

# Strategies for growth & sustainability

## NEW PRODUCT DEVELOPMENT

Most products have a limited lifecycle. In order to create medium to longer term growth for their investors and keep customers loyal, companies need to have a continuous stream of new products and/or business services. The rate at which firms can develop these and bring them to their markets successfully is often a critical factor that distinguishes a company from its competitors. One way is to ultra-miniaturized and improve performance at the same time like below.

## 14 NANOMETRE CHIPS ENTER MASS PRODUCTION

The next generation of microprocessor technology is released by Intel, with transistors now based on a 14nm manufacturing process.\* For comparison, a carbon atom is 0.34nm wide.\* The 4GHz barrier in stock CPU is finally being passed, thanks to the performance and energy efficiency of these new chips. ([www.futuretimeline.com](http://www.futuretimeline.com))

Above right photo : Intel



### INSIDE THIS ISSUE

Manufacturing of the Future ...2
MT Gearbox Development..... 2
Memristor technology are becoming available ..... 3
Benchmarking Competitive Advantage ..... 3

### SPECIAL POINTS OF INTEREST

- Manpower
- Productivity
- Benchmarking

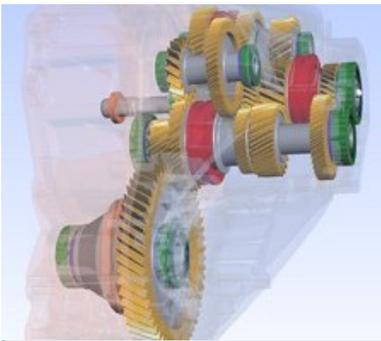
### **Manufacturing of the Future:**

1. Hydrogen technologies which involve manufacturing components to produce, deliver, and store hydrogen, will be a critical component of any strategy designed to move away from petroleum-based fuels.

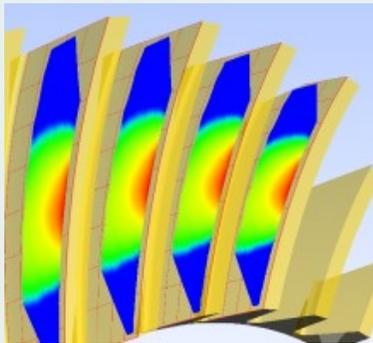
2. Nanomanufacturing involves creating ultra-miniaturized devices that have a broad range of applications. According to the report, nanomanufacturing “has the potential to impact virtually every industry, from aerospace and energy to healthcare and agriculture.”

3. Intelligent and integrated manufacturing involves applying advanced software, controls, sensors, networks, and other information technologies to rapid and adaptable manufacturing systems that fully exploit the latest production technologies.

Source : [trade.gov/press/publications/newsletters/ita.../manufacturing\\_0408.as...](http://trade.gov/press/publications/newsletters/ita.../manufacturing_0408.as...)



Source : <http://smartmt.com/products-services/engineering-consultancy/case-studies/truck-axle-development/>



The images show the simulated (top) and actual (bottom) contact patch analysis

2

## MT GEARBOX DEVELOPMENT

A collaboration between SMT and a major truck manufacturer enabled them to increase the axle load capacity and improved the NVH performance of their existing axle design. This was achieved by the optimisation of the gear dimensions, tooth form and root geometry.

Assistance was also given by SMT in:

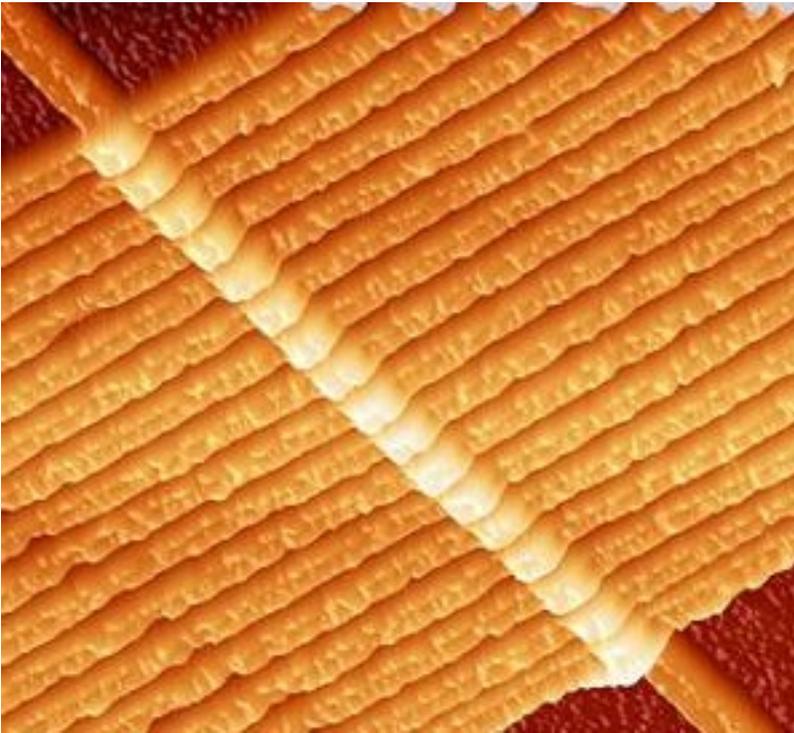
- Establishing design procedures
- Collecting design input data
- Training in the use of MASTA design software
- Establishing test and development procedures
- The design and supply of test equipment
- Rationalisation of the manufacturing process

