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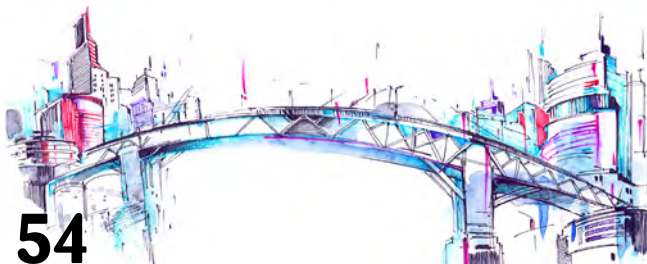
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Leadership

This issue of *SMT Magazine* looks into what makes a great leader, and the changing roles of the leader in the PCB assembly industry.

More Content:

What Makes a Great Leader?

by Stephen Las Marias
I-CONNECT007

Leadership encompasses the ability of an individual to lead or guide other individuals, teams, or entire organizations in the accomplishment of common goals. In many industries, great leadership is required now more than ever as companies face a myriad of challenges such as globalization, uncertainties in global markets, and increased demand for flexibility. The electronics assembly industry is no different. Amid the rapid change in technology and innovation, leadership is required to drive the organization ahead of its competition and sustain its competitive advantages to overcome new challenges brought about by market demands.

But then, there are good leaders, and there are great leaders. How do we differentiate one from the other? According to author Jon Gordon, good leaders get people to believe in them, while great leaders inspire people to believe in themselves.

Apparently, it's true. According to our survey on leadership—which is also our topic for this month's issue of *SMT Magazine*—the majority or 70% of our respondents said the ability to inspire others is the one of the most important traits of a great leader today. This is followed by empowerment of employees, clarity of vision, and then integrity. Great leaders act in the best interest of the team they are leading. And while

The Most Important Traits and Skill Sets of a Great Leader Today
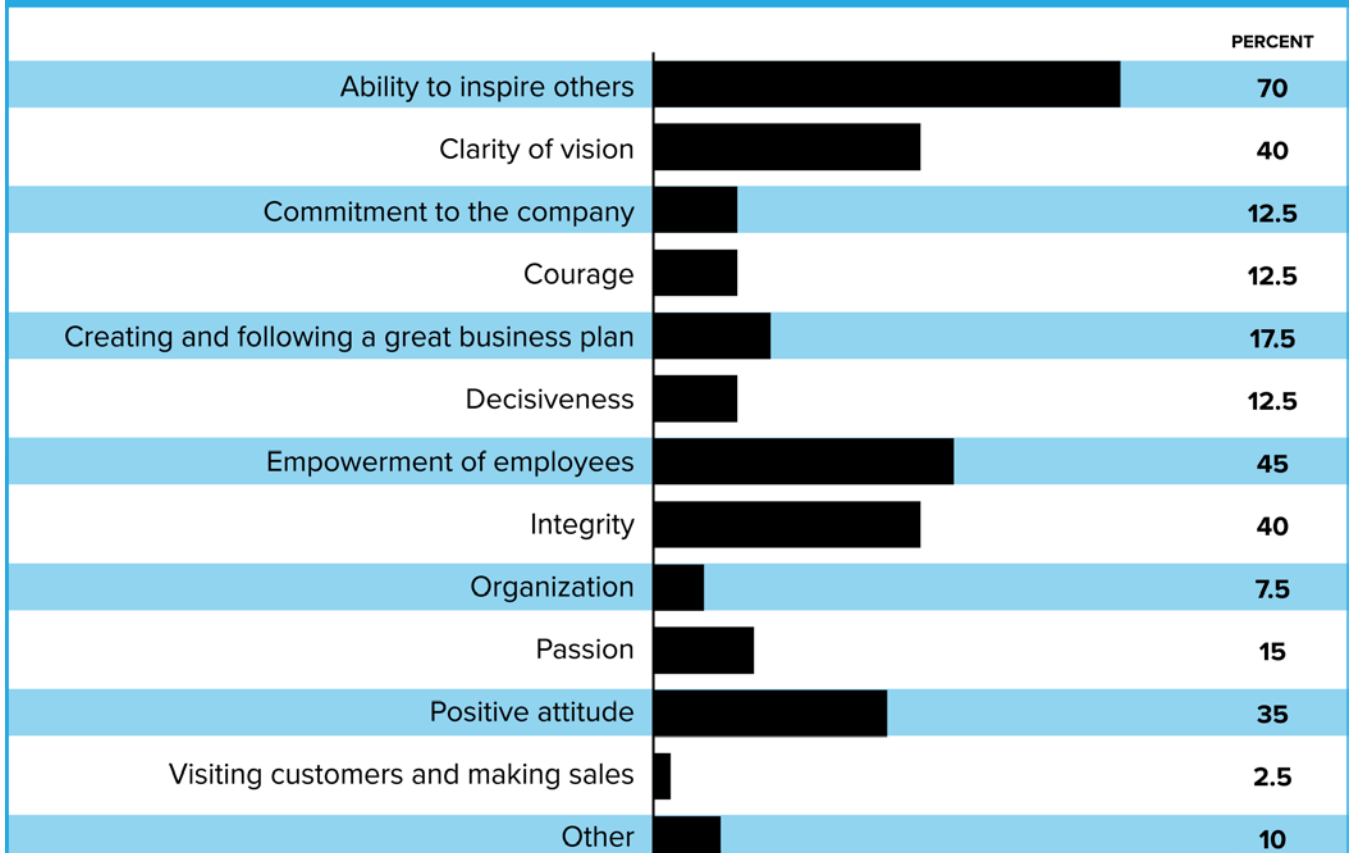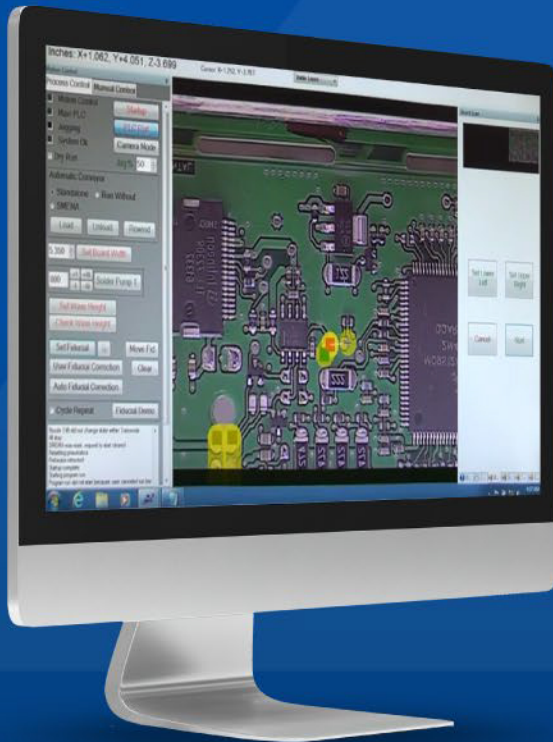
	PERCENT
Ability to inspire others	70
Clarity of vision	40
Commitment to the company	12.5
Courage	12.5
Creating and following a great business plan	17.5
Decisiveness	12.5
Empowerment of employees	45
Integrity	40
Organization	7.5
Passion	15
Positive attitude	35
Visiting customers and making sales	2.5
Other	10
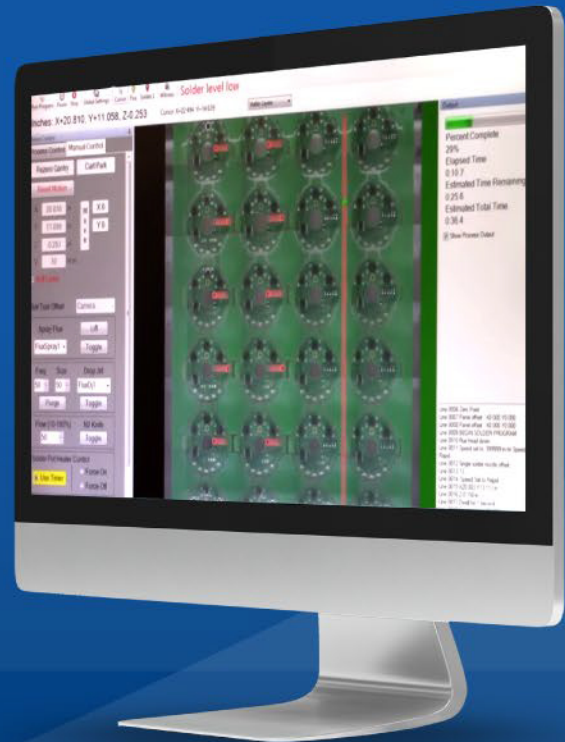
having and following a plan is a basic need, the ability to stay positive through challenges and demonstrate high levels of integrity at all times define great leadership.

When you inspire others and act in their best interest, you can be sure that your company is on track for success. We asked our readers the most important impact of great leadership—and they said it's happier employees and higher employee retention. Basically, employees are said to be the prime movers in any enterprise, so having long term, happy employees result in better margin and profitability for the company, and improved efficiency of operations.

Another barometer to gauge great leadership is whether employees feel empowered to make decisions at their jobs. Majority of our respondents say so (Always: 36%; Often: 33%). In this industry, decisions at times have to made immediately because delays can impact customers, so reducing the time to make these decisions is important to both the customer and supplier. This circles back to inspiring others, wherein employees feel confident of their responsibility to make important decisions for their company.

We also asked whether leadership has evolved throughout the years and decades. According to our survey, fundamentally speaking, leadership never changes. Having the clarity of vision and the courage to strive for that vision along with inspiring people to join in on the adventure is a constant. The changing elements are the current means needed to get there— whether that be the product, technology, market savvy, or technical tools to deliver the message.

Nowadays, one of those "changing elements" as mentioned above is the increasing number of millennials joining the workforce— in particular, the manufacturing industry. Therefore, we asked our readers how to lead the generation that says it doesn't want to be managed. The majority said it's difficult, noting that the greatest leadership challenge when it comes to millennials is dealing with that generation's narcissism and entitlement.

Which is why a great leader—no matter how clichéd it may sound—must always have a lamp to show the light to the team that is in the dark. Twelve to 16 years of individuals competing for grades does not promote the teamwork needed for success in the real world—so team dynamics needs to be taught. A great leader inspires them from the front. The fact remains that there are things that millennials don't know. Leading and demonstrating that knowledge helps them realize that learning is a part of life, not just a collegiate phase of life. Millennials want to under-

Most Important Impact of Great Leadership

- 40.5% ● Higher employee retention / happier employees
- 26% ● Improved efficiency of operations
- 14% ● Better margin /profitability
- 9.5% ● Other
- 7% ● Consistency
- 3% ● Process Control
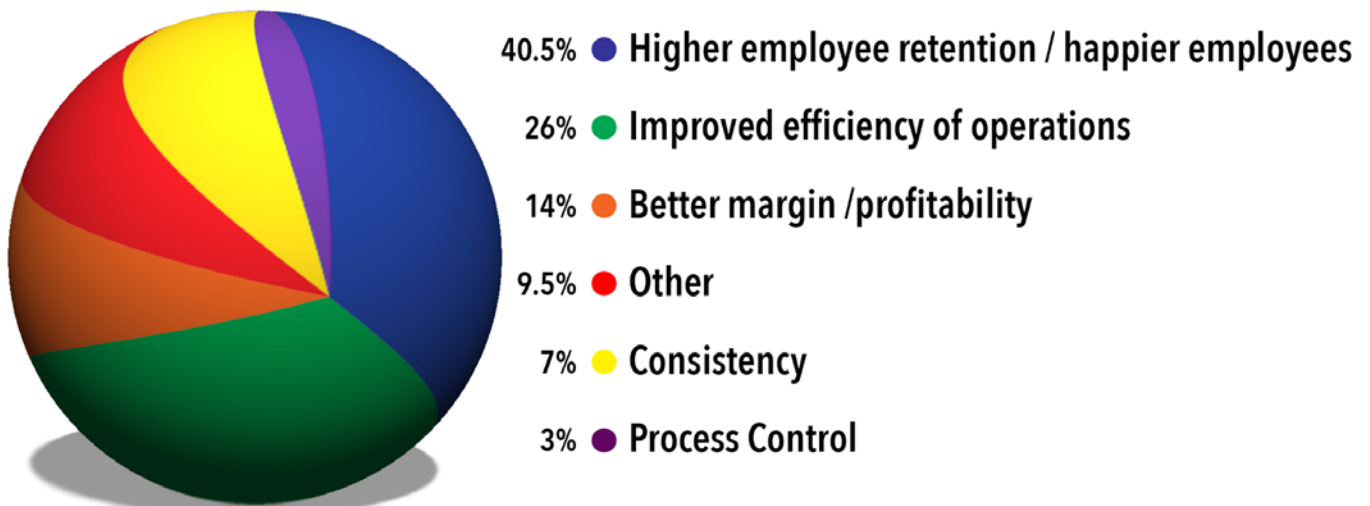
stand a leader's expectations, but want to be left alone to accomplish them. A great leader gives them the space they need— but intervenes and offers assistance when he sees them going off-track. He can still influence them, but he should let it be "their idea".

This month's issue of *SMT Magazine* celebrates leadership, and highlights such qualities that define great leaders.

For starters, I caught up with Thomas Forsythe, executive vice president of Kyzen Corp., at the recent NEPCON South China event in Shenzhen to talk about what makes a great leader, the changing roles of leaders in this industry, and the impact of effective leadership in the future of a company.

I also interviewed Vi Technology's Jean-Marc Peallat, vice president of global sales, about his thoughts on the role of a leader and how it differs from that of a manager and why inspiration is the key to leadership. He also discussed how to lead the younger generation, and what the office or shop floor will look like 10–20 years from now.

Transcend's Laura Huckabee-Jennings, meanwhile, writes about STI Electronics' founder David Raby's leadership journey, and how he was able to steer his company towards success.

Frederick Blancas of EMS firm Integrated Micro-Electronics Inc. talks about how sustainability has moved up in the priority agenda of business leaders tasked to shape their companies' goals, and how they can align aspects of their business with socially meaningful activities that are fulfilled through economic efficiency and entrepreneurial innovation.

Susan Mucha of Powell-Mucha Consulting Inc., offers her thoughts about building bridges with cross-cultural teams. She notes that as we live in a global society now, more and more leaders are now managing global teams. Therefore, understanding the behavior patterns driven by the cultures of team members, having discussions about differences and similarities, and creating an environment where people who are uncomfortable can discuss their concerns, can go a long way to eliminating cultural conflict and building strong teams.

Albert C. Yanez Sr., the corporate VP of Asteelflash Group and president of Asteelflash

AMERICAS, writes about the leadership principles that his company embraces.

I also interviewed Knoll Evangelista of EMS Components Assembly Inc., who talked about leadership, motivation, and how great leaders navigate the challenges to bring their companies to success.

In his column this month, Tom Borkes of The Jefferson Project discusses the cost of management and leadership, and what a company gets from that money.

Our remaining content includes a variety of pieces from around the industry, including regular columnist Robert Voigt of DDM Novastar, who writes about helping users in their search for used SMT assembly equipment and provides some tips to avoid getting a raw deal or actually spending more than new by the time they get that bargain acquisition in good working order.

At NEPCON South China, I had a chance to interview Koh Young Technology Inc.'s Thomas Lau, sales manager for Southeast Asia, about the challenges and developments happening in the AOI sector. We discussed why manufacturers are increasingly looking into strengthening their inspection capabilities.

Then we have Tony Bellitto of Firstronic, and his article on the challenge of developing an effective way to recruit and retain high-quality team members in labor markets where experienced manufacturing talent is in short supply.

Finally, W. Scott Fillebrown of Libra Industries provides ten key items to look for in an EMS company.

I hope you enjoy this month's issue of *SMT Magazine*. Next month, we will focus on how vias impact the PCB assembly process.

Don't forget: We are always in search of columnists for *SMT Magazine* and SMT007 online. If you're interested, feel free to drop us a note. **SMT**

Stephen Las Marias is managing editor of *SMT Magazine.* He has been a technology editor for more than 12 years covering electronics, components, and industrial automation systems.

KYZEN on Leadership and Teamwork

by Stephen Las Marias

At the recent NEPCON South China event in Shenzhen, I caught up with Thomas Forsythe, executive vice president of Kyzen Corp., to talk about what makes a great leader, the changing roles of leaders in this industry, and the impact of effective leadership in the future of a company.

Stephen Las Marias: *Tom, from your perspective, what is the difference between being a leader and a manager?*

Thomas Forsythe: They share some pieces. Managers tend to be focused on tasks, for example, 'we need the production out by Friday,' and organizing resources to try to accomplish that task. I think leadership certainly includes that, but it's more about why and where. Where are we trying to go? What are we trying to do? Where's the organization headed? Whether it's a kid's football team or a big company, it's kind of the same thing of: where are we going, why are we going there, why is that the right thing,

why is that good for us as people, why is that good for our customers, and why is it good for our shareholders and neighbors? Leaders worry about those things. Managers, maybe, but typically not so much.

Las Marias: *Leaders then tend to look at the big picture?*

Forsythe: Leaders have to look at both pictures. If people only look at the big picture, then their head's in the sky, right? Those are the ivory tower guys that we all worry about. Leaders have to be in touch and in tune with their team; and if it's an outward looking team, their customers too. They also need to have the bigger picture of where the world is going, or where the market is going. Compare this to what it looked like 10 years ago. It's really different.

How many people then knew the world was going here? Some did and they probably did well, their teams did well and their people did well. That's the responsibility of leaders, to look down that road. No one can see the future, but you can consider it. What might happen? What

are the factors going on? That's where leaders have to do both jobs. It's not just one or the other.

Las Marias: *How do you know you're an effective leader?*

Forsythe: The reality is that everyone's always trying to be an effective leader. The only way it happens is how your team works. How does your company succeed over the long haul? Are you headed the right way? It's that whole idea of if you sit down in a car trip and you don't know where you're going, you're not going to get anywhere. You need that idea of where you're going and continue to evaluate that.

> " Leadership isn't always about achieving the goal. That's part of it, but it's also evaluating it along the way and seeing what's changing. "

Leadership isn't always about achieving the goal. That's part of it, but it's also evaluating it along the way and seeing what's changing. Maybe none of us knew what it was going to look like 10 years ago, but what about five years ago? Maybe we had a better idea of what was going on, and we should make changes to adjust for that even though we didn't make those changes 10 years ago.

It's not playing a sporting event where you have 60 minutes or so and you're done. It's a much longer term thing. It's that reevaluation and that openness to adapt to changing circumstances and making sure your team can speak up, because you never know who's going to have the next good idea. You can all look at the same things and somebody goes, "Wow, you know, what if we did this?" We all look at the same thing, but that one woman or man,

do we hear that person? Do we give them credit? Do we encourage them to do that?

Las Marias: *That's an important point: Do people feel empowered to speak their minds?*

Forsythe: Absolutely. Part of that's the environment. These days, a lot of that environment stuff tends to be talked about negatively, like "oh you can't do this," or "you can't do that," but that environment stuff is also positive. You can speak your mind. You can come up with a crazy idea. Maybe, it's a good crazy idea. Who knows? That's always a challenge. People are constantly changing and are in different parts and places of their lives. Sometimes they're more open to it. Sometimes they're not. It's a very moving and fluid thing.

