METALS POLYMERS CERAMICS

Tata Motors introduces $2500 Nano for customers in India

The Tata Nano, a $2500 car with a length of 3.1 meters, width of 1.5 meters, and height of 1.6 meters has been introduced in India by Tata Motors, India. Its mono-volume design, with wheels at the corners and the powertrain at the rear, enables it to combine both space and maneuverability. The Nano has a rear-wheel drive, all-aluminum, two-cylinder, 623cc, multi-point fuel injection engine. It has a sheet-steel body and safety features such as crumple zones and intrusion-resistant doors. The rear tailgate is glass bonded to the body. Performance is controlled by a specially designed electronic engine management system.

For more information: Debasis Ray, Tata Motors Limited, India; tel: 91-226-665-7613; peoplescar@tatamotors.com; www.tatapeoplescar.com.

Multi-phase high-strength steel has excellent formability

A multiphase steel said to provide a minimum strength of 780 MPa (113 ksi) and 40% higher elongation than conventional high-strength steels has been jointly developed by ThyssenKrupp Steel, Germany, and JFE Steel Corp., Japan.

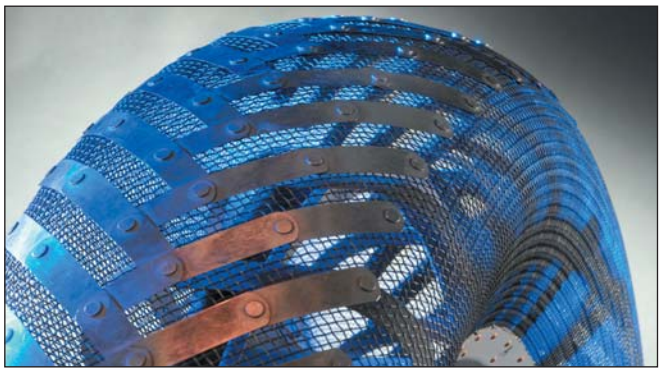
Designated TP-N 68/78, its high strength and good formability are attributed to a bainitic-ferritic microstructure with embedded retained austenite in combination with nanometer-size precipitates. During forming, the austenite content is transformed into hard martensite, which means that the steel reaches its final strength during fabrication to the finished part. To achieve these specific properties, materials engineers developed a new alloying concept and new temperature-control methods during hot rolling and cooling.

TP-N 68/78 is available as hot-rolled coil, on request also coated. Typical applications include crash-relevant automotive body structural parts.

For more information: Bernd Overmaat, ThyssenKrupp Steel, Germany; tel: 49 203 / 52 - 4 51 85; fax: 49 203 / 52 - 2 57 07; bernd.overmaat@thyssenkrupp.com; www.thyssenkrupp.com.

Wire mesh tire to be developed for lunar roving vehicles

This Lunar Rover Vehicle tire was woven out of piano wire by Goodyear Inc., working with NASA Glenn Research Center. The material provides a soft, springy surface to contour to the ground and provide good ride quality. This approach worked very well, because each LRV tire was only required to support about 60 pounds of weight and be used for a maximum of 75 miles.



However, the new fleet of lunar vehicles will require tires to support about ten times the weight and last for up to 100 times the distance.

To extend the utility of this wire mesh tire, exact replicas of the tires are being manufactured and tested to find out how and why their load and life are limited. Essentially, the tires will be loaded and cycled until they fail. The Goodyear tire designers and research engineers

BRIEFS

The American Iron and Steel Institute plans to participate in the Future Steel Vehicle global research initiative to develop steel auto body concepts that address alternative powertrains, such as advanced hybrid, electric, and fuel cell systems.
www.steel.org

Alcoa Defense has joined the **Lockheed Martin** team that will compete to build the Joint Light Tactical Vehicle, the next generation of U.S. military trucks that will eventually replace the Humvee. Alcoa brings its materials knowledge, design skills, and aluminum components to the project that will help give the vehicle its structural strength at a lower weight.
www.alcoa.com

Ceradyne Inc. announces that its German ceramic operation, **ESK Ceramics,** has received a five-year contract for its EKasic silicon carbide industrial pump seal faces for $50 million.
www.ceradyne.com

Cereplast Inc. has won the inaugural Autoplast award from the **Society of Plastics Engineers** for plastics in the auto industry. The award was for its Bio-propylene polypropylene, in which 50% of the content is based on cornstarch, tapioca, or other starches.
www.cereplast.com

Hexcel Corp. announces that both first and second-place winners in the Transat Jacques Vabare yacht race were built of its composite materials. The hulls were made of honeycomb sandwich composites comprised of both woven and unidirectional prepregs containing carbon fibers in a HexPly M10 resin matrix. www.hexcel.com

