covered by existing patents without license from the owners thereof.

5 /29/2015



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Monolythic Valve Cover

Innovation Tips

Direct camshaft assembly without bolting elements

This optimized assembling method is made possible with SBHPP compounds thanks to the tight molding tolerances and the excellent thermal resistance of the thermosetting materials

The camshaft (shaft + cam elements) can be assembly directly on the valve cover. The shaft is cooled down at very low temperature whereas the cams are heated up and positioned over the molded valve cover.

SUMIKON®, DUREZ® and VYNCOLIT® reinforced phenolic compounds offer excellent processability, and provide an excellent balance of heat resistance, surface hardness and finish.

- In combination with the monolythic valve cover concept they offer weight reduction up to 45 percent compared to die cast aluminum.
- The high creep resistance allows designing without insert.

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Innovation focus

Monolythic Valve Cover



5/20/2015



OIL SUMP MODULE CONCEPT

The concept of an composite Oil Sump Module (OSM) with integration of several functions like the oil pump, oil cooler and oil filter has multiple benefits. Due to the integration, compact design is possible resulting in better and easier control of the oil flow and oil temperature thus helping to reduce fuel consumption and thus lower CO₂ emissions. Also significant weight reduction (up to 45%) and cost reduction can be realized. The concept of the composite OSM is based on the use of the SBHPP POROPHEN® compound for the structural parts (oil sump) combined with the SBHPP short fiber Engineering Thermoset compounds for the functional applications like the oilpump, -cooler and –filter.



Innovation Tip

Function Integration

SBHPP Engineering Thermoset compounds are very well suited to replace sintered metal and aluminum in oil pumps were thermal-, mechanical- and chemical resistance combined with the need for tight tolerance are key requirements.

Design flexibility and excellent moldability allows for new innovative pump concepts resulting in lower part cost and improved performance helping to reduce fuel consumption and CO₂ emission.

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1- PULLEYS

Lower weight, no balancing, no corrosion protection and freedom in design are key benefits of SB Thermoset compounds for pulley applications.

2- OIL PUMPS

SBHPP thermoset compounds are in use where no thermoplastics were able to go before, namely in the hard of variable oil pumps. Thanks to the unique combination of chemical- and thermal resistance combine with a low CTE SB Thermoset compounds are used to replace sinter metal components resulting in lower we and cost combined with impr performance. Other Components

Innovation

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3- HIGH PRESSURE PUMP

Lower weight, function integration, smoother surface and near tolerance molding capability allows for lower cost, lower weight and improved performance. SBHPP Thermoset compounds also have excellent chemical resistance against all known fuels and bio fuels.

4- WATER PUMP

for over a decade several OEM's in Europe are using composite water pumps made out of SBHPP Thermoset compounds. From standard water pumps over mechanical drive variable water pumps to fully electrical variable water pumps are in use today. Lower weight, cost saving and especially the higher yield due to a very smooth internal surface are the key advantages for using SBHPP thermoset molding compounds for engine cooling applications.

Carbon footprint & Innovative Recycling



- Energy Requirement to produce raw material (in M J/kg)
- Energy to produce component with equal stiffness than steel (base 100)

Compared with other plastics SBHPP molding compounds require a low energy input value during manufacturing and transformation. If one relates energy consumption to the properties obtained, e.g. stiffness, then the unique position of thermosetting molding compounds becomes even clearer.

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Among several recycling COMPLETE DECOMPOmethods, micronized recycle powder (as filler) or combustible (cement industry) are mostly used for thermoset parts. However none of them are able to significantly save fossil resource and reduce CO_2 emission. By developing the Chemical Recycling Technology, using supercritrical fluid, we are able to recover the raw materials such as monomers, oligomers and reinforcements (fibers) in their initial state.



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FEW EXAMPLES



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Oil pump slider

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FEW EXAMPLES



Housing for an electrical water pump

Pulley for Air conditioning compressor

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GLOBAL MATERIALS ENGINEERING

SBHPP group is market leader in Engineering Thermosetting Compounds. With companies based in Japan, Belgium and USA, SBHPP specializes in short & long fiber (carbon, glass, aramide) reinforced polymers such as phenolic, polyimide & epoxy with outstanding thermo-mechanical properties.

www.sbhpp.com



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CONSULTING, SALES, SUPPORT

The company provides a huge choice of technical assistance to customers, ranging from initial design to prototyping from its Japanese, European & American Technical Market Development Centers. Its broad product line is essential to the development of high-tech structural applications based on molding polymers with a special emphasis on automotive components.

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