Las Marias: *Do you think leadership has evolved over the past decade?*

Forsythe: Really good leaders haven't changed all that much. They're generally open to ideas. They're trying to question those assumptions and presumptions. What's changed is that there was a time where, and there still is in some organizations, the leader is kind of like a king.

Those organizations, sometimes they succeed, but a lot of times they don't. Because no matter how smart one person is, 100 smart people usually can do a better job. The idea of 'getting more people on the bus' is not really a new idea. It gets written about more, but it's been there for a very long time for lots of people and lots of organizations, especially the ones that do pretty well.

Las Marias: *Regarding millennials, how do you lead a generation that says they don't want to be managed? Do you think they're ready when the baby boomers leave the work force?*

Forsythe: The reality is everyone grows up and no one's ready when they're 17; or very few people are, but somebody probably is. That process of gaining experience and figuring out, there's lot of fancy words for it these days, that tribal knowledge. All that really means is group experience, right? The stuff that's not written

Phil Zhang and Thomas Forsythe.

down but everyone seems to know. Let's face it, there's always been that stuff. Now, it just has a name. The fact of the matter is that while new and fresh perspectives are helpful, experience is likewise helpful.

There's a balance of those things. Certainly in areas where technology is involved, there are a lot of technical elements that are easier to learn now. The fact of the matter is when SMT was invented 20 years ago, it was new. Nobody knew anything. The guys inventing it didn't know anything. They didn't have any experience. Now, people can learn it way quicker than they could 20 years ago when people were making it all up as they went along.

Part of that is generational, where 'It took me so long to learn this, you can learn it quicker.' Well, some things you can. It's easier to do geometry on a programmable calculator than with a pencil. It's just easier! It's a lot faster and the numbers are probably more accurate. Does that mean people don't know it? If they get the answer, then they do know. In business, understanding your markets and understanding the

customer is not so much about running a calculator as it is running a relationship. All relationships between consenting adults and consenting organizations are an evolution. If anyone is too forward too early, nothing good happens, no matter what the relationship is. Sometimes, that does come with experience. That's not a fresh look. That stuff probably hasn't changed in 10,000 years, that's my guess.

Las Marias: You have to nurture it, right?

Forsythe: You have to nurture it. These are things that take time. Sometimes, there's a spark and it gets started quicker than others. That certainly can happen, but generally it's a slow burn and generally it's a process. I think millennials aren't any different from anybody else.

Las Marias: Right now it's all about globalization, so from your view as a leader of a global company, should global teams be managed? What are the challenges and the difficulties and how do you become successful in unifying your teams in different parts of the globe toward one goal?

Forsythe: Teamwork is a big deal. That's kind of where the company's leadership comes in, which is not a person but a group. Certainly, any company has lots of people that are in a leadership role, including ours. It's understanding those mutual goals. It's not about an individual contributor. It's about a group effort and how we achieve this group goal.

We have lots of projects where there are people all over the world working on things to figure out the answer or come up with an answer for the customer. There's probably more where it's just a local thing. We live in a very global world, but every problem is not global. Most of life is local, and it's true here too. It's a balance. That's where that sharing of knowledge comes in. Maybe somebody somewhere knows the answer but the local person doesn't. Making sure there's connectivity there and openness where somebody can be open that they don't have an answer and say, "Hey, does somebody else know this?"

That's about the environment. That's having a growing and learning environment that people are okay asking those questions and the culture around the company. They know they're not going to get "Why didn't you know that?" That openness to ask questions and reminding them to ask questions is pretty important, particularly when you have the old guys wandering around that seem to know all the answers.

It's like, "He'll think I'm stupid because he knows the answer and I don't know the answer." The reality is, why would you know the answer? You've never encountered it before. It's not something you just figure out. How could you possibly know? You could make a good guess, but why guess when you could know? Ask somebody and you get to know. Knowing is more fun.

That's a key part of it, and millennials are in the same boat. We were the same boat when we were their age. We're in a hurry, we're eager and old people are dumb and all this. Every now and then, they know a few things. Every now and then, they prevent an error or they can save an error that got made. That's the balance. It's having that give and take and that sharing of knowledge.

Let's face it. The organization wins if the young people do learn it faster because they'll have more people that know. That's better for them, better for the company and better for everybody.

Las Marias: Definitely. Now let's talk about training. What is the role of a leader when it comes to training and updating the training or knowledge of the team?

Forsythe: In this world that we live in, most people think of training as technical training. "How does the gizmo work? You got this lovely little recorder device, well how does it work? How do you turn it on? Oh, okay, that wasn't very hard." But if we left you to figure it out on your own, maybe it would take longer. There's that technical nuts and bolts kind of stuff.

A lot of leadership is learned by watching other people do it. Everyone has their own styles. Some people are loud and beat drums. Other people are more quiet. I don't think one's any better than the other on average, but the key is understanding what works for you and what works for your team. Some teams, even if loud is your favorite technique, in some crowds

> **" Leaders have to evolve their technique a little bit with their teams and recognize what they have there and let people grow but also keep them on track. "**

that just doesn't work. Leaders have to evolve their technique a little bit with their teams and recognize what they have there and let people grow but also keep them on track.

While there are ways to train leadership in the business environment, it's difficult. It's more of the journeyman approach where people tend to get put in charge of projects where there are one or two people involved and they

get to hone their skills a little bit. It can be a challenge for sure.

Las Marias: Are you seeing young movers and shakers in the industry right now?

Forsythe: Sure, we've got plenty of smart people on our team. The reality is there's just no shortage of smart men and woman. It's the case of what they choose to do with their lives. The challenge is to find those folks and recruit them and keep them happy. We've been fortunate in our company. We don't have a lot of staff turnover. People seem to be happy with what they do and we're happy about that. We think that's good for everybody, them included.

Especially here in China, that's a real challenge for many organizations. It's tough to develop that experience when you're jumping around a lot.

Las Marias: What do you think is the impact of good leadership in a company?

Forsythe: Look at any sports team that is terrible and you'll find it. How many teams don't do very well, then they get a new coach and the next year they're better but with the same players. The players are about the same, they're a year older which means maybe they're a year slower, not faster, at least that's the general per-

ception, and yet they play better. Leadership must make a difference.

Every endeavor, whether it's sports or business, has its own scorecard. Some people are working on profits, some people are working on growth, some people are working on market share, and so on. All kinds of enterprises are focused on their particular strategic challenge in some part of the world. It's really how you define that and how you choose to go after that.

I don't think there's one metric that says that's how it works, but if your company doesn't know what you're shooting for, they're not going to help you get there. Whatever it is, whether it's market share, profits, growth, or whatever may be, the team needs to know what that is so they can help get there.

Las Marias: Is there anything you would like to add?

Forsythe: I appreciate the opportunity to talk with you today. Leadership is an interesting thing. Business is fun and business is good, and I hope it is for you too.

Las Marias: It definitely is, Tom. Thank you very much.

Forsythe: You're welcome.   **SMT**

Perovskite/CIGS Tandem Solar Module Achieves Record 17.8% Efficiency

Researchers from Germany's Karlsruhe Institute of Technology (KIT), and ZSW (Zentrum für Sonnenenergie- und Wasserstoff-Forschung — or Center for Solar Energy and Hydrogen Research — Baden-Württemberg), and Belgium's imec have developed a perovskite/CIGS tandem thin-film solar module that achieves 17.8% in efficiency, surpassing for the first time the efficiency of separate perovskite and CIGS solar modules.

The novel stacked module combines the advantages of two highly innovative thin-film technologies: the semitransparent upper perovskite solar module efficiently absorbs the high-energy portion of the solar spectrum, while the lower CIGS (copper indium gallium selenide) layer converts the infrared parts. In total, the prototype achieves an energy conversion efficiency of 17.8%. For comparison, the current world record for perovskite modules on this scale is at 15.3%, and the reference CIGS solar module has an efficiency of 15.7%.
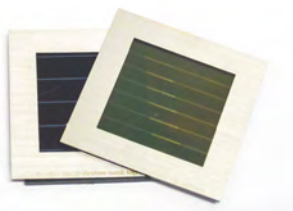
The research was presented at the 2nd International Conference on Perovskite Solar Cells and Optoelectronics (PSCO-2016) in Genoa, Italy.

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ITAR

Do the High Paid Managers in Your Organization Add Value?

by Tom Borkes
THE JEFFERSON PROJECT

The first six *Jumping off the Bandwagon* monthly columns have been dedicated to addressing the proper academic preparation of our high-tech electronic product assembly workforce.

As the gap between industry need and academic preparation has continued to widen, a consequence has been the adverse effect this disconnect has had on the ability of a company to compete in the global manufacturing marketplace.

All competitive roads in any capitalist free market business ultimately lead to a cost versus contribution analysis—or said another way: a value assessment. The next series of columns in this space will explore another important cost driver—one that, like academic preparation, in many circles is at best awkward and uncomfortable, and at worst is dangerous to talk about.

What is the cost of management and leadership? And, what does a company get for that money?

These are questions that have been rarely discussed in an analytic way. They have been considered a given component of the administrative cost a company needs to absorb—the assumption always being it is a cost needed for the company to fit into a traditional hierarchal organizational structure.

Here are some of the additional questions and topics that will be addressed in this and subsequent columns in this series:

1. Is there a difference between management and leadership?

2. If so, what are the corresponding attributes of both?

3. What metrics can be used to evaluate the effectiveness of each attribute?

4. What role does a leader play in today's high tech electronic product assembly industry?

5. Who can be a leader? Must he or she be a manager?

6. What is the management and leadership cost for a high tech electronic product assembly company?

7. Are there alternate organizational models that achieve management and leadership objectives at a lower cost?
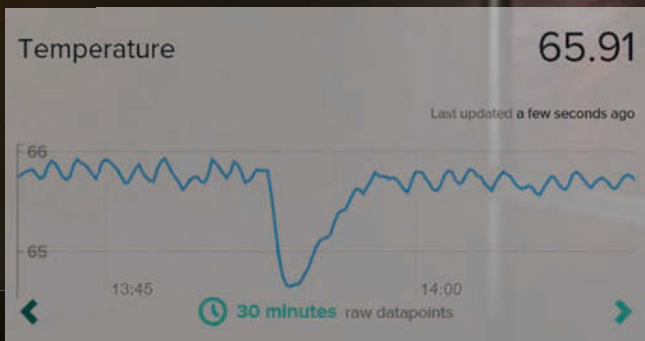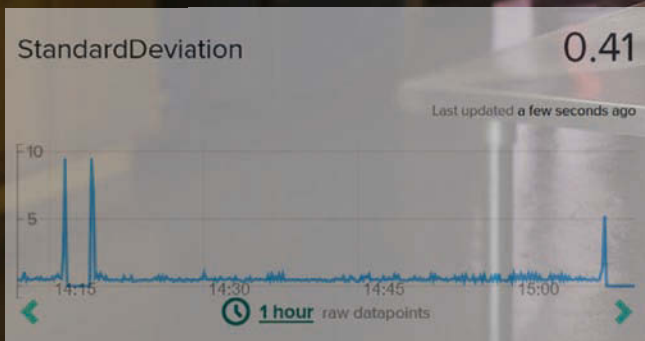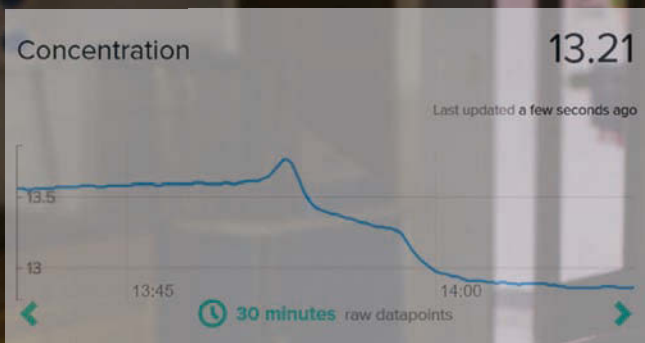
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This column will set the scene and take a first cut across these issues. Subsequent columns will drill down and discuss the details of each. As I am fond of saying: *el diablo está en los detalles.* ("The devil is in the details.")

First, let's clear the decks and make sure we have a common grasp of some very basic tenets of economics, and an understanding of the organizational business structure that companies in our industry have worked out of for decades.

Private Ownership vs. Government Ownership

A free-market system based on private ownership continues to be the source of incredible wealth generation, middle-class growth, and the rise in the standard of living of the masses. At the same time, left unchecked, wealth can lead to significant inequities in individual incomes. Even Karl Marx recognized capitalism as a wealth-generating machine and thought it necessary to prime his communist pump—a required step in his application of Friedrich Hegel's dialectical materialism.

> **" Marx saw private property as the source of economic class creation and conflict. "**

Hegel developed his theory of dialectical materialism (thesis, antithesis and synthesis). Marx applied it to economic class struggle. Marx saw private property as the source of economic class creation and conflict. Capitalism accelerated the creation of wealth by a small group of bourgeois shop or business owners who exploited the large working class (proletariat) for their own selfish benefit. This would evolve into communism—the synthesis. The communist government would abolish private property and divide it among the people[1]. Once up and running the government would take over the means of production and distribute its output based on need. From each according to his

ability, to each according to his need[2]. In the final phase, the government would not be needed and social ownership and management of the means of production would be done by a cooperative (common ownership). So, the thesis (bourgeois) creates the antithesis (proletariat) and a clash between to two causes the synthesis (communism).

In 1932, Joseph Stalin went one step further. He saw the rich land-owning farmers (Kulaks) in Ukraine as a threat. They had been seeking independence from the influence of Russia, and now, since the 1917 Bolshevik revolution, the Soviet Union. Stalin seized their land and food. From that point, the farms were managed by government collectives. Notice he skipped a step—the government was still there—necessary to shepherd and manage the process. Seven million Ukrainians died through government purges and starvation.

Capitalism makes the wealth "pie" bigger, regardless of the size of the slices.

Government collectivism, whether socialism or communism, is concerned in different degrees with the size of the pieces of the wealth "pie." In the spirit of social justice, the government feels it is their responsibility to conduct the social engineering necessary to control the slice size.

It is cliché, but history has borne out the truth at its core: that pure capitalism makes everyone unequally rich, and pure socialism makes everyone equally poor.

The Public and Private Sectors

There are two general umbrellas that companies reside under in a capitalist economic system: A company is said to be in either the public or private sector. Companies in both sectors require money, or capital, to start-up, operate and grow. The difference between the two is simply how that money is acquired.

A private sector company initially issues stock to the company's owners when the corporation is formed. The share of equity an owner is allocated is typically based on their contribution, both monetarily and intellectually, to the company's start-up and operation. If 100 shares are issued and an owner is given 40 shares, she owns 40% of the company.

One important point of clarification: A private sector company can have its stock (or ownership) either privately held or publically traded. When a private sector, privately-held company is said to "go public," through an initial public offering (IPO), it's still a private sector company. However, it is now permitted to raise funds from the general public. The private owners are effectively selling partial ownership in the company to the general public by the issuance of stock. The stock an investor buys provides them with an ownership or equity position in the company. As the company operates, the value of the initial stock offering price increases and decreases depending on the perceived value of the company. The stock shares are traded on a stock exchange.

In a public sector company, the government supplies the money, typically from tax revenue.

Managers with Ownership Positions

The point of this is as follows: Company management members who are shareholders have a different stake in the company than do managers who are not equity owners. Very often, the former invest funds from their own bank accounts, or borrow the needed start-up funds using personal assets like their house as collateral. These funds are risk. The latter non-equity managers don't. They simply are employed to perform indirect tasks within the organization. In our discussion, the distinction between the two types of managers needs to be made.

The capital suppliers who have an equity (ownership) stake in the company can be participants in the ongoing operation or silent members. We will call operational managers who have ownership positions within an organization, manager/owners. In either case, people with equity positions, whether operational or silent, have one basic objective—getting a good return on their investment. Their investment is at risk. If the company performs poorly, their investment decreases in value, or in the worst case becomes worthless.

We have traditionally collected personnel of common education, background and responsibility into groups. Those groups organized into departments. So manufacturing engineers are in the manufacturing engineering department. Personnel who do the buying for the company are found in the procurement department. Directors will be responsible for several departments with the mangers of each reporting to them. This hierarchy has formed the business pyramid.

> **" Directors will be responsible for several departments with the mangers of each reporting to them. This hierarchy has formed the business pyramid. "**

Personnel directly assignable to the assembly of a product are classified as *direct labor* and form the direct labor cost. Personnel who cut across many products, or are general employees not directly involved in a product's assembly are classified as either *indirect, overhead, or general and administrative.* The cost associated with all of these employees is loaded on or absorbed into the average direct labor cost to form the labor sell rate (when profit is added). These costs must be budgeted and managed. Typically, each department manager has this responsibility.

The Difference Between Management and Leadership

The other basic distinction that needs to be made is the difference between management and leadership. We often use the two terms interchangeably. However, they are very different.

1. Managers maintain the status quo. They plan the work and work the plan. They operate to schedules and budgets. All activities are conducted under the aegis of the company's standard operating procedures (SOPs). They may have the administrative responsibility for a department—again, assigning work and measuring the performance of the members in their

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-Larry Robinson, Electrotek

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group. They define department tasks and cost estimates to marketing for proposals and quotes.

2. Leadership has historically manifested itself as an employee characteristic rather than a job category. Traditionally, there has not been a position in an organization called leader. Sometimes personnel are assigned the role of *team leaders,* usually in the context of a project that has had a team formed from recruiting people from assorted departments with the needed skill sets. However, dubbing a collection of people who have been *matrixed* in from different departments a *team* does not in itself make a true team. In the same way crowning an individual *team leader* does not guarantee he or she will exhibit leadership skills. Anyone who has been part of a well-functioning team knows that the team output is always much greater than would be the sum of each member's output if they worked as individuals—that's the magic

> 66 **True leaders within an organization challenge the status quo. They rock the boat. If it's not broke they break it.** 99

of teams. True leaders within an organization challenge the status quo. They rock the boat. If it's not broke they break it. We have traditionally looked to company managers for leadership.

3. At the project or product management level, leaders are forward thinkers trying to anticipate potential storm clouds and develop contingency plans, proactively. Their passion for excellence, and their unselfishness, high character and virtue attract others to act in the same way. Having a project manager with these leadership qualities is a big advantage.

These attributes do not come naturally. We'll discuss training the workforce in the next issue.

One of the best treatments of this subject has been done by John Kotter, the Konosuke Matsushita Professor of Leadership, Emeritus, at the Harvard Business School[3].

At this risk of oversimplifying his groundbreaking work on the difference between management and leadership, Dr. Kotter concludes that companies that have been successful over the long term are found to have a good blend of both—leaders and managers.

The Hidden Responsibility of Many Managers

Another responsibility of managers not often spoken about or found in a manager's job description is their role in transitioning students into the real world. This is certainly true in the business of high-tech electronic product assembly. The academic organizational structure is just very different than the for-profit company business model.