Johnson Controls has developed the Ecobond automotive headliner, which is made of hemp, flax, and knaf instead of fiberglass. A soy-based urethane bonds the materials, and soy-based polyols are blended with petroleum polyols to make the foam core. www.johnsoncontrols.com

RathGibson has redesigned and restructured its web site to provide essential product information, service, and support to its customers. RathGibson and **Greenville Tube** products are organized by alloy and by market. Technical information, news, and events are also included. www.rathgibson.com

Schwarzkopf Technologies LLC has changed its name to **Plansee USA LLC**. www.plansee.com

Treves, France, supported by the European **Eureka Project**, has developed materials to reduce the weight of sound insulation in cars from 11.3 to 3.4 kg (25 to 7.5 lb). Layering compressed felt with low-density felt reduced weight by 50%, and making elastic parts of foam textile waste reduced weight by another 25%. www.treves.fr; www.es.eureka.be

Ugitech USA, which is part of **Schmolz and Bickenbach Group**, announces that it will now operate as the **Stainless Steel Materials** division of **Schmolz and Bickenbach USA**. www.scmolz-bickenbach.com

at NASA GRC will then iteratively design, build, and laboratory-test concept tires to mitigate the failures. The exact nature of these design changes has not been disclosed yet. A set of 12 tires will be built by winter of 2009 and demonstrated on the new NASA Chariot roving vehicle at the Johnson Space Center in Texas. (See http://robonaut.jsc.nasa.gov/chariot/.)

For more information: Clint Smith, Goodyear Inc., 1144 East Market Street, Akron, OH 44316; tel: 330/796-3663 ; www.goodyear.com/corporate; http://chariot.jsc.nasa.gov.

Composite tailcone developed for Black Hawk helicopter

A new all-composite tailcone for Black Hawk helicopters that has reportedly met critical goals in reduced weight, parts count, tooling costs, and manufacturing costs, has been developed by GKN Aerospace, Lisle, Ill., teamed with Sikorsky Aircraft and the U.S. Army's ManTech Program Office. A manufacturing approach called Reduced Tooling Concept has cut the number of tools by more than 70% over traditional methods, while producing a highly repeatable, close-tolerance structure. Costs have also been reduced through automated fiber placement in the manufacture of the tailcone skins, providing high quality, repeatable laminates.

An engineered tailored material called X-Cor replaces traditional honeycomb in sandwich structures. The design also incorporates a paint-less finish that integrates the color into the skin laminate at the lay-up stage. This new technique reduces labor costs while providing a high quality, durable finish.

For more information: GKN Aerospace, 550 Warrenville Road, Suite 400, Lisle, IL 60532-4308; tel.: 630/737-1456; fax: 630/719-7242; www.gknaerospace.com.

Ceramic macro-fiber monitors vibration, detects pipeline cracks

NASA announces that its Government Invention of the Year is a ceramic macro-fiber composite developed at NASA Langley Research Center, Hampton, Va. The composite can be attached to a structure to bend it, reduce vibrations, and monitor force. By applying voltage to the MFC, the ceramic fibers change shape to expand or contract and turn the resulting force into a bending or twisting action on the material. Likewise, voltage is generated in proportion to the force applied to the material.

The material primarily is used in industrial and research applications for vibration monitoring and damping. In addition to improved helicopter rotor blades research, NASA uses of MFC include vibration monitoring of support structures near the space shuttle pads during launches. The composite material can be used for pipeline crack detection and is being tested in wind turbine blades.

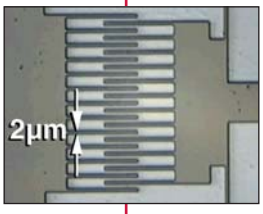
During the STS-123 mission, space shuttle Endeavour will carry MFCs into space for the Rigidizable Inflatable Get-Away-Special Experiment. It is a U.S. Department of Defense trial designed to test and collect data on inflated and rigid structures in space. Inflatable space structures can be used for antennas, communication satellites, space station trusses, and solar sail support structures. All these could benefit from MFC technology. Smart Material Corp. is the licensee and manufacturer of MFC.

For more information: Robert Bryant, NASA Langley Research Center, Hampton, VA ; www.ibc.nasa.gov/invention.html; www.smart-material.com.

Diamond micromachines could make medical implants

Diamond micromachines etched from a surface of amorphous diamond have reportedly been developed by researchers at Sandia National Laboratories, Albuquerque, N.M. Amorphous diamond is the hardest material in the world after crystalline diamond.

Diamond interests researchers because of its superior wear-resistant qualities, resistance to stiction, and potential as a biocompatible material that could function inside the human body for medical purposes without generating an allergic reaction.



