DEARBORN, Mich., March 14, 2012 & #8212;

Society of Manufacturing Engineers

Society of Manufacturing Engineers Unveils Its Annual Innovations List

DEARBORN, Mich., March 14, 2012 Recognizing that advancement in the way things are made is critical to the success of manufacturing, the Society of Manufacturing Engineers [1] (SME) announces its 2012 list of *Innovations That Could Change the Way You Manufacture.* [2]

Selected by SMEs *Innovation Watch Committee* [3],the new and emerging technologies on this list are already being used in manufacturing settings and have shown successful implementation. It is expected that many other manufacturers will see the value and will begin adopting these materials and processes into their products in the near future.

Innovation keeps U.S. manufacturing strong. By constantly re-inventing itself, developing new materials, technologies and processes, manufacturing increases its productivity while creating products that enhance our lives, said LaRoux Gillespie, 2012 president of the Society. That is why SME is seeking out, acknowledging and sharing these innovations with the larger manufacturing community.

The Innovations That Could Change the Way You Manufacture will be a featured session track at the SME Annual Conference [4] scheduled June 3-5, 2012, in Cleveland. The conference brings together manufacturing professionals and leaders from throughout North America and beyond who are interested in innovations and exchanging ideas in one place.

2012 Innovations That Could Change the Way You Manufacture [5]

Biomimicry: Manufacturing Inspiration from Nature
Biomimicry takes ideas from nature inspire designs and processes so that products can be made better and more sustainable. Think of nature as the ultimate engineer. Biomimicry is behind many developments including synthetic gecko tape, strong coatings and materials inspired by abalone, coloration with nanophotonic crystals inspired by peacock feathers and an artificial leaf that harnesses solar energy. Another example of biomimicry is the hummingbird inspired nano air vehicle (NAV) that could provide surveillance in many environments. The vehicle demonstrates hover stability in wind gusts, continuous hover without external power, transition from hover to fast forward and many other abilities of the hummingbird.

Transistors Go 3-D for more Performance and Energy Efficiency
The 3D Tri-Gate transistor represents a fundamental departure from the traditional "flat" two-dimensional gate. Using three gates wrapped around the silicon channel in a 3-D structure, current flow is controlled on three sides of the channel rather

than just from the top. Because these fins are vertical, transistors can be packed closer together. The new technology enables innovative microarchitectures, system on chip (SoC) designs and new products. They will first appear in Ivy Bridge-based ultrabooks. Designers will also be able to continue growing the height of the fins to get more performance and energy-efficiency gains.

Economic Machining of Hardened Steels and Super Alloys with Hyper-Carbide Cutting Tools

Hyper-carbides are sintered, metal-matrix composites that differ from traditional carbides in the binder composition. By replacing the traditional binder metal (cobalt) with others such as Re, Mo, Ni and Cr, the composite achieves a much greater hot hardness and thermal resistance, thus giving the tool an ability to withstand the extreme temperatures and pressures of higher speed cutting. The resulting performance allows machining at 10 or more times the usual material removal rates. Yet, hyper-carbides are produced using the same basic methods as other carbide tools resulting in similar tool production costs.

Artificial Replaced with Synthetic, Grown Body Parts

Nanotechnology has played a critical role in the first synthetic trachea transplant. A patented nanocomposite was used to form a scaffold exactly the same size and shape as the patients own windpipe, which was then seeded with adult stem cells from the patients own bone marrow. This innovation is in addition to other methods that are being used to grow or print new body parts. While the list of parts that can be built is limited (bladders, heart valves, etc.), it is imaginable that new parts could be built eliminating the need for things like dialysis machines, artificial hearts and artificial joints.

Tighter Tolerances on Leading and Trailing Edges with Automated System

An automated profiling system has attained precision levels which were never reached before, reducing the need for manual inspection, and increasing performance and efficiency with tolerances within 50 microns. This also reduces the abrasive material consumption up to 75 percent and allows designers to define more complex shapes on the leading and trailing edges. This adaptive automated process is yields high repeatability and the system has been benchmarked to eliminate the typical manual final inspection of the edges. The system is currently being used in the production of jet engine parts and is well suited for gas turbines used in generators.

Green Steel Technology Using Recycled Rubber Tires

Traditionally, in electric arc furnace (EAF) steelmaking, scrap is reprocessed using large amounts of nonrenewable fossil fuel. Polymer injection technology mixes plastic and rubber waste, reducing the reliance on coke. The technology reduces carbon emissions, requires less electricity, and reduces the amount of plastic and rubber that ends up in landfills. One Steel, in collaboration with the University of New South Wales, has seen a 3 percent energy reduction, 3 percent productivity improvement and 10 percent reduction in carbon emissions in test plants. Expanding this to all plants, they estimate the reduction in carbon dioxide would be the equivalent of removing approximately 4,000 cars from the road.

More Good Batches at Lower Cost Using the Model Predictive Control
For batch processing, a multivariate-based model allows for a more accurate analysis and provides process insights not available from other approaches. Using available online multivariate analytics, the model predictive approach can provide immediate and substantial benefits including an increase in the consistency product quality, greater throughput through better yields, and decreased cycle time and outages. During Lubrizols first trial at a plant in Rouen, France, 18 input variable, 38 process variables and four output variables were used. They realized numerous and ongoing benefits including uncovering a fault in the process that went unnoticed through traditional monitoring systems, quickly solving problems and avoiding extended downtime.

Technology that Sees into the Future for Lower Energy Production Costs
Predictive header pressure controller adjusts boiler loads to maintain header pressure several minutes into the future. Controlling more like an operator, the system anticipates a change in header pressure, makes an adjustment, waits, then tweaks. The result is substantially reduced fuel costs, which will benefit every energy consumer as well as the environment through efficient consumption of fuels. Through use of the technology, a major pulp mill in Western Canada reduced fossil fuel costs by more than $500,000 per month and reduced electric power imports by $60,000 per month. These savings resulted in a 2.5 percent reduction in pulp production costs.

In reviewing submissions for the *Innovations That Could Change the Way You Manufacture*, the committee also highlights an **Innovation Watch List** [6]. These technologies are showing great promise but, as yet, are unproven in the manufacturing setting. This years list includes:

- Fiber optics replacing metal wiring between computer components
- Quantum locking
- New methods of color mixing for LED production
- Semi-solid flow cells for electric cars
- Artificial photosynthesis to turn sunlight into liquid fuel
- Aerovoltaic wind technology with no moving parts

About SME:
The Society of Manufacturing Engineers (SME) [7] is the premier source for manufacturing knowledge, education and networking. Through its many programs, events, magazines, publications and online training division, Tooling U [8], SME connects manufacturing practitioners to each other, to the latest technologies and to the most up-to-date manufacturing processes. SME has members around the world and is supported by a network of chapters and technical communities. A 501(c)3 organization, SME is a leader in manufacturing workforce development issues, working with industry, academic and government partners to support the current and future skilled workforce.

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