It is recognized that students have a learning curve to go up once they are employed in the real world. That learning curve consists of acquiring the technical skills to fill the gaps in their academic preparation, as well as attaining the needed soft skills such as working in teams and conflict resolution.

Management of entry-level personnel are important players in this often overlooked role. Try to remember your first real world job and the important influence your first manager had on your professional development.

Consider this: What is the metric used to determine a student's success? It's their grade point average. How does a student achieve a high GPA? By successfully competing as an individual against her fellow students in the classroom. They do this as individuals for some sixteen years, striving above all to get high marks on the tests they take.

Then, they leave academia and enter the real world and are asked to be team players!

Educating in a real world environment by using a for-profit EMS business as the classroom as suggested in last month's column[4] would eliminate the need for managers to provide this shepherding and remedial skill role.

I remember the early days of SMT. If I was composing a video essay at this point ethereal
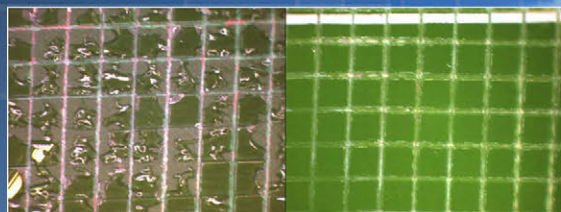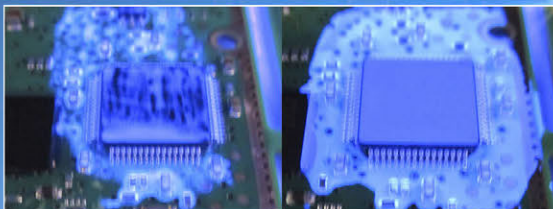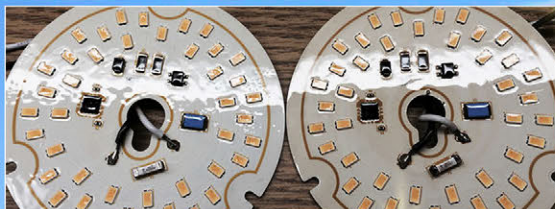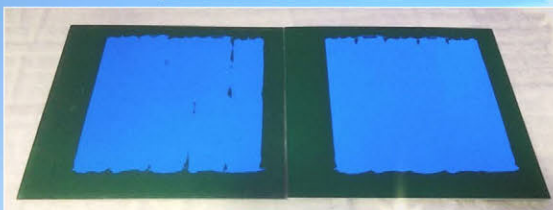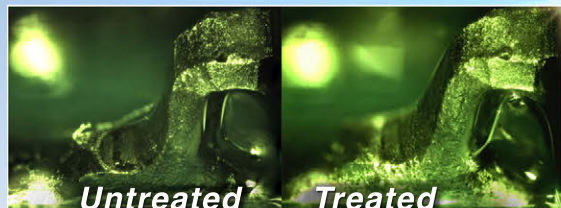
music would begin to play and the screen image would begin to fade and distort as we were clearly going back in time. Early in my professional development I came to the stunning realization that in high-tech electronic product assembly, the technical problems were the easy ones to solve. Like a lightning bolt from the blue, it hit me: Could this be? It seemed the problems associated with co-workers' priorities working in different departments and their respective manager's priorities were the difficult ones. Like baby birds vying for their mother manager's/director's attention these issues were much more complex. And worse, they seemed to be intractable and unsolvable.

> **" Now we begin to approach leadership and see it as a human characteristic, not a job title. "**

Now we begin to approach leadership and see it as a human characteristic, not a job title.

In those early days (cue the music again) we just did the near impossible by soldering IC packages whose lead pitch was reduced from 100 mils (0.100 inches or 2.54 mm read last month's column) and, as important, developed the assembly processes that permitted the new devices to be soldered to circuit boards en masse for commercial, high-volume product applications. The dual in-line package (DIP), was used practically from the advent of integrated circuit (IC) packages, to connect the silicon die to the other components in a product's circuitry. They came on the scene after WWII. The need for increased pin-out and speed requirements in the early '80s caused product designers to embrace a new commercial plastic package that had been used in a ceramic form by the military for years (the leadless ceramic chip carrier). It had leads on a 50-mil pitch. In addition, the leads didn't go through the board. They were soldered on the same side of the circuit board as the component body resided. Then came fine pitch…

However, the automated assembly equipment kept up and, although daunting when introduced, developing assembly processes to accommodate these new component packages was a reasonable task.

Contract manufacturing was beginning to take hold as electronic product design companies tried to avoid the ballooning cost of assembling their products—both capital equipment and personnel.

One important role of a company's managers is to provide an operational infrastructure that supplies data to permit performance measurement.

Here is an instructional example of the difference between a poor manager and a leader: In those days, production floor data was not as readily available as it is today. So a concerted effort was needed to understand what a product actually cost to build. It took time and money to accumulate and track actual costs and use these as a measure against a product's standard cost (hopefully, used to bid on the job). As a manager, an alternate strategy was to whisper under your breath, "the hell with it. I'll just book as much business as I can by what I think it will cost and ship, ship, ship." Or worse, "I'll bid what I think will win the job without regard to its true cost and ship, ship, ship. We'll see at the end of the month if the company made or lost money." Not properly estimating cost beforehand leads to one of two reactions within an operation when a bid is successful:

- Sales/Marketing—We won! Hurray!
- Production—We won! Uh oh!

The good news is this "strategy" often caused the sales curves to go up and to the right. The bad news is the cost curves would also go up and to the right—at a faster rate. The sales and cost curves would never cross. The more you shipped the more money you lost! It was like wrapping a $10 bill around every product that went out the door!

In this case, the manager saw his role as shipping product for maximum revenue, literally, at any cost. The manager's primary objective was ill founded in the context of what was best for the company.

A leader would have challenged this approach and become a champion of improving the operation's infrastructure to permit costs to be captured to help ultimately maximize margins.

So, often another difference between leaders and managers is a leader will advocate change by taking the longer view. The manager is normally preoccupied with meeting short-term goals, sometimes at the expense of long-term company growth and health.

Making my department "look good," even at the expense of other departments, is often the competitive dynamic set up by poor managers in the traditional organizational structure. To illustrate the ends a manager might go to achieve this objective, let me share another true story:

As you probably know the total cost of a product is the sum of the material and labor costs. The cost of material almost always dominates—typically, anywhere between 60% and 90% of the total product cost. In the material procurement world there is a metric called purchase price variance or PPV. It is simply the difference in the cost a procurement group estimates when quoting a bill of material (BOM) during the bidding phase (let's say the company is an EMS), and what they actually end up buying the material for when the job is won and the product is being prepared for actual production.

In this case the procurement manager would purposely inflate the material cost during the quote phase, so when called upon to actually buy the material a positive PPV could be reported—purportedly because of the excellent negotiating skills of the manager and procurement department. This "strategy" was exposed when customers started to challenge the material side of the quote. "You have all that volume buying leverage, yet we get better material pricing when we quote the bill than you have provided in your proposal!"

It is an example of why in my mind it makes sense to dismantle the traditional organizational hierarchy of departments. Your electronic product customer doesn't pay for your procurement department. They don't care that you have a process engineering department and a test engineering department and a production department and a finance department and a project management department and a marketing department. They buy products!

What your customer cares about is the price, quality, timely delivery of the product, and, sometimes, design-for-production input[5] for a new product design—that's all.

Character is an important trait of a good leader. I think in many ways it is the most crucial attribute: I like the often repeated definition that character is doing what is right when no one is looking. No compromise when the times get tough.

Setting an example by exhibiting behavior that is consistent with the values of the company is critical for the leader (assuming the company has admirable values).

Good delegation skills are another component of a good leader. The ability of being secure in one's decision-making, and not act defensively when those decisions are challenged will enhance the ability to lead (i.e., not having to be right all the time).

Being empathetic is another good attribute of a leader. Daniel Goleman discusses the importance of empathy in his books on emotional intelligence[6].

> " Being empathetic is another good attribute of a leader. "

A unique leadership skill in today's organizations is dealing with the inability of many in the workforce to defer personal gratification and the rampant narcissism that exists. It's hard to have a truly functioning team when members of the team effectively have a blinking LED sign hanging around their necks that says "look at me!"

Managers are much more effective if they are also leaders. Managers that are leaders appeal to the workforce by their virtue. They do not manage by fear and intimidation. They en-

courage feedback from their group, both positive and negative. One of the ways they encourage negative feedback is not to "kill the messenger" who is the bearer of bad news.

However, probably the most important thing is that leaders don't have to be managers.

Anyone in the organization can be a technical leader through demonstrating their mastery of the technical component of their job, but more important, they can be a leader of the workforce by putting their team, project and the company before themselves.

Next month we'll drill down into some of these topics and work toward a saner organizational structure—one that permits a more efficient and cost effective way to manage electronic product assembly and exploits the natural leadership abilities within the company.

Hey, what do YOU say? I'd like to hear your thoughts and experiences.   **SMT**

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Tom Borkes is the founder of The Jefferson Project and the forthcoming Jefferson Institute of Technology. To reach Borkes, click here.
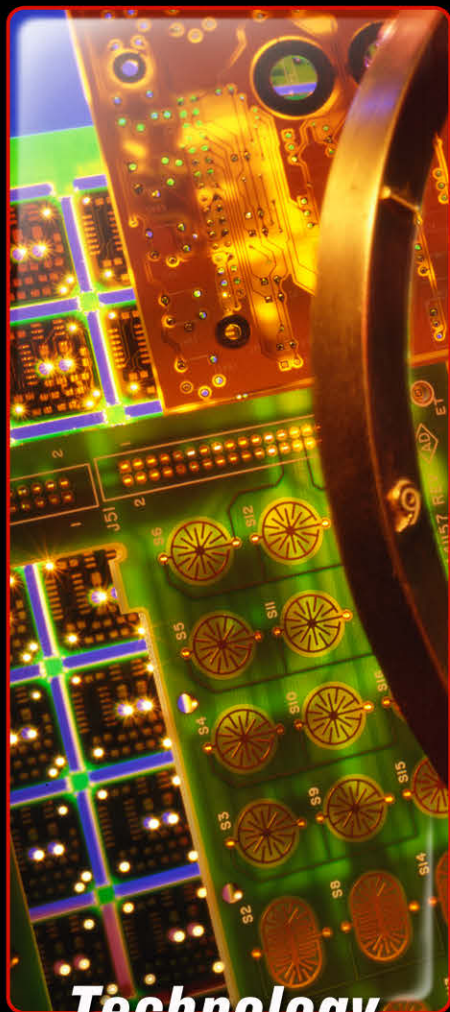
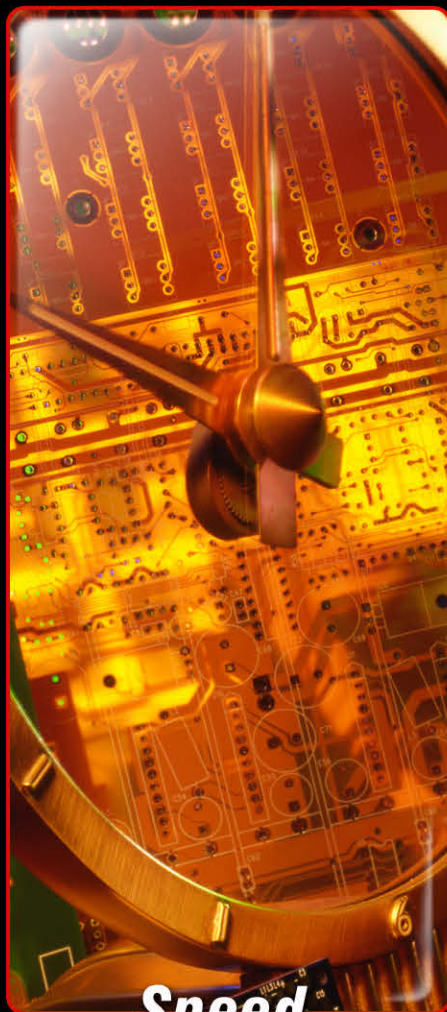## Saline Lectronics Invests in the Millennial Generation

Manufacturing Manager Jason Sciberras discusses how his company attracts and keeps a large percentage of millennials in their manufacturing workplace. Look for more on this important topic in the forthcoming series by Saline Lectronics.
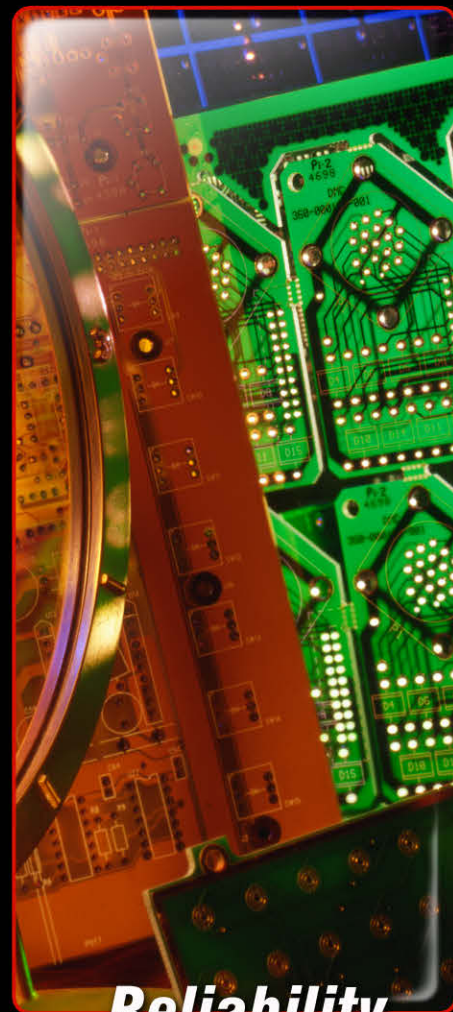
Supply Lines
Highlights

Digital X-Ray—For More Than Inspection
At the recent SMTA Ohio Expo, Sheri Martin, sales manager at YXLON, spoke with I-Connect007's Patty Goldman about her company, their digital X-ray system, and the value of joining such trade events, and the benefits of using X-ray when it comes to failure analysis.

Real Time with NEPCON South China:
P. Kay Metal Discusses New Markets for MS2
James Goyne, the newly appointed global business development director at P. Kay Metal Inc., speaks with I-Connect007's Stephen Las Marias about what he aims to achieve in his new role, as well as the new markets and opportunities for their MS2 solder dross eliminator.

Real Time with NEPCON South China:
Mentor Graphics Discusses Control
on the Shop Floor
Ofer Lavi Ben David, director of shop floor manufacturing solutions at Mentor Graphics Valor Division, talks with I-Connect007's Stephen Las Marias about how the smart factory should look, their Open Manufacturing Language, and their solution to provide end-to-end visibility and control in the shop floor.

Being More than a Manufacturer's Rep
Matt Bonweg, process support specialist at manufacturers' rep firm Murray Percival Company, speaks with I-Connect007's Patty Goldman during the recent SMTA Ohio Expo about the company's history and philosophy, as well as their strategies for success in this industry.

DS Electronics Installs Fourth ACE
Selective Soldering Machine
DS Electronics has invested in a fourth KISS-103 selective soldering machine from ACE Production Technologies Inc., which has been installed at DS Electronics' facility in Tempe, Arizona.

BEST to Hold Wire and Cable Harness
Hands-on Assembly Class
A complement to the IPC-A-620 Acceptability of Wire and Cable Harness class, BEST's wire and cable harness assembly class takes a student through the building of a wire harness assembly.

Cogiscan and Interlatin to Present
Track-Trace-Control Solutions for Enabling
Industry 4.0 at SMTA Guadalajara
Cogiscan Inc. will exhibit with Interlatin and discuss the TTC platform, the enabling technology for Industry 4.0, at the SMTA Guadalajara Expo & Tech Forum, scheduled to take place October 5-6, 2016 at Hotel Riu Guadalajara in Mexico.

GOEPEL Inline AOI System Addresses
Placement Inspection of THT Components
GOEPEL electronic's latest inline AOI system MultiCam Line provides placement inspection of THT components with a test speed of up to 300 cm²/s.

Panasonic Launches Odd-form and
Insertion Solution NPM-VF
Panasonic Factory Solutions Company of America has launched the high-speed NPM-VF, an odd-form and insertion solution to help manufacturers offset increasing global labor costs and manual assembly complexity.

KIC Offers Automation and Smart
Oven Technology for the Smart Factory
KIC will demonstrate how its smart oven technologies lead to reduced production costs, higher quality and the new capabilities that the electronic assembly market demands, at the SMTA Guadalajara Expo & Tech Forum, scheduled to take place October 5-6, 2016 at Hotel Riu Guadalajara in Mexico.

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BizBrain IQ Test:

by David Dibble
DIBBLE LEADERS

With an introduction by Barry Matties, Publisher, I-Connect007

Introduction

When David Dibble was only 24 years old, with just $5,000, he started a PCB company—in a garage. He built it to a profitable $10 million in sales and 200 employees making printed circuit boards.

Focusing upon the work of W. Edwards Deming, Peter Senge, Buckminster Fuller, Ilya Prigogine, and John S. Bell, David became an expert in workplace systems improvement. Since 1990, he has been training and consulting using his *Four New Agreements for Leaders and Managers* as a proven model for sustainable organizational transformation, with remarkable results. Today, he is the president of Dibble Leaders.

I-Connect007 worked with David to formulate the *Biz Brain IQ Test,* which we offered to readers during the last several months within I-Connect007 publications. Below are the combined responses from the 170 people who completed the quiz, representing a cross-section of disciplines from our industry.

The highest possible score for the Biz Brain IQ Test is 200. The average result was 120, while the highest score we saw was 167.

Discussion of Results and Answers

1. The culture of a company is most shaped by:

The mindset of top management	32%
Values	25%
Company policies	15%
Vision	15%
Mission	13%

This question is probably a bit too easy in that there is more than one best answer. The culture of a company is most shaped by *the mindset of top management.* Having said that, we see that values and vision are part of the mindset of top management. *Mission* also falls in there somewhere. We can even make a case that *company policies* many times come from the mindset of top management.

_____

2. The most important aspect of being a good manager is:

Setting people up to be successful	50%
Immediately act to solve problems	19%
Being a systems thinker	13%
Holding people accountable	8%
Controlling people's actions	4%
Being good to people	4%
Pushing people to reach goals	2%

This question starts to get to the heart of what it means to be a great manager. The best answer is *being a systems thinker.* Notice only 12.86% of responders picked this answer while 50% picked *setting people up to be successful.* Interestingly, it's very difficult to set people up to be successful unless the systems in which they work have been optimized in a systems-based manner. *Taking immediate action to solve problems* is usually a bad choice in that the "don't just stand there—do something" tenet driving most managers is seldom the best option. Doing something before understanding the problem (system) often makes things worse. How can we *hold people accountable,* if we haven't optimized the systems in which they work? Remember, approximately 94% of the results are a function of the systems in which people work, not the efforts of people. Most of the time when we measure results we attribute to people, we are measuring results produced by the systems.