The image shows a diamond comb drive whose tiny interspaced teeth move forward and back, driving a diamond piston as an electrical current reverses constantly between positive and negative. This is the first demonstration of a micro-motion drive made of amorphous diamond. The goal is to develop a layering technology that could increase the life span and performance of micromachines.

For more information: John Sullivan, Sandia National Laboratories, Albuquerque, NM 87123; tel: 505/845-9496; jpsulli@sandia.gov; www.sandia.gov.

Mixed rare earths replace neodymium in high-heat magnets

A high-performance neodymium-iron-boron (NdFeB) permanent magnet alloy in which neodymium has been replaced with mixed rare earths to raise its Curie temperature has reportedly been developed by Iver Anderson and colleagues at the DOE Ames Laboratory, Iowa State University, Ames. The magnet operates with good magnetic strength at 200°C (390°F).

The most effective permanent-magnet material today is an alloy of neodymium-iron-boron with a 2-14-1 crystal structure – Nd2Fe14B. However, this alloy tends to lose about half its power by 100 to 125°C (212 to 260°F). Therefore, the team designed an alloy that replaces pure neodymium with mixed rare earths, a combination of neodymium, yttrium, and dysprosium that forms 2-14-1 crystal structures. This alloy has much less degradation of magnetic properties with temperature, due to the influence of the yttrium and dysprosium. The "crossover in temperature," at which the properties of the new magnet become better than NdFeB, is around 75°C (170°F).

To fabricate magnets, the alloy is argon-gas-atomized and the resulting spherical powders are injection molded to shape. This enables high-volume production at relatively low cost.

For more information: Iver Anderson, Ames Laboratory, Ames, IA 50011; tel: 515/294-9791; andersoni@ameslab.gov; www.ameslab.gov.

Aluminum foil alloy resists corrosion from acid and soy sauce

Aluminum foil that does not break down as readily in the presence of acid as regular household foil has reportedly been developed by Toyo Aluminium KK, Japan. General-purpose aluminum foil contains small amounts of iron, copper, and magnesium, which increase its strength but also tend to reduce corrosion resistance. The new foil was made by reducing these additives to enhance corrosion resistance, while increasing the proportion of manganese to maintain strength.

In tests by Toyo Aluminium, regular aluminum foil 20 microns thick developed holes in less than a month when immersed in soy sauce. The same thickness of the new foil showed no changes after three months of immersion, and although corrosion could be confirmed after six months, no holes had formed.

The new foil will cost 1.5 times to twice as much as regular foil. Toyo aims to expand sales beyond the food industry to such applications as packaging materials for chemicals.

For more information: Toyo Aluminium KK, Osaka, Japan; tel: 81-6-6271-3151; www.toyoal.co.jp/eng.

Porous copper structures enable micro-detonators

Tiny copper structures with pores at both the nanometer and micron size scales could improve the reliability, reduce the size, and lower the cost of certain military munitions, say researchers at the Georgia Tech Research Institute (GTRI) and the Indian Head Division of the Naval Surface Warfare Center. The highly uniform copper structures will be incorporated into integrated circuits, then chemically converted to millimeter-diameter explosives. Because they can be integrated into standard microelectronics fabrication processes, the copper materials will enable micro-electromechanical (MEMS) fuzes for military munitions to be mass-produced like computer chips.

A variety of templates, including microspheres and woven fabrics, create regular patterns in copper oxide paste whose viscosity is controlled by the addition of polymers. The template is thermochemically removed, and the resulting copper oxide structures are converted to pure metal, retaining the patterns imparted by the template. The size of the pores can be controlled by different templates and processing conditions.

For more information: Jason Nadler, Georgia Institute of Technology, 75 Fifth Street N.W., Atlanta, GA 30308; tel: 404/407-6104; jason.nadler@gtri.gatech.edu; www.gatech.edu.

Polyamide extends thermal stability of many products

Next-generation Stanyl polyamide grades that offer improved long term thermal stability have been announced by DSM Engineering Plastics, Evansville, Ind. This technology, developed and patented by DSM, extends the functional life of components well beyond the limits of other high-temperature polyamides. By limiting thermal oxidative breakdown, Stanyl Diablo withstands more than 3000 hours temperature exposure up to 230°C (450°F) with less than 15% loss in mechanical properties.

Environmental requirements, EURO V and VI legislation, and the call for reduced fuel consumption have resulted in smaller engines with higher turbo pressures and exhaust gas recirculation. As a consequence, automobile components such as air ducts, air intake manifolds, and charge air cooler end-caps are exposed to continually rising service temperatures.

For more information: DSM Engineering Plastics, 2267 West Mill Road, Evansville, IN 47732-3333; tel: 800/333-4237; www.dsmep.com.