

## The NEXT Big Event?

Ken Gilleo, Cookson Electronics - Ken@T-Trends.com  
EP&P

In 1900 electronics was the hot topic among engineers, inventors and savvy business people. Telegraph and telephone were the mainstay of the **Communications Revolution**. The Marconi Wireless Telegraph (radio) amazed the world. The invention of the vacuum tube amplifier during the first decade of the new century brought remarkable progress that would continue for *another 50 years*. But electronics was expensive, slow and massive.

Everyone wanted smaller, faster, cheaper but this turned out to be an overwhelming challenge for vacuum tube-based technology that defied integration. But everything would change after Bell Labs developed the transistor in 1947. Almost a decade later, Intel's Robert Noyce came up with an idea to integrate these solid-state transistors, but it was Jack Kilby of Texas Instruments who concurrently invented and implemented a working integrated circuit. Integrated solid-state electronics was the **BIG EVENT** in technology, but it took 50 years with a decade's lag from lab to factory. Where is the next big one?

Our industry has integrated electronic devices but not much else. Mechanical motion devices like motors have remained separate discrete components that are typically connected to electronics at the system level. Optical elements, like lasers and light controllers, have remained separate and must be externally connected to highly-integrated electronics. In a very real sense, our electronically-controlled mechanical and optical products use concepts from the 1900's. Parts are built piece meal and "bolted and wired" together later. Worse yet, the mechanical and optical components are built using very mature, macro-world strategies even though automation is used effectively. What would happen if *everything were integrated*? Would this be the next big event?

We are finally in the midst of the next **BIG EVENT** where electronics, mechanics and optics are being merged and integrated. Its called MOEMS for MicroOptoElectroMechanical Systems. Just about anything that can be constructed in the macro-world can be crafted in the *brave new nano-world*. What's so amazing is that motors, gears, optical controllers and electronics can be mass-produced in a semiconductor plant to construct complex and powerful fully-integrated systems. ***The entire world of science and technology will converge in this nano-space.*** The semiconductor factory becomes the nano-factory for all kinds of machines with millions of moving parts that can carry out tasks far beyond capabilities of the best macro-machines. Today, 2-million gold-plated mirrors in a postage-stamp size chip can beam a color motion picture onto a large screen. MEMS DNA chips, built of silicon by IBM, can detect abnormal molecules of life. Every domain of science and all the quadrants of technology will ultimately be changed in the ***Brave New Nano-World***. This really is the next *prime-time program* that was 50 years in the making. Will nano-robots repair our bodies or even build smaller *nanobots*? Will tiny "rocket chips" explore the universe? Science fiction? Cal-Tech and the Jet Propulsion Lab are testing the rocket chip. And someday soon, in a theater near you, a digital movie will be generated by microscopic mirrors, sent over the Internet as light waves.