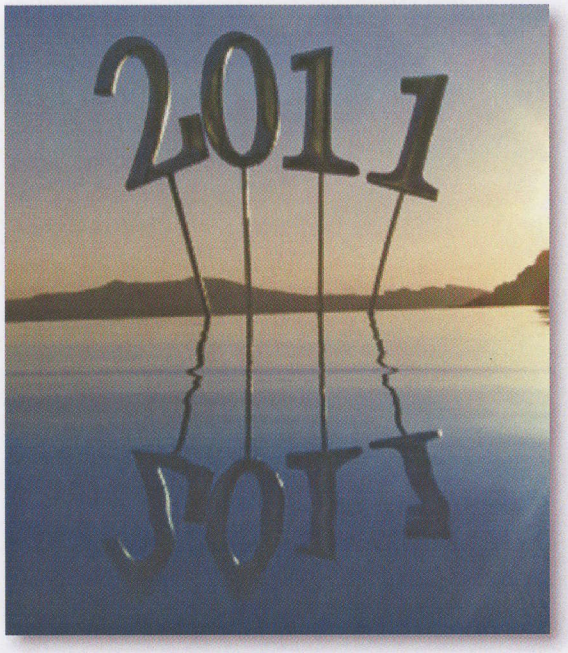
2011: Year-End Review

IN SUMMARY

The state of economy this year has made us all feel a bit jittery and the U.S. credit rating downgrade caused unprecedented discomfort to all. However, corporate earnings for the year have impressed many. Is the world transitioning into a new era—a new economic formula, a new corporate focus and a new political landscape?

by Dr. Jennie S. Hwang, *CEO*
H-TECHNOLOGIES GROUP

What an intriguing year! It was nothing short of unexpected, filled with good and not-so-good events. In this last column of the year, I would like to highlight a few exciting past events that impacted our industry and reflect on forecast points found in my previous column, What Can We Expect in 2011?,published in the February issue of SMT Magazine.



Global Economy

The state of the global economy this year has made everyone feel jittery and the U.S. credit rating downgrade caused unprecedented discomfort to all. However, corporate earnings have impressed everyone. Is the world transitioning into a new era—a new economic formula, a new corporate focus and a new political landscape?

Two American economists who won this year's Nobel Prize in economics have demonstrated that the world of economics is more interconnected than traditional models recognized and that economic policies must reflect those connections. They believe that in a traditional macro-economic model a central bank that wants to reduce unemployment will lower interest rates, encouraging consumers to spend and companies to invest, which drives up demand for goods and services and spurs more hiring. Eventually, that will increase inflation, at which point the central bank can raise interest rates to slow down the economy.

This sounds so familiar since it has been the playbook of political debate over and over again. But the Nobel Prize bestows the award to the new thesis on "rational-expectations theory." According to this theory, consumers and companies know that lower interest rates will mean higher inflation in the future. Thus workers expect increased wages and investors demand a higher return on capital. These demands and expectations alter human behaviour, which, in turn, affect the state of economy.

In a nutshell, these Nobel laureates' empirical research on cause and effect in the macro-economy works, in their description, this way: What's going to happen depends partly on what you think is going to happen. Expectations, not necessarily the immediate effect of policies, control the human behaviour. These forces consequently limit the effectiveness of the central bank's policies. Is this the reason that there, seemingly, is not a direct correlation between the monetary policy with QE1, QE2 and Operation Twist and real-world results? Is this an explanation as to why

the U.S. GDP has scored below the original forecast, as well as below the mid-year revised lower forecast since these forecasts may have taken the traditional effects of low interest rates and the economic stimuli implemented during the year into the GDP formula computation?

Regardless of the low level of U.S. growth and confidence throughout the year, most corporations have performed well in both revenues and earnings and our industry has continued to innovate and advance.

Industry and Technology

On the technological front, 2011 was filled with exciting news. For one, the multi-billion dollar plan to build chips on 450 mm wafers was officially committed by Intel and IBM along with other major chip companies. The manufacturing of 22-nanometer processors has also been reaffirmed by Intel. These plans and commitments will lead to the continued advances in the chip industry to deliver increased functionalities and reduced cost in future computing and communication products.

Let's now look at some of my forecast points that were put forth in this column at the beginning of this year:

> ***"...overall, transformative products may not materialize in 2011, yet a plethora of innovations will be reflected in products across industries..."***
>
> ***"...2011 will be the fruitful year for PoP and "small" BTC packages..."***
>
> ***"In selecting the IC packages, the ultimate practice is the tradeoffs of functionality, reliability and cost, leading to the increased use of these 3D and BTC packages. This will push challenges to the board-level manufacturing in process, equipment and materials of the SMT industry."***

Indeed, no breakthroughs in the architecture of IC packages were introduced, yet many improvements and advancements have materialized, particularly in package-on-package (PoP) and BTC packages. Engineers and researchers have conducted diligent studies on the manufacture of packages and the subsequent SMT assembly to identify the key parameters and process in an effort to maximize production efficiency. Validation of such processes and parameters has helped increase manufacturing yield.