_____

The Surprising Results

3. When a new employee is hired, the most important training should be:

Vision, mission, values of the company	38.6%
Specific job training by a superior	18.6%
Sexual harassment	11.4%
Policies and procedures	10.7%
Systems thinking and tools	10.7%
Informal get-togethers to meet peers	6.4%
Merit review process	3.6%

This question tests the responder in a couple of ways. First, it gets to the heart of systems thinking and if the responder is a systems thinker. The best answer is *systems thinking and tools.* Only 10.71% of responders chose this best answer while 38.57% chose *vision, mission and values.* If vision, mission and values do not include systems thinking and tools, it is very difficult to set people or the company up to be successful—or at least optimally successful. Second, although a widely accepted practice, *specific job training by a superior* is simply wrong. It adds variation to systems making them less efficient over time. While *sexual harassment* training is important, sexual harassment itself in the workplace is a cultural problem that must be addressed at that higher level before training itself will be effective. *Policies and procedures* are useful, but usually only in disciplining employees. Instead, build policies and procedures around optimized systems.

4. Do you consider yourself to be a systems thinker?

Most of the time	36.4%
Sometimes	23.6%
Absolutely	18.6%
I'm not familiar with systems thinking	18.6%
Occasionally	0.0%

This question looks at the responder's understanding of systems thinking. There is only one best answer to this question and that is *absolutely*. You either are a systems thinker or not. If you are a systems thinker, you know it absolutely. If you're not a systems thinker or only on your way to becoming a systems thinker, you will have responded something other than absolutely. Systems thinking is much like learning a foreign language. At first we translate the foreign language back into our native thinking to make sense of it. As we progress, we are able to translate more and more back into our native thinking. One day, with ongoing practice, we reach a point where we don't have to translate back. We simply *think* in the foreign language. At that point we are fluent. Systems thinking can be a curse in that, when you think in systems, it's often difficult to believe the workplace works at all with all the non-systematic thinking entrenched within the vast majority of leaders and managers.

5. How do you prioritize your work or projects?

I put things in proper sequence	37%
I work on my top 20% important issues	22%
I work on whatever is most pressing	20%
I do what I think best	12%
I don't formally prioritize very much	5%
I mostly work on the things I like to do	3.6%

This question looks at systems thinking and tools. One of the most useful and powerful systems optimization tools is the 80/20 rule. This Pareto principle tells us that usually 20% of the variables create 80% of the outputs. If you look in your closet, you'll see that 80% of the time you wear 20% of the clothes in your closet. It's the same for most systems. If you want to get the most out of your systems, identify the critical 20% of the variables. In fact, as a leader or manager, you want your people working only on the critical 20% of their systems/projects.

The best answer here is *I work on only my top 20% of important issues.* A close second is I put things in proper sequence. However, note that you can't put things in proper sequence unless you have first identified the critical 20%. *I work on whatever is most pressing* is wrong unless one has done the systems work to know what's most pressing and specifically the critical 20%. *I do what I think is best* is mostly wrong. Unless data indicates that what you think is best is really best, you'll usually be working on the wrong issues or symptoms of root causes.

6. What do you think the most important goal for leaders should be?

Providing value to customers	29.3%
Optimizing systems/growing employees	28.6%
Setting people up to be successful	15%
Making money	6%
Optimizing our systems	6%
Growing employees	5%
Hitting our numbers	2%
Growing the business	0%

The best answer here is *optimizing systems and growing employees.* If a leader focuses on optimizing systems and growing employees, both the employees and customers will feel valued and taken care of. *Setting people up to be successful* is second in that it entails optimizing systems and growing people. *Optimizing systems* is third and *growing employees* is fourth. *Providing value to customers* garnered nearly 30% of the vote but this is the wrong place to focus. Customer satisfaction and value received is much more a function of happy, systems-literate employees, management and leadership than anything else. In fact, some studies suggest that customers will feel that same about the company as employees over time.

7. What do you think is the best way to deal with problems?

Looking to systems as source of problem	32%
Putting our best people on the problem	29%
Getting people to behave differently	11%
Cracking the whip	11%
Telling people how to fix the problem	10%
Holding people accountable	6%

Looking to the systems as source of the problem is easily the best answer here. If 94% of the problem is systems-related, why would you look anywhere else? From a systems thinking perspective, there are no other good answers here. While *putting our best people on the problem* is a traditional approach, it is badly flawed. Unless the "best people" take a systems-based approach, problem solving will be a firefighting exercise and solutions will not be sustainable. The remainder of the answers to the question are also flawed and, in some cases, make things worse. Taking any action without knowledge of the systems is simply tampering, which adds variation to already stressed systems.

8. What do you think is the best way to optimize the performance of a company?

Rally the people through teambuilding	29%
Fix or optimize a few key systems	27%
Implement latest information technology	10%
Increase profit-margin goals	10%
Bring in new people in key areas	10%
Increase revenue growth rate goals	6%
Reduce real costs	4%
Cut expenses across the board	4%

The best answer here is *fix or optimize a few key systems.* In most cases, nothing improves performance like optimizing the few key systems that are holding the company back. Because all systems are connected, optimization in key areas creates synergies throughout the organization and even to customers and suppliers. The second best answer is to reduce real costs. Systems optimization naturally reduces real costs, usually significantly. In certain circumstances, people really are the issue and require us to *bring in new people in key areas.* Remember, however, that bringing in new people will not change results unless systems are optimized. Like bringing in new people, in some cases we must *implement the latest information technology.* Be aware that, even when absolutely necessary, implementing new technology will take longer and be more expensive than even the highest estimates. *Rally the people through teambuilding* may give a short-term boost to the company but it won't last without systems work. The other answer options will usually make performance worse, not better.

_____

9. In making decisions in a business, what do you think most influences those decisions?

80% logic / 20% emotion	47%
50% logic / 50% emotion	17%
100% logic	16.5%
20% logic / 80% emotion	12%
100% emotion	6.5%

The answer to this question will likely surprise many. The best answer is *100% emotion.*

In fact, every decision that the human mind makes is driven by emotional energy and only later backed up with logic. It doesn't matter if we're running numbers in a spreadsheet, picking out a dress or ordering dessert, the mechanics are the same—emotion before logic. Think how this may affect your decision-making. Notice most leaders and managers believe that logic drives emotion rather than vice versa. The further you get away from 100% emotion as the driver, the worse your answer. For those who are not convinced, we have an exercise we do with skeptical executives which proves the point.

_____

10. What causes the most frustration for people in the workplace?

Poor leadership	24%
Poor direct management	21%
No passion for the job	19%
Poor systems	11%
Not enough private life	10%
Poor business planning	9%
Not enough money	4%
Too far from work	2%

This question is really a look in the mirror for leaders and managers. Without doubt, the root causes of most frustration in the workplace is *poor leadership, poor direct management* and *poor systems* where people cannot feel successful in their jobs. The mind of top management shapes the culture of the company. Poor or faulty thinking by leadership equals a troubled culture. Poor direct management impinges on every aspect of the workplace experience for most employees. Poor systems imprison an employee in a no-win situation. Is it any wonder that 70% of the U.S. workforce is disengaged in the workplace? If I could wish any single improvement to leadership and management worldwide, it is systems thinking. No matter how poor leadership or management may be, systems thinking will create a dramatic improvement.

Bonus Question

I have one final bonus question for those of you who are interested in the costs of bringing sustainable systems optimization to your company and people:

What is the average ROI for doing in-depth, sustainable, systems optimization work in conjunction with systems-based staff training?

> **A. 300%–1000%**
> **B. 100%–300%**
> **C. 50%–100%**
> **D. 47%**
> **E. 28%**
> **F. 10-25%**

The answer to this question can be found after the scoring summary below.

The Biz Brain IQ Test is designed to introduce you to the power of systems thinking and the roles of leadership and management in harnessing that power. The test challenges many of the old beliefs about leadership and management that now go unexamined. It is also an opportunity for you to get a feel for where you stand in relation to other leaders and managers as relates to systems thinking and the use of systems optimization tools as your best bet for resolving problems and significantly improving the performance of your company.

Check out your score and, if you have questions, feel free to contact me anytime.

Scoring

150–200—You are a genius leader or manager. You're probably in the top 1–2% of all leaders or managers. Your business will likely dramatically outperform those of your competitors. You are probably being recognized as a leader in your industry and business in general.

130–149—Congratulations! You are for the most part a good leader or manager. Your business is probably doing well in relation to your competitors. You may be seen as a leader in your industry.

110–129—You are about average and probably a somewhat effective leader or manager. Your business is probably performing about the same of your competitors. Your company could be doing significantly better.

90–109—You are below average in your knowledge of systems and growing your people. Your business is probably struggling at times and needs work in both systems optimization and growing people.

89 or less—You may have difficulty sustainably solving problems, motivating people or growing the business. Your business will often be filled with drama and expensive firefights. You may well be feeling somewhat overwhelmed or exhausted.

Bonus Question Answer

The answer is A: 300%–1000%. Because ROIs like this are very rare in most businesses, for most leaders and managers this is a hard number to fathom. Yet, throughout a 25-year period of doing this type of work, 300–1000% first year ROIs are where the returns on the vast majority of implementations fell. The point of this question is to get leaders and managers thinking about what they might do to raise their game and most benefit their people and companies. **SMT**

References

1. Biz Brain IQ Test by Dibble Leaders.

David Dibble is a keynote speaker, trainer, consultant, executive coach, and systems thinker. For more than 25 years he has consulted and trained in the workplace, with a focus on his systems-based book *The New Agreements in the Workplace*. To reach Dibble, click here.

Leadership Evolution in a Changing Marketplace

by Laura Huckabee-Jennings
TRANSCEND

Leadership in many industries is undergoing broad systemic change, and ours is no different. The growing number of millennials in the workplace, the globalization of both customers and competitors, increased uncertainty in the marketplace, and increased demands for flexibility all conspire to make a leader's job more challenging. To continue to grow and remain competitive, leaders must continue to evolve their own leadership skills and approaches, and make better use of the talent they hire.

David Raby, founder of STI Electronics, has seen enormous change in his industry and growth in his own leadership as a result. His core principles in starting the business haven't changed, but he has learned in his 30+ years in business to be a better leader and, in turn, his company has grown and responded more successfully to market needs.

Core Principles

Every great business and great business leader has clear principles around which the business is organized. David's core principles were straightforward: Treat people like you want to be treated, and do what's right. As the business has grown and changed in the past three decades, those principles have remained steady; but the way in which David and his company implement those principles has changed to meet demands in the marketplace for both customers and talent.

Treating people like you want to be treated seems like a simple concept. However, every person is unique, so treating them all the same is not very effective. Instead, great leaders work to understand the needs and motivations of each individual, and try to treat each person well, and the whole group of employees fairly. In many successful companies, leaders have learned that if you want to treat your customers well, it starts with treating your employ-

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ees well. Happy employees make happy customers. For David, this translates into loyalty and transparency. Treating people well over time—even when times are tough—creates mutual trust and respect that pays dividends with both customers and employees.

Doing what's right is a slippery concept, since reasonable people may disagree on what is "right," but at STI Electronics, David puts himself in the shoes of the customer and tries to imagine what would seem reasonable to them.

David Raby

The Leader's Role

Growing a business requires completing various management tasks, and over time stepping up to leadership and out of management. Management is about making decisions, delegating tasks, and solving problems. While a leader may still make major decisions, leadership is more about helping others solve problems for themselves. Leaders set direction, clarify roles and make sure the right team is in place, giving the team room to operate.

David says this particular lesson has taken him most of his career to really absorb—to trust people and let them do their jobs. He focuses on hiring people with the right attitude and fit with the company, and has learned to trust that his people care about the results just as much as he does. Trusting his people has been key to allowing the business and his people to grow.

Finally, David's leadership role includes making the hard decisions of moving on from a customer or firing an employee. One clue is that if almost every meeting includes a discussion of one customer or employee, that is a relationship that is eating up resources and perhaps not creating value for anyone. Leadership is recognizing that fact and making the hard call to move on and stop trying to fix a relationship that isn't working.

Leading a Changing Workforce

One of the most challenging dynamics for leaders is a shift in the workforce as younger workers enter the business, bringing with them a different set of expectations and ideas about work. Millennials are making it more evident than ever that leading employee engagement is critical to keep good employees and get the most from them. Employee engagement is what determines how much discretionary effort you get from an employee. It is the difference between someone who punches a clock to get paid and someone who is actively thinking about how to make the business more successful and offering up extra time, ideas and effort to make things better.
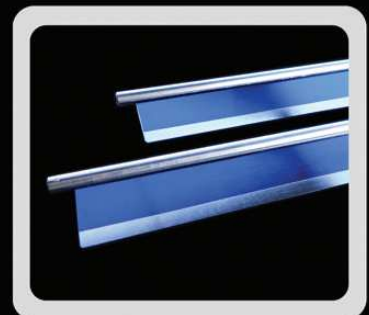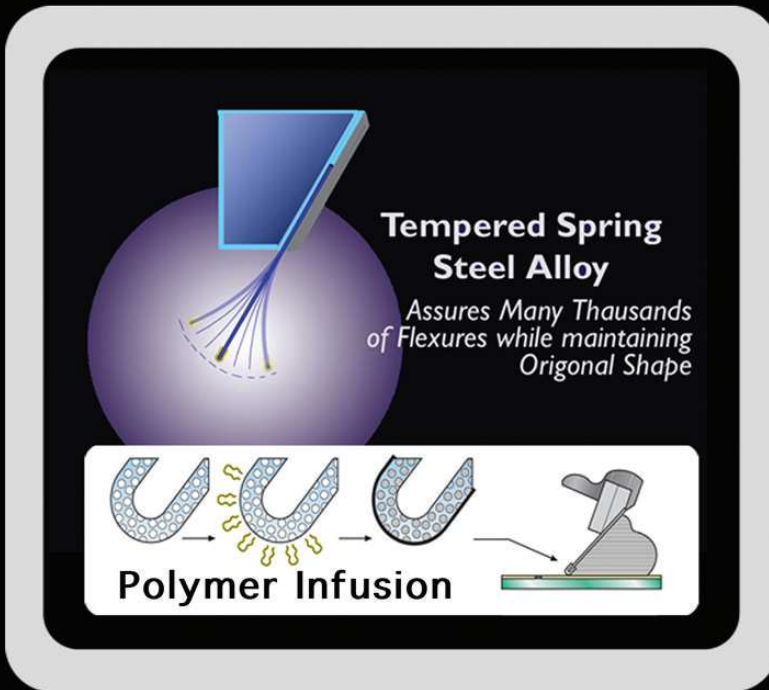
Three keys to employee engagement are relevant at any age, but they seem to be more evident in younger (or young at heart) employees: autonomy, mastery and purpose (Drive, Daniel Pink, 2009).

Autonomy

Employees seek to have input on how they get their work done. If you give someone a task, project, or goal, that individual wants to have some ability to customize how they achieve that goal. This level of autonomy is the opposite of micro-managing. For many managers, this is the hardest element of engagement to develop. Instead, they rely on mindsets like, "It is easier to do it myself," or "They don't know how, so I need to show them." While new employees or new tasks might require some instruction, it often requires less than you think. The way you have always done something isn't necessarily the only way to do something, and you may be surprised by the new ideas that others will develop if you let them work on the "how." This is a big part of David's "trust them to do their jobs" lesson in leadership: "I've always said I only wanted to hire people smarter than me, but then I would limit how they worked, making their smarts less relevant. Giving them the freedom to experiment on better ways to do their jobs (which was really hard for me to do) allows those smarter people to develop better ways for our company to move forward."

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Mastery

The second key to employee engagement is a sense of mastery. We all want the sense that we are developing skills and becoming an expert at something. For David, this is an easy fit, since training is a core business for STI Electronics and employees are encouraged to enroll in training and continually hone their own skills. In fact, one of David's best employee pipelines is in taking interns and putting them through training and development to meet workforce needs 3–5 years out, not just immediate needs. "If I need a five-year veteran, I might hire that experienced person, but also hire a less experienced person at the same time to put through training to build experience and fill a need in the future. It doesn't always work out, but it is an investment in that person and in the future of our business." Continually growing the skills of your workforce is critical to keeping them engaged and excited about their work.

Purpose

Finally, employees want to feel that their work is important and that it makes a difference in the business, and in the world. This is particularly important for the millennial generation, although we all like to feel that our work matters. David makes a point of sharing with all employees how the products they help make change lives, from safety devices to imaging; when customers can attest to how the end product made a difference, David makes sure every employee gets to hear those stories. Making a real difference to the end user helps keep STI Electronics employees engaged and motivated to build a quality product.

Continual Learning Is Essential

One thing is for certain, change in our industry will continue as technological, social and economic factors continue to drive the dynamics of how our businesses compete and grow. For leaders to be successful, the key to remaining competitive is to identify core operating principles or values, to do the work that truly only you can do (and let others thrive in their own roles), and to continue to learn and evolve as a leader. David Raby is just one example of how the most successful leaders continue to add new skills and ideas to their leadership practices and continue to get better throughout their careers.

Key questions to ask yourself to keep developing and learning as a leader: How am I helping my people develop to take over more business roles? Where am I holding onto an old habit that might be holding the business back? What new ideas about leadership could I test in my organization to address some of our challenges?

Exceptional leadership is more about asking the deep questions that provoke new thinking than about having all the right answers. **SMT**

Laura Huckabee-Jennings is the CEO of Transcend.

Single Photon LEDs for On-Chip Integration

Atomically thin LEDs emitting one photon at a time have been developed by researchers from the Graphene Flagship. Constructed of layers of atomically thin materials, including transition metal dichalcogenides, graphene, and boron nitride, the ultra-thin LEDs showing all-electrical single photon generation could be excellent on-chip quantum light sources for a wide range of photonics applications for quantum communications and networks.

The research, reported in Nature Communications, was led by the University of Cambridge, UK. Authors of the research include Professor Mete Atatüre (Cavendish Laboratory, University of Cambridge, UK); Professor Frank Koppens (ICFO, Spain), leader of Work Package 8 – Optoelectronics and Photonics; and Professor Andrea Ferrari (University of Cambridge, UK), Chair of the Graphene Flagship Management Panel, and the Flagship's Science and Technology Officer.

INSPIRING OTHERS:
The Key to Leadership

by Stephen Las Marias
I-CONNECT007

In an interview with *SMT Magazine* during the recent NEPCON South China trade show in Shenzhen, Jean-Marc Peallat, vice president of global sales at Vi TECHNOLOGY, shared his thoughts on the role of a leader and how it differs from that of a manager; how management has evolved over the past decade; and why inspiration is the key to leadership. He also discussed how to lead the younger generation, and what the office or shop floor will look like 10–20 years from now.

Stephen Las Marias: *Jean-Marc, please briefly describe your role at Vi Technology.*

Jean-Marc Peallat: My role at Vi Technology, as global sales VP, is to manage the cross-cultural Sales and Applications teams across Europe, Asia and Americas. Of course, the obvious key metric on that position is to generate the revenues of the companies but the key metric is to grow company's customer base by creating long term relationship with our customer. This is possible only if you offer solutions that match customers' expectations, if you provide state of the art service and if you associate customers in new product development.

