

D P N

DESIGN PRODUCT NEWS



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Wireless sensor network

Sensicast smart wireless sensors provide a way to deploy networks through pre-integrated probes used for temperature and humidity, as well as motion, current and voltage. Small networks can be configured with just a few points or scaled up to hundreds of points.

cdnova.com

Info Card 340

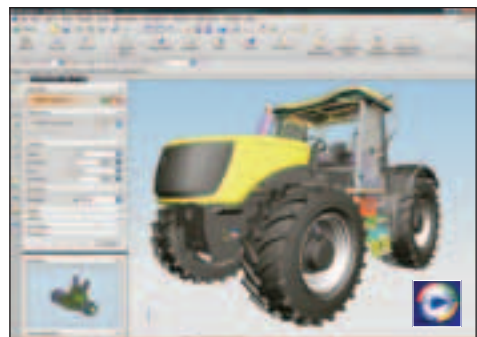


Color 3D prototype printer

Z Corporation has announced the ZPrinter 450 color 3D printer, an output device that transforms electronic 3D data into hand-held physical models, breaks the US\$40,000 price point. Features include automatic set-up and self-monitoring of materials.

zcorp.com

Info Card 341



NX 5 CAD/CAM/CAE software

UGS Corp. has announced Version 5 of its NX digital product development software. Features include effective reuse without redesign of legacy data and Active Mockup to bring in third party files into the context of a total product or assembly.

ugs.com/nx

Info Card 342



Nanotech shafts keep golfers on target

By Mike Edwards

Getting set to rip up the fairways this summer are the Epic brand series of composite shafts. Made by Grafalloy of Memphis, TN, the shafts were developed with the assistance of nanotechnology R&D licensor Toronto-based Integran Technologies Inc. and sporting goods nanotechnology licensee Power-Metal Technologies of Carlsbad, CA.

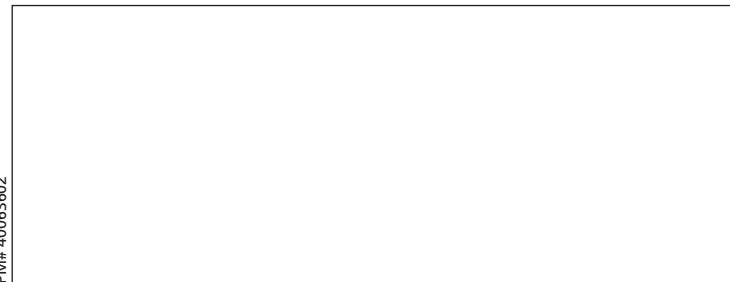
Integran, which licenses its technology for sporting goods, industrial and environmental applications, has discovered that a nanometal

coating acts as a hard but ductile protective layer on carbon fibre material typically prone to impact damage and crack propagation. In motorsports, engineers have found that nanometal coatings improve impact resistance to stone-chipping so that a coated carbon fibre tube sees little surface damage while an uncoated tube completely fractures.

Via Integran's patent-protected electrosynthesis technology, materials having average crystal sizes 1000x smaller – about 20 nm – than those found in conventional materials, can be inexpensively produced in a one-step process.

Golf clubs incorporating the nanotechnology

Volume 35 Number 3



Cover Story

Integran licenses nanotechnology for sport and industrial applications

From Front Page

have stiffer, lighter shafts that allow golfers to bring increased power and accuracy to their game. According to Edward Hughes, PowerMetal president and CEO, “the technology helps combine the best of both worlds with a shaft weight of graphite but strength of steel in irons, resulting in a 35% tighter dispersion pattern on strokes.”

His company, which licenses the metal

alloy nanotechnology from Integran for the sporting goods market, introduced a matrix of carbon fibre crystalline metal alloy to tennis rackets last year with the Head Metallix brand.

“Nanotechnology is actually design, engineering and manufacture of products on a near atomic scale,” states Dr. Gino Palumbo, chief technologist for PowerMetal Technologies and author of over 100 patents in the field of nanotechnology

research. He adds, “The fact that we can now see things in a microscope that we couldn’t see 10 or 20 years ago provides us the opportunity to design and manipulate materials on a very, very fine scale leading to properties of materials that allow true breakthroughs in shaft design and performance.”

PowerMetal alloys utilize the Hall-Petch Effect to achieve dramatic increases in mechanical properties of products such as golf

