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Where Are All The Engineers?

Following my June 2007 online article for SMT Magazine (**Electronics Manufacturing Trends in the United States**), I received many calls confirming the direction of our EMS industry and giving me additional concerns regarding other trends. Another common theme is the concern regarding manufacturing technology skills being lost in the USA. This takes the shape of American students losing interest in these technical fields and the increased interest by hard working students in emerging Asian countries.

In the United States we have 5% of the world's population, but we consume 40% of the world's natural resources. **We are becoming a nation of consumers with an entitlement attitude**. For generations we would manufacture what our people would demand to consume. We were the greatest manufacturing provider in the world. We now live in a global resource pool with people willing to do our manufacturing for us.

As the high volume manufacturing goes away, along with it goes the technical support careers. Mechanical and industrial engineers are trained to find ways to build factories and products. Where are the big automated factories of today? Fueling the exodus of manufacturing technology to Asia are the seemingly unlimited labor resources, a global marketplace, faster transportation systems, and aggressively supportive foreign governments. As the high technology job market grows in Asia, it is safe to say that US citizens will not be relocating there, only to work for the lower pay. There are many capable and very hard working engineers in Asia willing to work.

The appeal to go into manufacturing careers has lost its luster for many of the American students entering college. American students entering college have a variety of curriculum to choose from that pays more money than technical engineering positions. Careers in banking, marketing, advertising, finance, software executives, legal, and media somehow seem more exciting and enticing with a chance to make more money.

In the United States, we train our engineers at the universities on the theory of manufacturing and design. When they graduate, they are placed in product design positions, having never even worked in operations to understand the practical realities of actual manufacturing. **In Asia and in Europe, engineers must move through the ranks of manufacturing with all the practical knowledge before they are placed in a position to design product and process for others.** Being an apprentice engineer, with all the battle scars of real manufacturing experience, makes the technologist more valuable in the workplace. The individuals, companies, and countries that operate this way have an advantage over the ones that don't.

Who is getting the advanced engineering degrees at our universities? 30% of the students enrolled at SMU and the University of Texas in undergraduate classes for electrical engineering are of traditional European descendents. The remaining 70% is primarily Oriental, Indian, or Middle-Eastern ancestry. Many non-US citizens are coming to our universities with full scholarships to get advanced engineering degrees and then return to their homeland. Enrollments in the engineering departments in US universities and colleges consist of significant student populations from many technologically developing, emerging and maturing countries like Pakistan, Bangladesh, India, China, and other Asian countries. The majority of graduate level engineering students are not US citizens. "A growing trend is the return of the trained students to their native lands as opportunities abound to contribute to their country's technological prowess and gain personal economic prosperity for their family. This is a natural phenomenon. The foreign student population is bright, motivated, and very hard working" says Dr. Viswam Puligandla – professor at the University of Texas at Arlington and retired senior technologies for Nokia.

"We must find ways to encourage domestic manufacturing."

The United States is still a powerhouse of invention, discovery, and entrepreneurship. It is important to maintain that leadership by exploring, developing, and harnessing new technologies vital for the prosperity of future generations. We must find the ways to encourage domestic electronic manufacturing with all the creative and technical engineering jobs that can go with it.

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