After more than 10 years of use of environmentally-friendly, lead-free electronics, another prevalent topic is lead-free solder joint reliability. My statement at the beginning of the year, stating, "Overall, the industry has been long in generating reliability test results, but short on what it takes to have a high-performing lead-free alloy," still largely stands. Nonetheless, one encouraging sign is increased efforts in developing lead-free alloys in higher-element systems as evidenced in the technical paper presentations at SMTA International 2011. It is also comforting to see that the fundamental metallurgical alloy-strengthening mechanisms are being put in use after more than 15 years of my teaching and advocacy on approaches in achieving the desired reliability, which is a matter of record.

One golden rule in reliability that has demonstrated its prowess is as follows: A solder joint cannot outperform the maximum intrinsic performance properties

of a solder alloy, and its reliability cannot be accomplished by a testing scheme. Reliability can only come from a "robust" solder material that is designed by using the fundamental metallurgical principles. It seems that such practice has been quite sacred for the last two decades.

In solar photovoltaic, leaving the Solyndra saga aside, which is a small real-world mistake relative to a big industry, the sector continues the shakeout process while being stabilized and established. The saga literally relives the "how-to" in building an entrepreneurial business and the criticality of assessing the market and technology. This year, module prices have dropped precipitously affecting the revenues and margins throughout the supply chain. Technologically, crystalline silicon/thick film has remained dominant. Overall, the year 2011 is a rebalancing year, forcing all the players in the global landscape to join in this balancing act. In this regard, the drivers have spanned from the drastically reduced cost of crystalline silicon substrate and the global marketplace shift to the price drop and supply chain's re-establishment. This momentum will continue into 2012. **SMT**

Dr. Hwang, a pioneer and long-standing contributor to SMT manufacturing since its inception as well as to the lead-free development, has helped improve production yield and solved challenging reliability issues. Among her many awards and honors, she has been inducted into the WIT International Hall of Fame, elected to the National Academy of Engineering and named an R&D Stars to Watch. Having held senior executive positions with Lockheed Martin Corporation, Sherwin Williams Co., SCM Corporation and IEM Corporation, she is currently CEO of H-Technologies Group providing business, technology and manufacturing solutions. She is a member of the U.S. Commerce Department's Export Council, and serves on the board of Fortune 500 NYSE companies and civic and university boards. She is the author of 300+ publications and several textbooks and an international speaker and author on trade, business, education and social issues. Contact her at (216) 577-3284; e-mail JennieHwang@aol.com.

CTS to Acquire Valpey-Fisher

CTS Corporation and Valpey-Fisher Corporation announced have entered into a definitive merger agreement providing for the cash acquisition of Valpey-Fisher by CTS. Upon closing of the transaction, Valpey-Fisher will operate as an indirect wholly-owned subsidiary of CTS.

Pursuant to the terms of the definitive agreement, CTS will acquire 100% of the issued and outstanding equity of Valpey-Fisher for $4.15 per share for a total purchase price of approximately $18 million. Valpey-Fisher has $3 million of cash and is essentially debt free. Valpey-Fisher's Board of Directors has unanimously approved the merger and recommends that Valpey-Fisher's stockholders vote in favor of the transaction. The transaction is subject to customary closing conditions and approval of Valpey-Fisher's stockholders.

A more complete description of this transaction is included in Valpey-Fisher's Form 8-K to be filed later. The transaction is expected to close in January 2012.

Valpey-Fisher is a recognized technology leader in the design and manufacturing of precision crystal oscillators including higher frequency, lower phase noise timing solutions, high-performance RF/Microwave components, integrated modules and ultrasonic transducers. End markets served include telecommunications, computer, defense and aerospace, instrumentation and industrial markets. Sales in the last four reported quarters total approximately $15 million.

Vinod M. Khilnani, CTS Chairman and Chief Executive Officer, stated, "Valpey-Fisher is an excellent fit with CTS' Electronic Components business unit, bringing expanded products and capabilities to better serve CTS' customers. The two companies offer world-class highly-engineered frequency products to growing markets. In addition, Valpey-Fisher brings strong engineering capabilities and management leadership to support our strategy of double-digit top line growth over the next several years in our Components and Sensors segment."

To find out more, visit www.valpeyfisher.com.