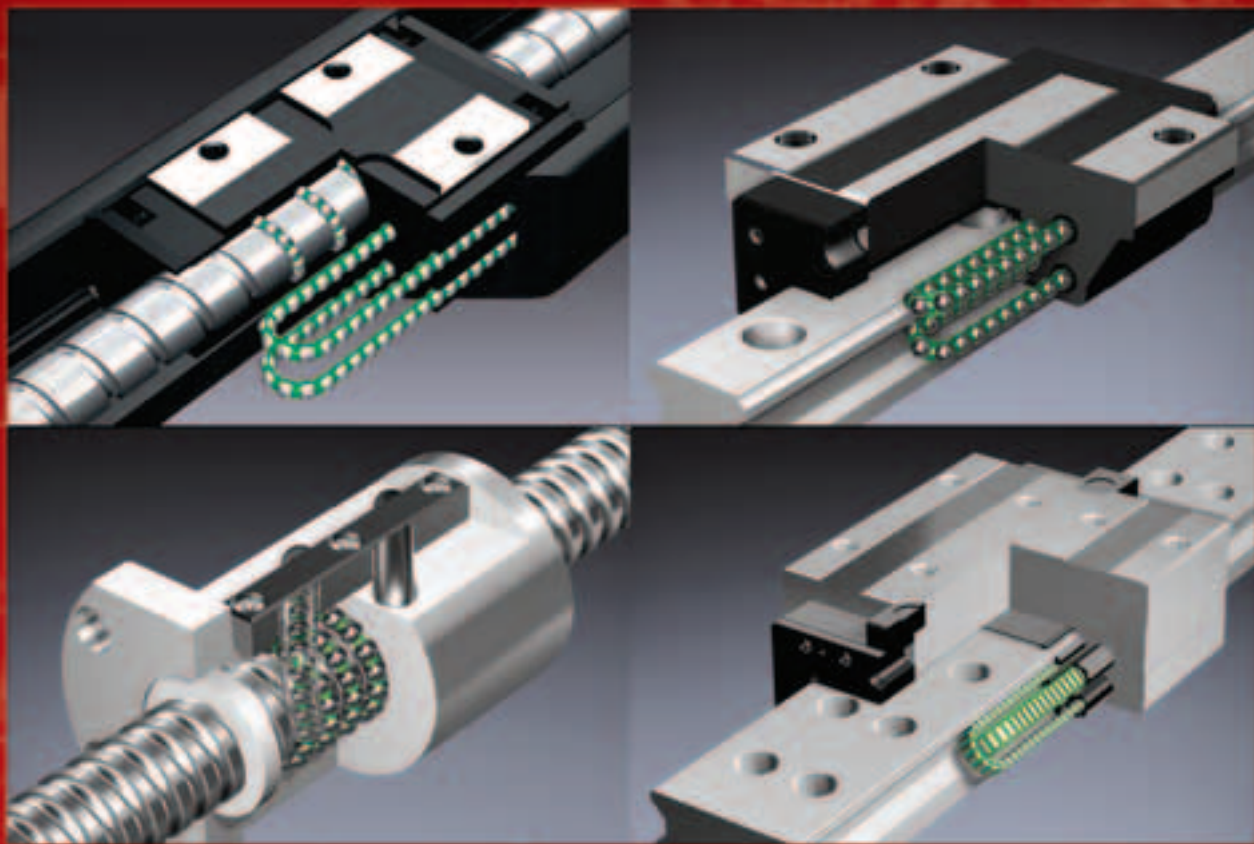
clubs, tennis rackets, cycling equipment and protective gear. As grain boundaries get smaller, material properties improve, and PowerMetal’s grains are on the nano-scale from 10-50 nm on average.

With a significantly higher yield stress (1785 MPa) than titanium or steel alloys, PowerMetal’s n-Ni Fe (20) system offers a specific strength just slightly higher than that of maraging steels and beta titaniums, but with added design and manufacturing flexibility to provide strength where it is needed at a competitive cost. For example, a PowerMetal deposition on a ping pong ball permits it to support over 200 lb.

In many sporting goods applications, such as golf clubs and baseball bats, the ability of PowerMetal alloys to return most of the impact energy back to the ball for increased distance (a great advantage to the player) exists due to their high yield strength and elastic limit. Many high strength alloys can be brittle, but PowerMetal’s inherent resilience is due to the unique atomic structure that the nanotechnology provides.

Pin-on-disc wear studies of PowerMetal alloys show very high wear resistance due to the nano-sized grains. This

IT'S ALL IN THE ENGINEERING



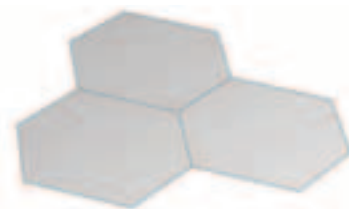
THK engineers design and develop products that outperform and surpass all industry standards.

Longest maintenance-free operation (three times longer than any competitor brand), THK products provide more than 30,000 km (18,000 miles) of operation without maintenance. The highest speeds, heaviest load capacities, and the smoothest and quietest operation all result from our patented Caged Ball Technology. Look to the leader for an edge, with innovative products designed for your every linear motion need. Linear guides, ball screws, a complete line of actuators, and fully integrated assemblies make THK the one company to work with in building your products.

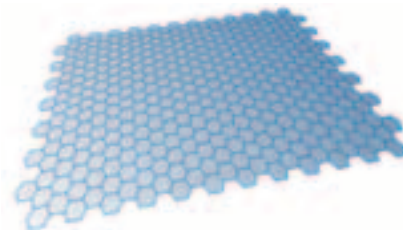
To learn more, give us a call at 905-820-7800 or visit www.thk.com.



Typical Grain Size Microns (20 µm)



PowerMetal Grains Nanometer (20 nm)



As grain boundaries get smaller, material properties improve. PowerMetal’s grains are on the nano-scale from 10 to 50 nm on average, 3 orders of magnitude smaller than a typical grain size.

inherent wear resistance coupled with the ability to add additional ceramic particles or alloying elements allows PowerMetal scientists to create custom high wear alloy solutions for critical safety and performance applications.

Grafalloy’s proprietary Nanofuse material found in the Epic shaft was made possible by harnessing the superior strength properties of nano-crystalline metals and fusing them at the molecular level with a composite polymer substrate. The nano-crystalline molecules are able to penetrate millions of engineered fissures within the composite polymer substrate to create the Nanofuse material. The result is the strongest, lightest golf shaft material ever created, the company says.

“While some shaft manufacturers have incorporated carbon nanotubes into composite shaft design, that use is only scratching the surface of the true potential of nanotechnology,” states Graeme Horwood, vice president of engineering/R&D for Grafalloy. “With Nanofuse, we are introducing an entirely new material into golf shaft design that offers the advantages of both steel and graphite without any of the inherent limitations associated with each.”

Info Card 339