Las Marias: *How do you know if you are an effective leader?*

Peallat: It's a tough question. And it would be very pretentious to state myself as an effective leader! But, I would say that an effective leader is able to achieve his goals while sharing his objectives and vision with his team.
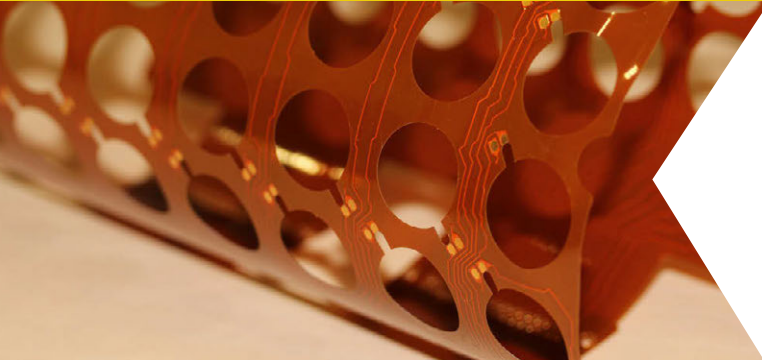
Las Marias: *So a leader inspires them.*

Peallat: Yes. There are two ways. You can achieve your goals with a team puzzled, segregated by functions or department with no chemistry when execution of the plan is key. If you are lucky, it works! But when time gets harder, when competition gets stronger, you won't be able to succeed as you may consume too much energy within the teams. With leadership, despite differences due to their activities, teams share the same vision and same global objectives, they understand each other and support each other. They are open to change to enable success. The leader is the one who creates this

Jean-Marc Peallat

chemistry. This is key when conditions are getting tougher. At the end of year, when reaching your objectives in such conditions, you are not just achieving, you are accomplishing.

Las Marias: From your perspective, what is the difference between a leader and a manager?

Peallat: For me, the main difference is the vision and the way a leader inspires others. Management is more technical in the way that you organize and prepare the team. Management brings a degree of order and consistency. We are in the delegate-control modus operandi. A leader sets directions and develops a vision for the future, not necessary long term. He enables tools to achieve that vision. Impacts on the team are about motivation, ability to accomplish more together and development of the individuals.

Las Marias: Do you think leadership has evolved over the past decade?

Peallat: Yes, management has evolved, but leadership has evolved also. Not in the way that the leader acts, but by the way that other people see the leaders. For me, the leader is always the guy who gets the flag and moves with the flag, but the younger generations have different values in life. Twenty or 30 years ago, that generation was work centric. They put a lot of energy into work, so the leader, at the work place, was more about

work. Today, the younger generations look at the leader as someone who has value in life as well. The way you act in your personal life, I think for the millennials, is important. Their leader has to also have a life that is inspiring, with value and with contribution to the community and not just work.

Las Marias: You mentioned the younger generations—the millennials. Some of the analysts are saying most businesses are wary of the millennial because they are the generation that doesn't want to be managed. From your perspective, how do you motivate the younger people who have joined the workforce?

Peallat: You're right to say that this new generation has a new approach to work. A hundred years ago, management was hierarchical: "You do what I say." After world war II, it did evolve gradualy to be more participative, more centered on people. It looks like the new generations are more in the freelance mood when they work with you, but they still need leadership. Their management has changed, but the leadership, and the person who will inspire them, is still needed. I think again even if the management changes, the way that you inspire is just a question of showing them the way to success in their life and not only at work. That doesn't change. As I just mentioned, life values, caring about the community and the planet are key. More and more, you have to show that you take care of global impact on the society. For me, that's the way we lead, by example.

Las Marias: What is the role of a leader when it comes to training your staff or making sure that your staff are up to date when it comes to the knowledge base in what they do?

Peallat: I would say training is more of a management role because it's more about making sure that your team is operational. Even if you are not a great leader, being a great manager ensures that your team is up to speed. I think the leadership portion in that is just again showing the way and making sure that they understand the big picture. In today's world, training and education are key along your career. World is changing so fast
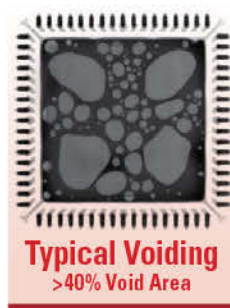
that you cannot rely only on your degree earned at the university. People will have to be continuously trained. The leader should explain this to encourage people, and not only the youngest, to acquire new skills.

Las Marias: *Jean-Marc, what do you think the office or the shop floor will look like 10–20 years from now?*

Peallat: With mobile technology, I think people are now working from almost anywhere. We already started to see that trend. With cloud technologies, the company is virtually everywhere and can be accessed as long as you have a connection. The new generation, as I mentioned earlier, are more freelancer type of worker. They want to balance life and work. I believe that the office will be a very small space where people meet and we will see less and less big buildings with a lot of cubicles. I think that will be over. When you look at the startups, you see offices with a very casual atmosphere where people work on their own and it's very simple and informal. Even big corporations are trying to move away from this scheme, their organization is changing to introduce smaller cells with higher energy level to enhance the activity.

I think business will get away from this formal, strict environment because the younger generations expect that. Millennials want to balance their life and do not want work to be their focus. It means they want to be able to mix work sessions with personal life sessions and break the cycle of commute-work-commute-sleep. When I look at my kids today, they are working on a few projects with different companies, they are able to change quickly from one project to the other, from one company's culture to another one. They manage their time. I think that mode doesn't fit a square cubicle. I see it being very open: no more cubicles, small spaces dedicated to meetings. People will work outside of

the office, may be 10,000 kilometers away, from their home or remote places. They will come back physically or virtually to share their work, to meet teams and will go away again.

Las Marias: *What can you say about NEPCON this year?*

Peallat: It was a very good show. I was surprised by the number of visitors. Of course, on our side, we had our new 3D AOI, so we got a lot of attention. Vi TECHNOLOGY with 20 years' experience in 2D AOI is one of the few companies that can provide really good and pragmatic 3D AOI solutions. There is no good 3D AOI without best in class 2D AOI. We are seeing a consolidation of the different areas of inspection. Industry 4.0 is now everywhere. We talk about productivity, line efficiency and process control. This future requires more intelligence along the manufacturing lines which cannot be answered with MES software. In China now, we see tremendous efforts to reduce the workforce as costs are getting higher and higher. We are going through the same path than Europe or Americas 15 years ago. The main difference is that technology allows more automation today at all stages. On our side, we need to provide our customers with more accurate systems, this is key for automation, with more software solutions to help them.

Automation is big. We see automation everywhere. A lot of robotic companies are here. I was surprised also by the number of local companies. Shenzhen has changed quite a lot where 5–10 years ago it was mainly Western or an external company coming to China. Now I would say two-thirds of the companies are local Chinese companies. That's the way that business has evolved here.

Las Marias: *Automation is one of the real hot topics nowadays, but automating your production line involves a lot of investment. How would companies justify investing in automated lines or advanced lines?*

Peallat: Of course there is the labor cost, which is the clear short-term benefit, but you also have quality and reliability. When your process is set with robots or automation, it's very stable. When you rely on people you may introduce more defects. Justification is twofold. When you say higher quality, it means less rework or less cost of nonquality. Also with total automation, you can manufacture everywhere with full flexibility of your assets.

Las Marias: *You mentioned quality and reliability. Before, people were not really into inspection equipment because according to them, they don't need it. Nowadays, because of quality and reliability issues, more and more manufacturers are really looking into installing inspection systems in their processes.*

Peallat: It's true. What we see now is that inspection is going into every single step of the SMT line. Of course, most popular are solder paste inspection and post-reflow inspection but now we have also pre-reflow. It means for one line now you have three points of inspection. Then you control your process at every single step. If you do that, the quality at the end is under control. Of course, the inspection changes as technology changes, so the quality of the inspection is also now getting higher and higher.

Now, we are talking about zero defect lines. Clearly in a few months, maybe the next years, most of the assembly line will be almost free of operators. The inspection machines will talk to each other and will talk to other equipment. The control loop will be fully automated. Inspection is getting more involved and in different locations. But, in order to achieve this, you need accuracy, and not just repeatability. This has always been our core advantage versus our competition for years.

Las Marias: *Not to mention that a lot of the products right now are getting smaller and smaller.*

Peallat: Yes, it's very difficult for a human visual inspection. When you have 0105s, it's already difficult; but you have components now that are four times smaller. You can't see it and you cannot repair it. That's the reason why you have to prevent it. Inspection used to be the goalkeeper at the end of the line. For years we were talking about preventing and preventing, but today it has become a must. You have to do it.

Las Marias: *At the end of the day, if failure happens, its cost is bigger than had you just invested in making sure that your line was top notch.*

Peallat: If you have an issue or a failure on your PCB, luckily you can maybe able to catch it at the end of the line and repair it, but then it's already a substantial cost. If some of the defects go to the consumer or end user, costs to repair are 10 times higher. I am not including all potential damages to the consumer himself or third party. This will become more and more critical with all the automation in our lives. You can just imagine what can happen with a defective self-driving car. But this is also important on the consumer side, when you pay a few hundred dollars for your phone and it fails, that's a problem too. Even if you can get a replacement quickly, it has a cost for the manufacturer. The only way to prevent all these is to do the inspection after every single process step. That's key.

Las Marias: *As a final question, how do you see your industry developing over the next few years?*

Peallat: For inspection in SMT what we see is most of the inspection companies are doing all types of inspection. People who were just in the SPI business came to AOI and AOI companies went to SPI. Now, most of the players are offering the complete solution. Software will be more and more important, as well as the ability to use this information. Today, we have a 3D image of the solder paste process and we have a 3D image of the component. How do we use all this information? It's a lot of information, first of all. Secondly, it's also more and more difficult for the operator to analyze this. Software will be key. Vi Technology is also working on the software side to develop tools that are usable by people, not only a PhD that analyzes data, but people on the line that can use and quickly interact with the assembly line.

Las Marias: *Great. Thank you very much for your time, Jean-Marc.*

Peallat: You're welcome. **SMT**

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Highlights

Zentech Subsidiary Colonial Assembly and Design Receives $37.1M Navy Contract

Colonial Assembly and Design LLC, a wholly-owned subsidiary of Zentech Manufacturing Inc., has received a United States Navy contract award in the amount of $37,191,138.00 to provide design and fabrication, rapid prototyping, and technology integration related to circuit board design and RF distribution assemblies, synthetic rope assemblies, mechanical fabrication, and fabric assemblies.

Milwaukee Electronics Names New CFO

David Cascio, an industry veteran with over 26 years of experience in organizational improvement initiative implementation, strategic planning, cost analysis, and ERP systems optimization, has joined Milwaukee Electronics as chief financial officer.

AWS Electronics Passes Nadcap Accreditation for 5th Year in a Row

European EMS firm AWS Electronics has announced that its facility in Newcastle-under-Lyme, UK, has achieved certification by Nadcap, with flying colors, for the fifth year in a row.

Orbit International's Electronics Group Receives Finalized Purchase Order for its Switch Panels

Orbit International has announced that its Electronics Group has received a finalized purchase order from a major prime contractor for approximately $1.06 million for its switch panels.

Primus Technologies Hires Paul Cary as VP of Operations

EMS firm Primus Technologies Corp. has announced that Paul Cary has joined the company as vice president of operations.

Fabrinet Reports 34% Revenue Jump in 4Q FY2016

Fabrinet has announced revenue of $276.4 million for the fourth quarter of fiscal year ended June 24, 2016, an increase of 34% compared to total revenue of $206.5 million for the comparable period in fiscal year 2015.

Rita Lane Joins Sanmina's Board of Directors

EMS firm Sanmina Corp. has appointed tech industry veteran Rita Lane to the company's Board of Directors effective September 9, 2016.

Benchmark Electronics Appoints Paul Tufano as President & CEO

Benchmark Electronics Inc. has named Paul J. Tufano as president and chief executive officer, replacing Gayla J. Delly who has resigned from her positions as president, CEO and as a member of the board of directors, effective immediately.

Sparton Showcases Future Naval Capability

Sparton, working closely with the Naval Undersea Warfare Center (NUWC) and industry partners, demonstrated the launch of an unmanned aerial vehicle from its Hammerhead system at the recent Annual Navy Technology Exercise in Newport, Rhode Island.

Libra Industries Takes Its SPI Speed and Accuracy to the Next Level

Libra Industries has boosted its inspection speed with the installation of its new Omron CDK VP5200-V Solder Paste Inspection system at its Mentor facility.

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BUILDING BRIDGES
WITH CROSS-CULTURAL TEAMS

by Susan Mucha
POWELL-MUCHA CONSULTING INC.

We live in a global society and one of the challenges can be learning to manage effectively across different cultures. I was fortunate to grow up in an Army family, making my first international trip at the ripe age of three months and then frequently moving around the world in the course of my childhood. Growing up in different cultures gave me a much different perspective of culture and its influence on behavior than I would have had growing up in a single culture. Most importantly, it helped me learn to view the behavior of people in other cultures through their cultural paradigms rather than through my own cultural paradigms. I think that is the one skill that leaders managing global teams should focus on mastering first.

Years ago I had a conversation with a Japanese engineer that illustrates the depth of the differences one may find on a cross-cultural team. He received his undergraduate degree in Japan and his graduate degree in the U.S. I asked him what he felt was the biggest difference in pursuing degrees in two countries. His

answer was, "the size of the book." I asked him that was because of the difference between the amount of space kanji (Japanese characters) and English characters required. He shook his head and went on to explain that Japan was a homogeneous society where everyone was educated the same way. The books could be very short because everyone had the same frame of reference in terms of the concepts introduced. Conversely, students in U.S. universities came from a very diverse set of educational experiences. The books needed to be longer to ensure that explanations were detailed enough to provide everyone with the same educational foundation.

From a sociological standpoint, cultural perspectives are a lot like that example. Some cultures are high context, meaning there is an unwritten set of rules of behavior that everyone in that culture understands. Examples would include most countries in Asia, India, the Middle East and Latin America. Conversely, low-context cultures like the U.S. have a very broad spectrum of acceptable behavior. Culture clash can arise when someone from a high-context culture meets an outsider who doesn't know the rules. The person from the high-context culture

sees ignorance of the "rules" as bad and/or rude behavior. The person from the low-context culture doesn't have a clue that what is acceptable in his or her culture is not acceptable in every culture. In team situations this can lead to lack of communication, open friction or employee grievances. In selling or negotiation situations, it can lead to loss of a sale or an inability to reach a mutually-agreeable resolution.

Eliminating Culture Clash

As a manager, how can one best eliminate culture clash in cross-cultural teams? First, learn a little about the cultures of the people on your team. That may be easy if the team membership is limited to a couple of cultures, but a little more challenging if several cultures are involved. Second, create an environment where team members feel comfortable discussing what is working and not working in the process. Many times issues that arise from conflict in perceptions of the "right way to do things" go away when people discuss the differences between their perceptions and reach a mutually agreeable solution.

For example, when I worked at an EMS provider in Mexico, we had a problem with program managers overcommitting to customers. We held an internal team meeting with all pro-

> " So if a customer asked for something that wasn't achievable, the culturally correct response was to agree to it and try one's best to make it happen. "

gram managers to discuss the issue. The answer the program managers gave was that in Mexican culture is considered rude to disappoint anyone. So if a customer asked for something that wasn't achievable, the culturally correct response was to agree to it and try one's best to make it happen. When it didn't happen, the culturally correct response was to explain how

hard you tried and have a really good reason for why it didn't happen. And in Mexico, a person hearing that reason would understand that it was unavoidable and be appreciative that the program manager had tried really hard to make it happen. We then discussed the likely perspective of the U.S. customer and how an affirmative commitment followed by a really good excuse put them in an embarrassing position. From the U.S. cultural perspective, the program manager failed to deliver on a commitment. Conversely, telling the customer immediately that their request was not achievable and offering them resolution options that were achievable, enabled the customer to pick what option would work best. Once the team realized that failing to follow through on a commitment created an embarrassing situation for the customer at their place of employment, it was easy to drive appropriate changes in "commitment" behavior. Going through the process of openly exchanging perspectives built stronger team relationships between Mexican and US team members.

Negotiation or Arguing?

In negotiations, cultural conflict often arises in regions where arguing is considered rude. Mexico and most of Asia are culturally very polite. In Asia, disagreement can lead to loss of face. Often the solution is avoidance of the discussion of the issue in order to eliminate the possibility that the other party will lose face when proven wrong. In Mexico, there is little difference between criticism of a behavior and criticism of the individual, so any disagreement potentially insults the other party's judgment relative to the feasibility of the request. In cases like these, the sign that there is a problem is often lack of a response. If emails go unanswered or the person seems to avoid the issue that is generally the signal there is no desire for further discussion of the issue or that the individual does not see a path to discuss it without appearing rude. I've found that the best way to approach that type of impasse is to work to build a strong enough relationship that the issue can be revisited and explored in casual conversation. In some cases, reassignment of personnel may be necessary. For example, in one case in Asia I found a program manager assigned to work with Euro-

pean customers who felt the negotiation behavior of German customers was too aggressive, and she was very uncomfortable. The optimum solution was reassigning her to manage Asian customers while assigning a member of the team who was more comfortable with aggressive negotiating styles to the European accounts.

Communications and Cultural Conflict

Another area where cultural conflict can arise is in communications. For example, in technical discussions, language differences often drive the biggest communications mistakes. In many cases, it isn't a pure lack of second language competency. Instead, it is a combination of use of unfamiliar jargon and fear of embarrassment. In countries other than the U.S., fluency in multiple languages is considered the norm. People viewed as not being fluent are perceived as less competent than peers with better language skills. But even individuals who are highly fluent in multiple languages may not be fluent in localized idioms, company-specific acronyms or jargon. The tie between fluency and competency discourages questions on points which aren't entirely clear. As a result, an individual who speaks English as a second language may agree to what he thinks you said rather than ask the questions necessary to fully understand a project objective. Good communications practices include:

- Team training and discussion on the value of clarifying questions in complex projects to create a comfort zone relative to asking questions
- A focus on avoiding idioms, jargon and acronyms that may not be globally relevant
- A pattern of written communications followed by phone discussions to make it easier for key points to be understood
- Slowing down conversations and repeating key points several times to give people who are mentally translating time to process information or catch up after brief lapses in attention
- Verbally testing comprehension by asking other team members to restate key points and commitments.

Communications style is important. Many high-context cultures value politeness. For example, in Mexico it is very customary to start conversations by discussing family or other personal things rather than jumping straight to business. Being short with someone in Mexico can have consequences. Years ago I came out of a meeting with a long and time-sensitive action item list and my secretary met me at my office door with a stack of phone messages. I looked at her and said briskly, "Not now, Veron-

> **"Many high-context cultures value politeness. For example, in Mexico it is very customary to start conversations by discussing family or other personal things rather than jumping straight to business."**

ica." The minute I said it I could see the look of hurt on her face. We had previously had a great working relationship, but took me months of being exceptionally polite to repair the damage I'd done by not stopping to talk with her politely because she was really insulted by my lack of what she perceived as good manners.

Time sense and focus in communications can also be an issue. In another example in Mexico, it became necessary to reassign a program manager who wouldn't change his style to fit the style of his customer. The program manager got things done, but he wasn't a detailed communicator. The customer wanted detailed meeting minutes and frequent updates. Moving the account to a program manager capable of meeting those expectations solved the problem.