SMT were commissioned to develop a new 5 speed manual automotive transmission to meet customer specified design targets including:

- Specified size and load capacity
- Input torque of 200Nm with potential to up-rate to 250Nm
- Service life of 200,000km
- Comparable or improved shift quality compared with a German-made reference gearbox
- Lower NVH than the reference gearbox
- Minimising manufacturing costs by eliminating gear tooth grinding

The SMT designed gearbox **met all the design targets set by the customer and in addition had manufacturing costs which were 40% of those of the reference gearbox manufactured in the same location.**

SMT also designed and developed test rigs for the gearbox, established test and development procedures, and established and trained a design and development team for the customer.



## THE FIRST PRODUCTS TO USE MEMRISTOR TECHNOLOGY ARE BECOMING AVAILABLE

First theorised in 1971, memristors were described as the "missing link" in electric circuitry. As a fourth fundamental circuit element, they would have properties unachievable in the other elements (resistors, inductors, capacitors).

After 40 years of research and development, they are now appearing in consumer products.\* Unlike conventional computer memory - which stores data with electronic on and off switches - memristors work at the atomic level. These nanoscale devices have a variable resistance, able to "remember" their resistance when power is off.

**This makes them phenomenally faster, denser and more energy efficient than previous electronics.** Mobile phones and countless other gadgets can now benefit from a vastly improved battery life, speed and memory capacity. Desktop computers and laptops, meanwhile, can be booted-up almost instantly. Because of their tiny size, memristors can also be used as microscopic sensors, gathering a wide range of data from their surroundings.\*

**Another benefit of memristors is their reconfigurability.** They can be similar in behaviour to the synapses in brains. This offers the potential to create electronics more capable of adapting to different situations and exhibiting a form of learning, which may advance efforts in artificial intelligence. Further into the future, it may be possible to build human brain-like computers.\*

Source: <http://www.futuretimeline.net/21stcentury/2013.htm>

Photo credit : HP Labs

### BENCHMARKING :

### COMPETITIVE ADVANTAGE

#### Key Findings

**Companies that cut-back capex on vital production equipment and distribution networks in the quest for cost savings risk losing their competitive edge in the markets they serve.**

Upper quartile companies enjoy higher quality supplies to the tune of six times better than that experienced by lower quartile companies .

Investments for which there is a substantiated and genuine business case (that exceeds the cost of capital needed to acquire and install them) for improving levels of efficiency, effectiveness and market coverage that provide a significant competitive advantage need to be made.

**Technology and infrastructure are not the only investments in the future of the company that need to be made. Employees need (and usually want) to be developed too through education and training programmes.**

Upper quartile companies make roughly four times the investment in their futures with both capital expenditure and employee training than the lower quartile companies do.

Median firms make just under half the level of investment that is made by the upper quartile firms. The value of training is under-appreciated across the whole SME manufacturing sector though – the £68 per employee per annum “invested” by the lower quartile firms is absurdly short-sighted and simply inexcusable. But even the £291 per employee achieved by the upper quartile companies is still derisory.

Source: The performance of manufacturing companies within Benchmark Index

For more information on Innovation & Productivity resources, Lean Six Sigma project coaching and implementation, research and benchmarking and seminars, please contact :

**Singapore Innovation & Productivity Institute  
c/o Singapore Manufacturers' Federation**

2 Bukit Merah Central #03-00  
SPRING Singapore Building  
Singapore 159835

Telephone & Fax  
(65) 6826 3000(65) 6826 3008

Email  
[sipi@smafederation.org.sg](mailto:sipi@smafederation.org.sg)

Office Hours  
9:00am to 6:00pm (Mon - Fri)