Time sense also plays a role in meeting success. In some cultures, starting a meeting on time is critical. In other cultures, meeting start times are very fluid. For example, in some parts of Malaysia, a meeting scheduled for 8 a.m. that

starts by 10 a.m. is considered on time. That can difficult to explain to a customer with a more rigid cultural perception of "on time."

Language and Learning

Training is another area where problems can arise in cross-cultural teams. For example, when the EMS company that I worked at in Mexico decided to upgrade its ERP system, management made the decision to conduct all training in English because the team members using the system were all fluent in English. Once training started, the bulk of the purchasing department was consistently failing their tests. The

> " Once training started, the bulk of the purchasing department was consistently failing their tests. "

company president, who was Mexican, was the first to identify the problem. He remembered that as a student in Chihuahua he had studied math and physics in English to better prepare for study at a U.S. university. One of the things he had discovered over time was that even though Spanish was his first language, because he had learned his basic math and physics concepts in English, he found it extremely difficult to do advanced study of those subjects in Spanish. Conversations with purchasing personnel uncovered the same pattern. They had learned supply chain management concepts in Spanish and learning the new system through English training was making it difficult to relate the new information to the concepts they understood. The training was switched to Spanish and the ERP implementation went smoothly from that point on.

Learning to Think Globally

I've often thought there are two distinct types of people: those who are comfortable working globally and move among different societies with little cultural conflict, and those who are uncomfortable outside of their own culture. These global people don't have all the answers, but they have learned to watch and listen for cultural cues when visiting new countries or dealing with people from unfamiliar cultures. Their openness to new ideas and new relationships builds bridges with every new conversation they have. Conversely, those who are uncomfortable often try to avoid this learning experience and consider anyone who is different to be less educated or uncouth.

This dichotomy of comfort level occurs in all cultures, so it is important to understand that in some cases no matter how hard one tries to build a bridge with a team member from a different culture, they may not be open to it. Generally, one can tell whether or not a bridge can be built in the first five minutes of conversation. Global people will find shared values and common interests. People who are culturally rigid will tend to complain about the other's culture or resist attempts to have anything but a purely business conversation.

Strengthening Relationships

While not appropriate in all cultures, socialization is often a good way to strengthen team and customer relationships. This can be particularly true when visiting the other's country. Make a point of eating local cuisine with team members or customers either at lunch or dinner, depending on what is appropriate for the situation. Where appropriate, try to reserve some time for casual conversation about family, hobbies, regional attractions or topics of interest to the others present. The more you discover shared values or interests, the stronger the relationship becomes. If you are travelling to a new country try to read up on language, customs and general information ahead of the trip. Learn a few polite phrases in the language of that country. I've found that just making a small effort to speak a host's language sends the signal that I value the relationship. I've also found that building a "day to explore" into new country visits enables me to discuss what I've seen with my hosts and the fact that I've taken the time to visit a museum, monument or just

walk about learning about the country, makes a very positive impression.

When dealing multicultural team members in your country, find ways to be inclusive. At a working team level consider multicultural lunch pot lucks or if you go out to eat as a team periodically for lunch, rotate through ethnic restaurants to get a taste for each team member's home cuisine, if possible. In short, make every team member feel valued through interest in their culture, cuisine and traditions. The dividend of this type of relationship building is often the ability to discuss "culture clash" easily when it occurs.

Working cross culturally is a continuous learning experience. Understanding the behavior patterns driven by the cultures of your team members, having discussions about differences and similarities, and creating an environment where people who are uncomfortable can discuss their concerns can go a long way to eliminating cultural conflict and building strong teams. **SMT**
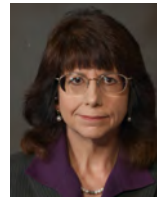
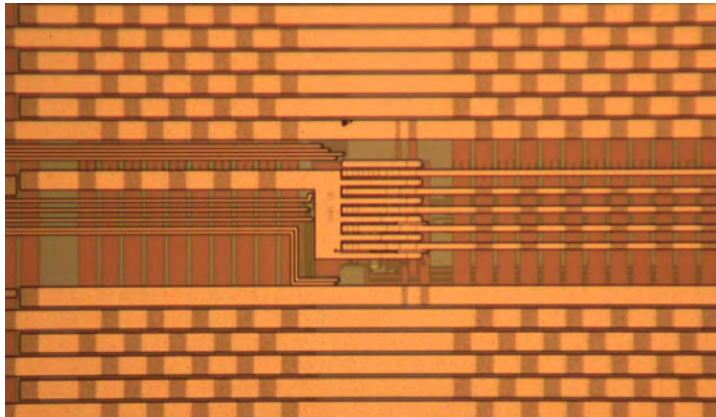**Susan Mucha** is the president of Powell-Mucha Consulting Inc. To reach the author, click here.

Reconfigurable Chaos-based Microchips Offer Possible Solution to Moore's Law

Researchers at North Carolina State University have developed new, nonlinear, chaos-based integrated circuits that enable computer chips to perform multiple functions with fewer transistors. These integrated circuits can be manufactured with

the work, and NC State colleague William Ditto, professor of physics and dean of the College of Sciences, worked on the conception, design, development and fabrication of an integrated circuit chip that contains working nonlinear circuits to perform multiple

"off the shelf" fabrication processes and could lead to novel computer architectures that do more with less circuitry and fewer transistors.

Moore's law states that the number of transistors on an integrated circuit will double every two years in order to keep up with processing demands. Previously this goal has been addressed by shrinking the size of individual transistors so that more could be added to the chip. However, that solution is quickly becoming untenable, and the semiconductor industry is looking for new ways to create better computer chips.

Behnam Kia, senior research scholar in physics at NC State and lead author of a paper describing

different digital computations.

In Kia's design, the transistor circuit can be programmed to implement different instructions by morphing between different operations and functions. The heart of the design is an analog nonlinear circuit, but the interface is fully digital, enabling the circuit to operate as a fully morphable digital circuit that can be easily connected to the other digital systems.

The researchers have produced an alternative approach for computing that is compatible with existing technology and utilizes the same fabrication process and CAD tools as existing computer chips, which could aid commercial adoption.

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In this post ITRS era, there is great need for the industry to collaborate in charting a direction into the future. In 2015, the SIA announced their decision to bring ITRS to a close, with the 2015 edition being the final edition. The IEEE CPMT Society took the initiative to establish a technology roadmap focused on heterogeneous integration, to be modeled after the ITRS in purpose, structure, and governance. This initiative quickly found resonance with SEMI, and the IEEE Electron Devices Society (EDS) joined the effort, resulting in the launch of the Heterogeneous Integration Roadmap (HIR). **MEPTEC has moved to participate in this roadmap collaboration.**

MORNING KEYNOTE SPEAKER

Wilmer R. Bottoms, Ph.D.

Chairman, Third Millennium Test Solutions
Co-chair, Heterogeneous Integration
Roadmap (HIR)

AFTERNOON KEYNOTE SPEAKER

William (Bill) Chen, Ph.D.

ASE Fellow and Senior Technical Advisor,
ASE Group
Co-chair, Heterogeneous Integration
Roadmap (HIR)

MORNING SESSION:

Strategic Directions in Heterogeneous Integration

The morning session will address the strategic directions in heterogeneous integration that address the market inflection points and technology fault lines. What will be the crucial roles for integrated phonics for data to the cloud, and for sensing? What technologies will be developed and implemented for the self driven cars be introduced into our cities and byways? How embedded sensing will enable the transition from IoT to IoE around the world.

AFTERNOON SESSION:

Innovations in SiP and Integration

This session will address the major developments in heterogeneous components – power devices, analog, MEMS sensors, photonics, and in SiP integration – fan out, 2.5D, embedded, and co-design technologies. How will the momentum of these technology developments move forward to address road blocks moving ahead? What research areas and ecosystem collaboration will be needed for continued progress? These and more questions will be addressed.

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THINK LIKE AN ENTREPRENEUR

Leadership Toward Greater Meaning

by Frederick Blancas

INTEGRATED MICRO-ELECTRONICS INC.

As we hunker down to begin work on the 15-year roadmap for the 17 Sustainable Development Goals (SDGs) adopted by United Nations (UN) member-countries in 2015, we welcome the fresh emphasis across the UN on collaborating with responsible businesses in delivering sustainable development. There's much to look forward to in terms of various sectors—governments, private enterprise, and civil society—working together toward solutions that would harness the full potential of what all the stakeholders, particularly corporations, can contribute to the development action plan.

The SDGs build upon the UN Millennium Development Goals (MDGs) that expired at the end of 2015. The SDGs' broader sustainability agenda picks up from where the MDGs left off and reaches out much further to deal with the root causes of poverty and hunger, and the universal need for development that will benefit all people.

Realizing this ambitious agenda will require support from all sectors. And now is as good a time as any for collaborative efforts, with businesses finding themselves uniquely positioned in a burgeoning sharing and solution economy that deploys new technologies and innovative business models to solve old challenges. Moreover, in the last decade, sustainability has moved up the priority agenda of business leaders tasked to shape their companies' goals, and has preoccupied a growing number of social entrepreneurs.

Increasingly, business leaders have become a sort of social entrepreneur themselves, aligning aspects of the business with socially meaningful activities that are fulfilled through economic efficiency and entrepreneurial innovation. Today, both businesses and social enterprises are doubling down on fulfilling a social purpose in their activities.

Authors John Elkington and Pamela Hartigan *(The Power of Unreasonable People,* 2008)[4] cite how social entrepreneurs have collaborated with government agencies, nongovernment organizations (NGOs), private foundations, or even big private corporations for resources and markets to carry out their social mission. Some, they add, have even ventured into startups in a continuous drive to innovate, refusing to accept resource limitations.

Their social mission drives them to create social change. Such entrepreneurs start their quest from social challenges, unlike their traditional counterparts who are driven by commercial value. In doing so, social entrepreneurs look at sustainable long-term strategies that will ensure change. They are also known for excellent navigational skills in difficult situations like lack of initial resources. They not only involve communities but also engage profit-oriented businesses to share in their endeavor. Social entrepreneurs, oriented toward inclusive and sustainable development, are thus natural collaborators. As observers have noted, the "social" part of their title is geared toward communities and societies while as entrepreneurs they represent capable sectors that wield much power, like businesses and governments.

Social enterprises have been on the rise in the Philippines. Rags 2 Riches (R2R), for example, produces and sells eco-ethical fashion and home accessories out of upcycled, overstock cloth, and indigenous fabrics. R2R assembles the bags in their own workshops, employing members of their partner-poor communities.

Messy Bessy, another example has a straight-forward branding message: "We clean. We green. We educate." A manufacturer and wholesaler of natural, chemical-free household and personal care cleaners made by at-risk youths in the Philippines who receive skills, education, and mentorship to help their rehabilitation, Messy Bessy not only highlights its products' green aspect and social impact, it works closely with chemists to ensure that its all-natural line is as effective as the next cleaner on the grocery store shelf.

Big corporations, on the other hand, have been implementing their respective sustainability programs over the last decade. As mentioned earlier, sustainability has become top priority on both the CEO and boardroom programs. Business' three pillars are thus profit (making money), people (providing jobs and taking care of employees and community), and planet (committing to environmentally sustainable practices or products).

Michael Porter and Mark Kramer have discussed the impact of social improvements (environmental impact, supplier access and via-

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bility, employee skills, worker safety, employee health, water use, energy use) on businesses: "There are numerous ways in which addressing societal concerns can yield productivity benefits to firms. Consider, for example, what happened when a firm invests in a wellness program. Society benefits because employees and their families become healthier, and the firm minimizes employee absences and lost productivity." [8]

They add that the ultimate goal of corporations embarking on a sustainability program is creating shared value (CSV). Beyond corporate social responsibility (CSR), CSV focuses on economic and social benefits—more specifically, on value creation for the community and other stakeholders.

Thus to assure inclusive and sustainable development, the responsibility rests not only on the corporations, but on the collaboration of corporations, governments, NGOs, and individuals and communities.

A recent McKinsey study demonstrates the growing urgency of sustainability to business leaders: 36% of global CEOs consider sustainability as one of their top three priorities, and more than 10% of CEOs consider it as the top priority.

Arthur Tan, CEO of Integrated Micro-Electronics Inc (IMI), a leading global provider of electronics manufacturing services, said, "We should be able to provide not only profitability and financial growth but, more importantly, ensure that the people that are involved, the communities that we serve, and the products that we build are actually entwined in making the world a better place."

He added that in doing so, IMI creates meaning: "We improve lives because we see potential in our communities, and augment or build businesses that serve all of us."

Gilles Bernard, IMI president and chief operations officer, believes that corporations should go the extra mile to help poor communities. "We do this by engaging either in sustainable community development projects or shared-value businesses. The latter involves having in our portfolio profitable innovative businesses that propose solutions to social problems."

In early 2015, IMI partnered with ChildFund Foundation and Yakap sa Kaunlaran ng Bata Inc. to gather women of the San Pablo Parents' Association to form a group of seamstresses. The collaboration aimed to provide the women with a sustainable livelihood. Besides giving them sewing machines, IMI also secured the participation of Krizia ladies wear, one of the country's popular fashion brands, to ensure the project's sustainability and act as mentor and quality coach. When at last the brand's quality standards were met, the community became a subcontractor of Krizia for ready-to-wear items. Eventually, the community could be part of IMI's supply chain, providing corporate uniforms.

In partnership with the British Council, Laguna Water Corporation, Ayala Corporation, and the Ayala Foundation, IMI will run a boot camp on social entrepreneurship for 15 Laguna communities on 3–7 October 2016. With expenses considerably minimized via collaboration with other institutions, IMI will be instrumental in making 15 communities learn to manage their livelihood projects. Six of these communities will be receiving funding and all community projects will be monitored to ensure profitability and sustainability. Every year, IMI aims to provide skills—and hope—to at least 10 new rural communities.

IMI believes that the ability to profit and sustain growth drives innovations that improve the public good, make progress in the fight against climate change, and enhance lives and livelihoods. It assembles for original equipment manufacturers (OEMs) safety electronics and pollution reduction systems in cars, theft pre-

vention systems for homes and buildings, medical diagnostic devices for wireless monitoring of vital signs, and dosimeters for measuring exposure to ionizing radiation, among other products that address social and environmental concerns. The company hopes to do more of these types of products; proactively, it can develop platforms for such products by leveraging external expertise and funding like those provided by universities and foreign and local government institutions.

Imagine that six of 10 Filipinos who succumb to sickness die without ever seeing a doctor because of expensive medical services. At the same time, in India, electronics giants like GE Healthcare and Medtronic have developed more affordable yet effective medical equipment like ECG testing machines and hemodialysis systems for deployment to rural areas, bringing down the costs of medical services. IMI is reaching out to Filipino universities to co-develop with IMI engineers platforms for medical devices or equipment in the hope that these can help Filipinos have access to improved and affordable medical care.

Perhaps we could all take a leaf from the life of commitment led by the newly minted saint, Mother Teresa. Shane Claiborne, a Christian activist and writer, recalls how, while working with the charity in the '90s, he had been struck by the sight of the missionary's terribly misshapen feet. One of the sisters explained that because there were just enough donated shoes to go around for everyone, Mother Teresa took the worst pair of shoes for herself. Years of wearing the worst pair thus deformed her feet. Claiborne goes on to challenge our culture's raging narcissism and materialism, proposing an alternative—what might the world look like if we literally loved our neighbor as we loved ourselves? What if we really did "honor the needs of others above our own"?

We can take heart that today's effective private-sector leaders (social entrepreneurs or CEOs) have been showing the way toward greater significance through innovation and shared-value creation for a wider base of stakeholders—the others, the neighbors—rather than simply making profuse shareholder value. These emerging leaders are distinguished by their ability to collaborate with different sectors in imagining and implementing programs that address their social mission. This is the leadership mindset that is certain to take its place up there with the timeless qualities of great leadership, such as integrity, passion, courage, and vision. **SMT**

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Frederick Blancas is the Sustainability Manager of Integrated Micro-Electronics Inc. (IMI). He is grateful to Danielle Afuang, a student-intern, for helping him with his research for this article.

Electronics Industry News
Market Highlights

Strong Stock-Up Demand Pushed Prices of 4GB DRAM Modules to a High of $14 in August

DRAM prices in August were on an upward trend as they were in the previous month. The monthly average of contract prices for 4GB modules (DDR3 and DDR4) rose by 2% sequentially to $13.5, while the monthly high rose by 3.7% sequentially to $14, according to DRAMeXchange.

Global Revenue of NAND Flash Market Up 3.4% Sequentially in Q2

In the second quarter of 2016, demand for high-capacity eMMC/eMCP from Chinese smartphone brands and the stock-up activities ahead of the iPhone 7 release caused a gradual tightening of NAND Flash supply.

Flat Smartphone Growth Projected for 2016 as Mature Markets Veer into Declines

Worldwide smartphone shipments are expected to reach 1.46 billion units with a year-over-year growth rate of just 1.6% in 2016, according to the latest forecast from International Data Corp.'s (IDC) Worldwide Quarterly Mobile Phone Tracker.

Fab Equipment Spending Ascending

SEMI's latest data show increasing equipment spending, reaching 4.1% YOY in 2016 and 10.6% in 2017, mainly attributed to mobile devices (including devices using SSDs) and automotive electronics.

Total Pure-play Foundry Market Expected to Jump 9% This Year

For 2016, the pure-play foundry market is expected to increase by 9% and greatly outperform the growth rate of total IC market, which is forecast to drop by 2% this year, according to IC Insights' August Update to the 2016 McClean Report.

Gartner's Hype Cycle Highlights China's Aggressive Investment in High Tech Despite Economic Slowdown

Despite the slowdown in GDP growth to 6.9% in 2015, China is still making aggressive investments to drive the adoption of high technology by local enterprises and organizations, according to Gartner Inc.

Global Automotive Technology Developments to Create $350B in Supplier Opportunities

Fuel efficiency, weight reduction, advanced safety technologies, human machine interface, lighting and consumer comfort features will drive $350 billion in incremental automotive supplier business opportunities by 2021.

Rapid Expansion Projected for Smart Home Devices

The smart home market is projected to broaden at a compound annual growth rate of 60%, reaching 477 million devices in 2020 from 47 million in 2015, according to IHS Markit.

Medical Electronics Market to Reach $219B by 2024

With technological advancements boosting the applications of electronics in the fields of diagnostics, therapeutics, and wellness, the global medical electronics market is expected to reach $219 billion by 2024, according to a new report by Grand View Research.

China's Manufacturing IoT Spending to Hit $128B by 2020

Chinese manufacturing enterprises' spending on the Internet of Things (IoT) is expected to reach $127.5 billion (approximately RMB848.3 billion) by 2020, with a compound average growth rate of 14.7% during 2016 to 2020, according to IDC China.

Defining a Leader

by Albert C. Yanez Sr.
ASTEELFLASH

How is a leader defined, especially a leader in the EMS industry?

Leaders follow a few basic principles, no matter which industry they work in.

One could define a leader as an individual leading a group of individuals towards a clearly defined goal. A broader perspective, as Bob Reina, CEO of Talk Fusion explains, would define leadership as "with having a selfless heart and always being willing to reach out and lend a helping hand."

At Asteelflash, the leadership principles we embrace are:

- **Self-Evaluation:** Evaluating your own strengths and weaknesses as well as others' strengths and weaknesses will definitely help deal with any type of situation.
- **Relevant Skills:** Leaders do not have to be the most technical in the workplace. However, maintain a high level of competence in the industry you're active in will create a legitimate relationship of respect.
- **Know Your Employees:** Know their name, what they like to do after work and most important, how they react to situations. Indeed, knowing your collaborators' personalities will help by saving time and avoiding issues; it will enable you, as

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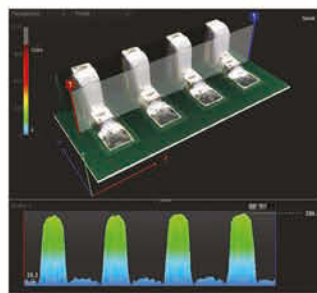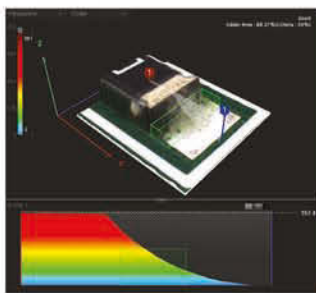
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a leader, to coordinate and decide how best to employ each individual.

- **Set the Standards by Leading by Example:** Employees tend to watch managers' and directors' appearance and attitude at work, using it as an example. If you set the standards high for yourself, your employees are most likely to follow the same trends and be motivated by your attitude.
- **Teamwork and Accountability at All Times:** Train your employees with a purpose and emphasize the essential elements of teamwork and realism. Teach your people to train, play and operate as a team. Be sure that everyone knows their positions and responsibilities within the team framework.
- **Training and Personal Development:** Show your employees you are interested in their welfare by giving them the opportunity for professional development. Assigning tasks and delegating authority promotes mutual confidence and respect between the leader and the team.

In the fast-paced environment of the EMS industry, there is no room for people hiding from their responsibilities. The customer is at the heart of the overall business model, so it is critical for employees in the industry, from the production floor to top management, to know how important their role for the organization is, and to always work as a team to make sure the quality of the product is unmatched and delivered in a timely manner, as required by the customer.

Leadership is also the ability, in our industry, to have a strategic outlook on where the industry is going to be in 10 years, making it possible to evolve as a preferred partner. Indeed, as a contract manufacturer, it can be easy to focus on what's needed now and tomorrow, and to deliver the products to customers at the right time. However, every EMS organization needs a leader with a vision, one who knows where the growth is going to be in the next five years, and how to strengthen capabilities and technological expertise to address the needs of customers in the future. Not today, and not just tomorrow.

Be sure to put training programs in place to facilitate mobility within groups and divisions. Give employees opportunities to evolve and participate in different functions and grow as leaders. The success of the teams and the company will surely follow. **SMT**

Albert C. Yanez Sr. is the corporate VP of Asteelflash Group and president of Asteelflash AMERICAS.

New Tech Promises to Boost Electric Vehicle Efficiency, Range

Researchers at the Future Renewable Electric Energy Distribution and Management (FREEDM) Systems Center at North Carolina State University have developed a new type of inverter device using off-the-shelf components made of the wide-bandgap semiconductor material silicon carbide (SiC).

The SiC-based inverter features greater efficiency in a smaller, lighter package – which should improve the fuel-efficiency and range of hybrid and electric vehicles. It can convey 12.1kW/L – clo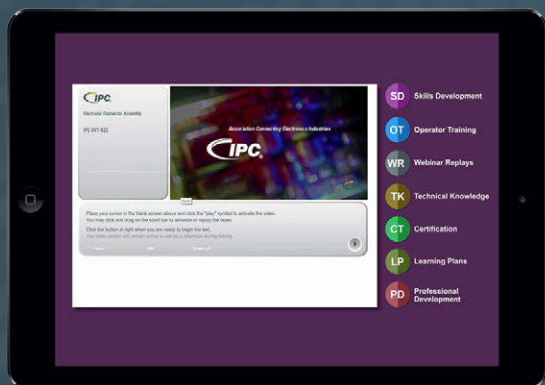se to the U.S. Department of Energy's goal of developing inverters that can achieve 13.4 kW/L by 2020. By way of comparison, a 2010 electric vehicle could achieve only 4.1 kW/L.

The power density of new SiC materials allows engineers to make the inverters – and their components, such as capacitors and inductors – smaller and lighter. What's more, the design of the new power component is more effective at dissipating heat than previous versions.

The current SiC inverter prototype was designed to go up to 55 kW. The researchers are now in the process of scaling it up to 100 kW.

The Make-up of a GREAT LEADER

Knoll Evangelista

by Stephen Las Marias
I-CONNECT007

Knoll Evangelista, director of the EMS Components and Group Operations of Laguna, Philippines-based electronics manufacturing services firm EMS Components Assembly Inc., speaks with *SMT Magazine* about leadership, motivation, and how great leaders navigate the challenges to bring their companies to success.

Stephen Las Marias: What makes a great leader?

Knoll Evangelista: A great leader is someone who embraces technology and innovation, a game changer, a benevolent disruptor, and has the passion to make things happen. A great leader is a composite of a person that gets an organization to work on an objective, and gets to deliver results and achieve the desired outcomes. He has the capability to change, lead, and discover new ideas of an organization that works.

Las Marias: What can you say about the changing roles of the leader in this industry?

Evangelista: Technology has been the mainstream driving economy of a country. In the electronics industry, once a technology is discovered, consider it obsolete; if you will not develop new technology, somebody else will. This is how fast the industry changes. Getting ahead and the niche of the market will drive growth and sustainability. Leaders with vision that embrace technology with readiness to future capabilities will always succeed.

Las Marias: What is the difference between being a leader and a manager?

Evangelista: We need more leaders than managers. Leaders see things at 60,000 feet and are always there ahead. A leader looks forward to innovate, adopts changes and makes things work while a manager focuses on day-to-day activity. Leaders are strategists while managers execute. Leaders deal with strategic issues while managers deal with the tactical ones. Leaders formulate strategies for growth and sustainability and have a wide vision of the horizon for what the future will be, while managers execute to achieve goals and objectives.

Las Marias: *How do you know you're an effective leader?*

Evangelista: If you are a game changer, always ahead of others, leading people to the next level, achieving common goals, and collectively contributing to make things happen.

Effective leaders are not saddled on the status quo. There is a consistent effort to innovate, improve and discover new frontiers. They are not afraid to chart territories and engage in new discoveries. These traits are in the DNA of an effective leader.

Las Marias: *What is the best strategy for leading millennials?*

Evangelista: The younger generation is made up of enthusiasts who understand how technology works for them, and are hungry to discover new things and passionate about achieving results. You can lead them by cultivating their ideas and converting their skills and talents into work. Millennials are known to be highly mobile, confident, articulate, and brave. These characteristics blend well in an organization that always seeks innovation and improvement.

Las Marias: *How do you motivate employees who aren't worried about traditional drivers like money, security or prestige?*

Evangelista: These people are the best to handle with passion for thinking out of the box, differentiating themselves and most of all how best to lead staffers from a variety of backgrounds and cultures. Self-confidence drives people that are result oriented, so give them the freedom to explore new ways and new means to achieve the goal.

Las Marias: *When it comes to training, what is the role of the leader?*

Evangelista: I had a chance to visit Denmark. While I was walking down the street, I saw this phrase on a window glass: A CFO asks his CEO: "What happens if we invest in developing our people, and then they leave the company?" The CEO answers: "What happens if we don't, and they stay?" When it comes to training, provide the skill set with a clear understanding of their goals, and don't be afraid to fail as long as they learn from their mistakes.

Las Marias: *Great, thank you very much again, Knoll.*

Evangelista: Thank you, Stephen. **SMT**

Acoustic Resonator Device Paves the Way for Better Communication

Yale researchers have developed a high-frequency version of a device known as an acoustic resonator that could advance the field of quantum computing and information processing.

Hong Tang, Yale's Llewellyn West Jones Jr. Professor of Electrical Engineering & Physics, and his research team—Xu Han, a Ph.D. student and lead author of the study, and Chang-Ling Zou, a postdoctoral scholar and co-author of the study—accomplished this with a piezo-optomechanical device, which achieves what is known as "a strong coupling" between two systems: a superconduct-

ing microwave cavity and a bulk acoustic resonator system.

With a strong coupling, the device achieves an exchange of energy and information between the microwave and mechanical resonator systems in a way that exceeds the dissipation of each of the individual systems. That way, information doesn't get lost.

The system operates at the very high frequency of 10GHz, allowing for a high signal-processing speed and making it easier to observe quantum phenomena in experiments. One of the potential applications is information storage, according to Han.

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How to Evaluate a Used Machine

by Robert Voigt

DDM NOVASTAR INC.

Used SMT assembly equipment can be found all over the Internet. In most cases it's "buyer beware," but there are some cases where you can get a good deal and save some money over a new machine. This chapter will help guide you in your search and give you some tips to avoid getting a raw deal or actually spending more than new by the time you get that bargain acquisition in good working order.

Why consider a used machine?

A new machine with all the options you want, the factory support you expect, and a warranty that protects you is always the first choice, but there are some good reasons to consider a factory reconditioned unit vs. new:

• A factory reconditioned machine can save you up to 50%, depending on age and condition of the unit

• If you have a short-term project that you want to minimize your cost and/or loss, buying a reconditioned machine could be a good choice

• If you have a complex application that you're not sure will even work, and you can't afford the cost of custom equipment, you may be able to create a work-around with a reconditioned unit, along with the technical support of the OEM

The "re" words—rebuilt, reconditioned, recycled, recertified, remanufactured, or refurbished—are intended to describe the various conditions you can expect to find in the used market; however, you really need to look deeper. Many times the wording is used interchangeably to mean the same thing. The kind of description you want to avoid is simply "used" or
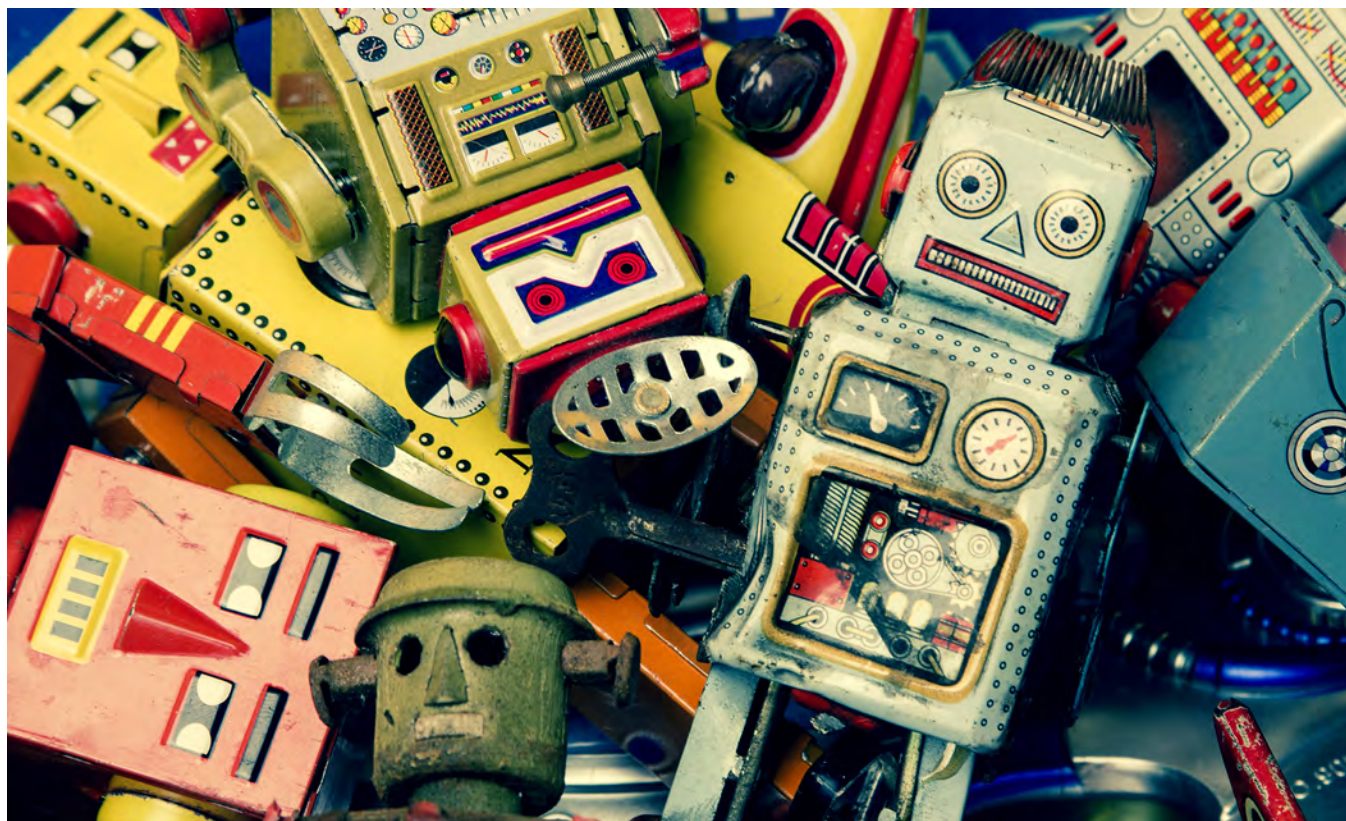
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Warranty: What's covered, and for how long?

Heating elements: Check that all are in good working order.

Controls: Is the software current and does it include a PC interface for updates?

Temp sensors: Validate tolerances are within spec for full range in all zones.
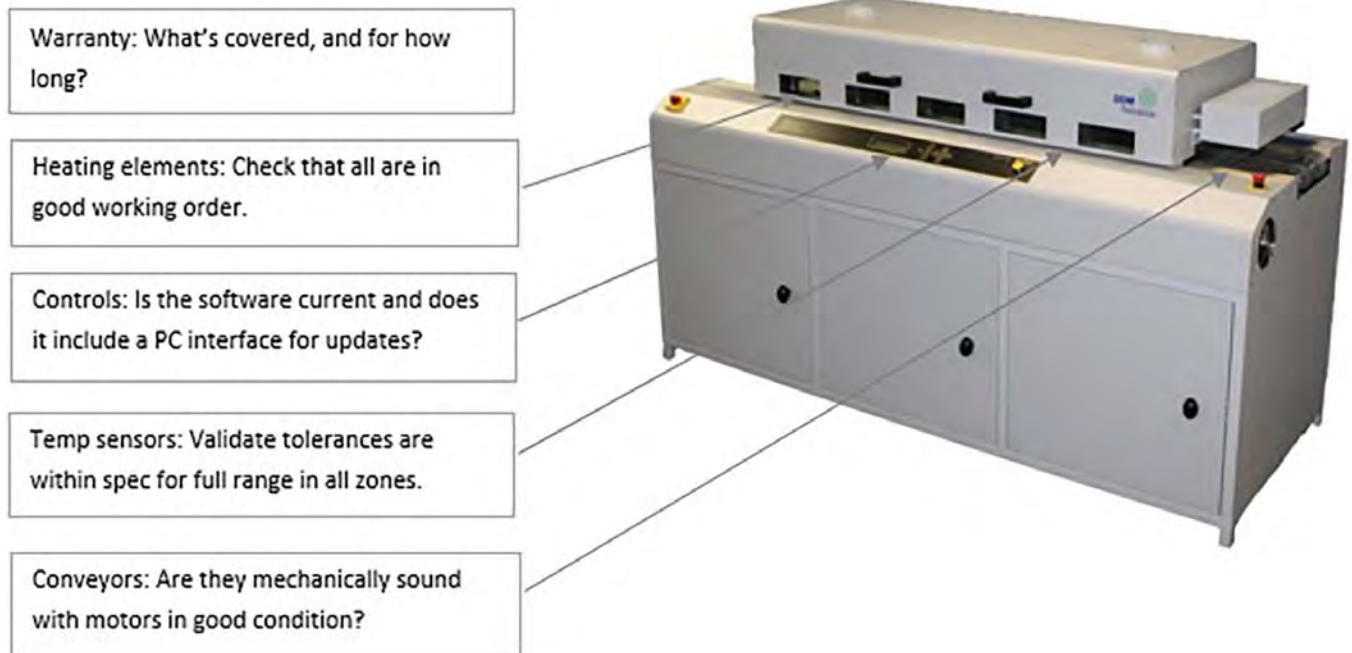
Conveyors: Are they mechanically sound with motors in good condition?

Figure 1: Here are some things to look for in a reconditioned machine, using this reflow oven as an example.

"as-is," because you have no idea how much work (and dollars) it will take to get it in good working order and registered by the manufacturer.

There are hundreds of surplus electronic manufacturing and test equipment re-sellers in the market, and they sell through different channels like eBay or SMTNet. Currently, SMT-Net has over 393 used SMT equipment dealers listed. Some have a good reputation for trying to help the customer with as much information as they can, while others may be only looking to make a fast buck on a bargain that they themselves found at a flea market.

The best situation, if you can find it, is to buy a factory reconditioned machine from a respectable manufacturer. Here's the distinction I make between "factory reconditioned" and "refurbished": A refurbished machine is one that may have been damaged and repaired, while a factory reconditioned unit has had all its worn parts replaced, outdated components updated with new, everything tested to be in good working order, and a factory warranty applied by the manufacturer.

There are quite a few resellers who say they recondition used machines, but it's always a risk. Here's why: Most SMT assembly equipment is initially licensed and registered with the OEM, similar to a title on a car. So, to get instructions, support and access to spare parts, you'll need to register your used machine with the OEM, and that can cost between $2,000 and $5,000, depending on the manufacturer. Not doing so would be taking a big financial and implementation risk, and if you bought from someone other than the manufacturer you could be paying for support they might not be able to deliver.

Original manufacturers will often take in older equipment in trade, or buy back machines that their customers have outgrown. They will also seek to purchase back their own brands from companies going out of business. This means you have a pretty good chance of finding a pick and place machine, reflow oven, wave soldering or other system that meets your needs direct from the manufacturer's reconditioned inventory. They won't always offer these machines on their websites, so you just need to remember to ask.

Sometimes a manufacturer is forced to downsize and sell off some equipment that may no longer fit what they need. So they decide to sell it on eBay or another discount online site. It may be in perfect working order, and it may be something you want test out before investing in a full line. I suggest contacting the manufacturer directly to see what support, warranty and training they offer even before making an offer on an online store. You should also consider the type of equipment and its average life cycle. If you can, check to see how many miles (or years of operation) are on stencil printers, pick and place machines, reflow ovens, or soldering systems.

"Reconditioned" vs. "Used"

Older equipment may have outdated software and old style feeders, for example, whereas a factory reconditioned machine will be upgraded with the latest software and mechanical systems to bring it up to date. A factory reconditioned machine should also come with the same warranty as a new machine, but be sure to ask.

Example: Mr. Joe Shopper searches on the Internet for a used pick and place machine and finds what he believes is a great deal at $9,000, originally valued at $30,000; however, he doesn't even know what questions to ask to understand what's involved in bringing it up to date. So he contacts the factory that originally made the machine in 1985 and discovers that he needs to spend another $12,000 to update the software and recondition other features so that it operates reliably. He also would need to register the machine with the OEM in order to get operating instructions, regular software updates, and 24/7 phone tech support that he'll need to ensure it runs the way it should. That will cost him another $3,000. By the time he's done, he'll have a machine in good working order, but he might have spent as much as $24,000, whereas, if he had gone directly to the manufacturer looking for a certified reconditioned machine, he might have been able to get a factory reconditioned machine for around $15,000.

Remember, a third-party reconditioned machine is not the same as a factory reconditioned machine. They may do their best to bring it up to today's standards, but the all-important factory support is still missing.

Considerations with Older Equipment

With electronics, a reconditioned unit will be updated with new and improved accessories or technology. If you are considering a pick and place machine, for example, consider the age and condition of its feeders. If the machine is factory reconditioned, it will likely come with updated feeders; plus, you will be able to adapt the machine with any current options or accessories that are normally offered.

Most of the used equipment for sale online today is well aged and may not have replacement parts even available. If the machine was made by a U.S. manufacturer currently in business, there's a good chance that they can support the needed repair parts or fabricate something from scratch if it's no longer in stock. At the risk of repetition, be sure to ask what registration costs with a factory reconditioned machine, and if they charge for support separately, what the hourly rate is. Finally, research the seller's policies regarding returns if something doesn't work as you expect.

If you already have equipment from the OEM re-seller, such as an existing reflow oven or pick and place machine, and you are looking to extend your production, buying the same brand makes compatibility smoother, and accessories such as feeders or pallets can be interchanged. Working with a brand name you are comfortable with can avoid lost time to retrain the operators, change maintenance protocols, or reconfigure company software. **SMT**

Robert Voigt is VP of global sales at DDM Novastar Inc. To reach Voigt, click here.

Thomas Lau

Koh Young Talks AOI Landscape and Trends

by Stephen Las Marias
I-CONNECT007

During the recent NEPCON South China tradeshow in Shenzhen, Thomas Lau, sales manager for Southeast Asia at Koh Young Technology Inc., speaks with SMT Magazine about the challenges, and developments happening in the AOI sector. He also discusses industry trends, why manufacturers are increasingly looking into strengthening their inspection capabilities and putting AI into AOI machines.

Stephen Las Marias: Thomas, what can you say about the current SMT landscape in Asia?

Thomas Lau: In terms of the overall market situation, the market was quite slow for the first half of the year, but things seem to be picking up. When it comes to machine investment, a lot of customers are pretty skeptical. A lot of them are still adopting a wait-and-see attitude because there are a lot of external factors affecting the market right now. For Southeast Asia,

there's always a lot of ups and downs. We do not have any high picks or low picks. Overall, it's pretty stable. One thing we have observed for PCB manufacturing is the trend of more industries actually shifting to less developed countries in order to produce more low-cost products. We are seeing more activities in Indonesia, in the Philippines, and also in areas like Vietnam and India. For Malaysia and Thailand—we term those as small mature markets because they started PCB building right from the very early years—they're actually leaning more towards retooling and what we call replacement opportunities.

Las Marias: What are the challenges you're seeing?

Lau: The greatest challenge that we see is that things are getting cheaper. A lot of customers are demanding even cheaper machines. If you look at SMT production and PCB manufacturing, a lot of the focus is actually on the pick-and-place machine. For inspection machines, a

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lot of customers still believe that this is not really a necessity, but we do see that this phenomenon is changing. More customers have come to realize the true value of the inspection machine especially when PCBs are getting smaller and PCB layout are getting denser. Rework becomes almost impossible and even more expensive if the defects are picked up only after the reflow process. Inspection machines play an important role: they serve as a gateway to pick up any defect right from the solder printing process.

Overall, the customers they are expecting the machine to produce more, because by producing more they are actually reducing the overall manufacturing cost. That's why there are more demands from the inspection machine.

Las Marias: So manufacturers were not really concerned about the inspection side before, but now they're trying to look into it more closely. Perhaps because failure is really costly?

Lau: That is one of the reasons behind it, definitely. Nowadays, PCB sizes are getting smaller and smaller and the placement of components are getting denser and denser, so there is a need to have 3D solutions. We used to have 2D inspection solutions, but those are just inspecting right from the top view, and actually what they are doing are comparisons. These are subject to a lot of failures due to lighting as well as gray scale comparison. We are doing 3D so that not only are we inspecting, but we are measuring. We are able to determine every single component's height and volume for SPI.

They are still many PCBA manufacturers who believe that their 2D inspection machine is enough for now, but we do see a trend for a lot of customers moving from 2D to 3D.

Las Marias: What is your outlook for the AOI and SPI equipment market?

Lau: I would say that the demand would be more for the AOI. SPI has been one of our core products; in fact, Koh Young is the market leader in SPI—and our market share is always maintained close to 50%. We see 3D SPI much more commonly used now, while 3D AOI is growing fast.

Las Marias: What can you say about the industry trends right now, like Industry 4.0 or the Internet of Things?

Lau: Industry 4.0, to me, is actually a very broad perspective, in a sense. Ultimately, it's about machines being able to communicate with each other, being able to react and execute actions on their own. I guess we are pretty far away from that, but we are definitely taking one step forward towards Industry 4.0.

Down the pipeline, definitely we are talking about adding more innovations and incorporating some form of artificial intelligence into our machines. We actually started three R&D centers for AI, one in Korea and two in the U.S. We are working with some of the top universities on some of these AI developments, and trying to incorporate some form of AI to allow our machines to think for themselves.

One of the key features that I can mention is the auto-verification function, whereby a lot of times users don't know when to calibrate the machine. A lot of them will do it based on gut feeling. With auto-verification, you can do auto-scheduling and preset it on your own. You can preset it for after every job, weekly, monthly, or even every half yearly. The auto-verification function does a self-assessment in order to check whether your machine is actually running in optimal condition. If there are any errors or anything that is out of range, a flag will go up and message the user to do the calibration.

Las Marias: What has your experience been at this year's NEPCON South China show?

Lau: This year, we are definitely seeing a stronger response here as compared to last year. We are getting more visitors and a lot of them are actually showing key interest in our 3D inspection machines and solutions.

Las Marias: Great. Thank you very much again, Thomas.

Lau: Thank you. **SMT**

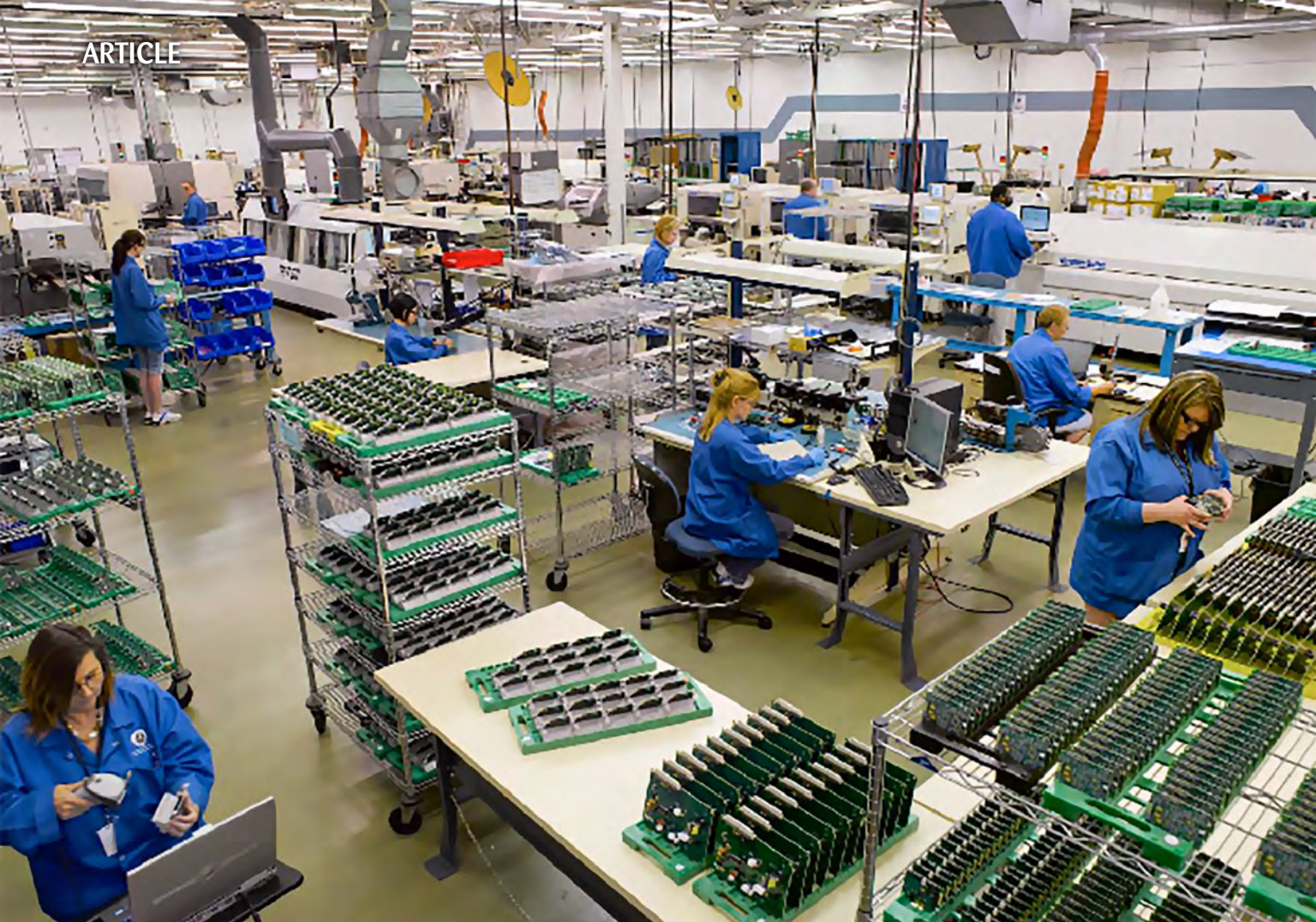# PCB BUYERS- compare nearly 1900 manufacturers now at *The* PCB List.

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Choosing an EMS Partner

by W. Scott Fillebrown
LIBRA INDUSTRIES

So many times we hear that an EMS company and their potential new customer want to have a partnership where each side can have a very open dialogue of what is going well and what needs improvement. At the end of these discussions, both sides typically leave feeling warm and fuzzy, and ready to hold hands into the sunset. Then, the rubber hits the road and you start dealing with the real world. As a customer of the EMS world, it is important to know two things when searching for your future partner.

First, what are you looking for in an EMS partnership? As you develop this thought, keep in mind that you are the customer of a provider of custom manufacturing services. That means that you get to define the level of partnership, and it is up to the EMS company to meet those requirements. That being said, most OEMs are looking for a company that will function as an extension of their own company. This means an open line of communication, access to the right people at the right time, and sharing improvements in every aspect of the relationship. In this day and age, those expectations are very realistic, as long as you pick the right partner. That brings us to the next factor to keep in mind when looking for your future partner: What qualities should an OEM look for when picking an EMS company?

Below is a list of 10 items that you should look for in an EMS company. No, this is not a complete list, but they are questions that should be asked first. Each OEM is unique; therefore, each will have a unique list of requirements. However, the following is a good starting point for OEMs of all sizes.

1. Choose a partner that has one level of certifications above what you actually need. For example, every production customer should require ISO-13485 for its traceability aspects even if you're not a medical company. While the certification may not be required for your particular product, it does ensure that the prospective EMS company has good traceability processes certified by an outside firm.

2. Consider in-house test capability, meaning not only the ability to perform test, but the ability to design and produce custom test solutions for your product. It is clear that a well-tested product is a reliable product. Your future EMS company should be proactive in the test development and improvement of your product. Doing so will mean improving their company while building a better product for you.

3. Customer service matters. Find a facility that gives you a constant point of contact, other than the owner or a salesperson. In a perfect world, direct communication should occur through all of the major steps of the process. This promotes a rapid response time and transparency. So many organizations communicate through a single person, which creates bureaucratic log jam. If engineering, supply chain or test has a question, they should be empowered with the correct contacts and authority to go directly to the appropriate contact to ask the question. You then can follow through by updating the process notes and answering the question.

4. Your vendor's technology roadmap should be ahead of your own. In the EMS world, the company that is not reinvesting is stagnant, and just as you would not want to drink from a stagnant pond, nor do you want to enter into a long-term relationship with a stagnant company.

5. Don't be a little fish in a big pond. Pick a CM that fits your needs. Put extreme high-volume with a Tier 1; put the lower volumes with a Tier 2 or 3 depending on your comfort level, even if you're a big OEM. So many times you will see a billion-dollar OEM only want to do business with a billion-dollar EMS provider, and will make that the law of the land for all of the divisions—a one-size-fits-all approach. While that approach might work well with baseball hats, it doesn't with electronic manufacturing. Those billion-dollar OEMs have technology, quantities and unique requirements that require an EMS company uniquely situated to meet them. At the same time, startups do not need to go to a Tier 1 supplier to impress a potential investor. In fact, the partnership will help woo your investor as part of your team, not a faceless vendor.

6. Ensure that good data systems are in place. Not only redundancy, but proper systems in place that protect your IP and, if required, ITAR. Does your potential partner have the best firewall, virus protection and data backup plan? Have these plans been tested and reviewed? So many times EMS companies are very focused on the latest manufacturing equipment that their back office gets left behind. In the world of Industry 4.0, the network and data systems are the equivalent to the central nervous system, bringing everything together to operate as one.

7. Look for an established quality system, with a 12 month or longer track record. As basic as this seems, it is critical to know that the EMS partner has experience on their systems and an auditable history of successful follow through.

8. Take a look at the financial stability. Make sure that they will be here for the long run. A key indicator is reinvestment in the latest equipment and technology. Look for a long-term plan for equipment and understand why they chose the make and model of the major pieces of equipment. Find the door if all you see is newly acquired used equipment. While buying an occasional used piece of equipment makes sense, some companies will buy only used without a long range plan, jumping to whatever they can find on the market. This means that they lack a relationship and support from the manufacturer. Run a D&B and review it with their CFO or controller. Talk to the major component distributors because they can tell you who is doing well and who isn't. Keep

in mind, this is an assurance of supply issue; no credit means no raw materials, and no raw materials means no product for you!

9. Examine their employee relations. Pick a non-union facility that focuses on employee growth and benefits, creating long tenures. Little perks matter, like sports tickets. Some will hire and terminate based on demands. In those cases, training will be suspect. Consistency from any company means keeping employees for the long haul, and having good training programs. You are looking for a long-term relationship, and the quickest way to know if the EMS company looks for the same is to understand their employees' tenure. When you tour the facility, ask to see the breakroom and other employee areas, ask the employees what they like about working there and how long they have been with the company. Then ask yourself, "Would I want to work here?"

10. Look for a good industry and customer mix. Make sure there isn't a hyper focus on one industry or customer, which could cause issues if that industry hits hard times. For example, automotive or, more recently, oil and gas. There is a saying in football, "you can live by the blitz or die by the blitz." The problem with companies that are heavily weighted in an industry or customer is twofold. First, the EMS company's priority will be with that customer or industry, causing you to be second fiddle at some point. Second, and most importantly, business cycles, buyouts and relationships change, a heavy concentration combined with a big negative swing in these areas will put the EMS company at risk.

As you move forward with your selection process, remember that there are so many EMS companies to choose from. None of them will be perfect, but one or two of them will be the right fit for your organization. The selection process starts with understanding your internal requirements and expectations, then finding an EMS company that aligns to your requirements and values. **SMT**

W. Scott Fillebrown is the CTO of Libra Industries.

Applying Photonics to Electronic Warfare Challenges

Researchers at Georgia Tech Research Institute (GTRI) are adapting optical techniques from the photonics telecom arena to enhance U.S. electronic warfare (EW) capabilities.

Optical approaches provide greatly increased frequency coverage and long distance low-loss transfer of analog signals when compared to traditional RF systems, resulting in substantial performance improvements. Chip-scale integrated photonics also allows for the potential of extensive reductions in size, weight and power (SWaP) needs.

Chris Ward, a senior research engineer who leads GTRI's EW photonics development program, explained that today, sophisticated commercial off-the-shelf photonic components, capable of cutting-edge data/signal transport, are widely available. GTRI researchers are using these devices in the development of novel EW architectures that have strong performance advantages. They have produced optical transceivers that can interface readily with existing digital or RF EW equipment. The team is currently focused on packaging novel photonic integrated circuits (PICs) for integration into existing EW systems.

"There are several challenges in adapting photonics technology for highly specialized EW needs," Ward said. "But the benefits in terms of the ability to effectively counter future threats, along with substantial cost reduction and greatly improved SWaP factors, make optical approaches highly promising for these applications."

Recruiting and Maintaining a High-Quality Manufacturing Workforce

by Tony Bellitto
FIRSTRONIC LLC

As with many EMS providers, Firstronic's team of people is its biggest competitive advantage. The challenge the company has faced is developing an effective way to recruit and retain high-quality team members in labor markets where experienced manufacturing talent is in short supply. A whole new generation of workforce is now entering manufacturing, and they're not the same as the past generation, and that generation is different than the one before it. This is a fact, and the sooner companies realize this, the sooner they start to become attractive to this new generation and retain those critical assets. This article looks at the company's systems for evaluating, onboarding and retaining a high quality workforce in its Grand Rapids, Michigan and Juarez, Mexico facilities.

The labor market dynamics associated with the two facilities are different. After more than a decade of focus on the service economy, the supply of experienced electronics assembly workers in Grand Rapids is limited. Conversely, Juarez has an experienced labor pool, but there is a high demand for experienced electronics assembly workers due to the large number of manufacturing facilities located there. In both cases, the company's rapid growth has driven the need to attract, train and retain large numbers of employees.

For example, the Grand Rapids facility nearly doubled its workforce in 2014, adding 110 workers. Most were entry-level workers. A $300,000 grant from The Right Place Inc., in collaboration with The Michigan Economic Development Corp. (MEDC), the City of Grand Rapids, and a $289,550 Skilled Trades Training Funds grant from the Michigan's Workforce Development Agency, was used to offset the costs of the training required to hire the additional workers.

The Juarez facility was a greenfield operation established in the third quarter of 2014. While a shelter provider with a robust labor recruitment process was utilized for a fast start-up, internal HR practices play a large role in minimizing turnover and encouraging word-of-mouth within the skilled labor pool about the quality of work environment and available positions. When the facility was opened in 2014

there were 15 employees. Today, there are nearly 200 employees, making it the same size as the Grand Rapids, Michigan facility.

Several Lessons Learned in Grand Rapids Employment Surge

Lessons learned in the original Grand Rapids recruiting and training process have driven a number of refinements to the company's process.

In the initial recruitment effort, the Grand Rapids facility adopted a 24/7 work schedule that had production employees working 12-hour shifts on alternating three-day and four-day weeks. There were four shifts. Shifts one and two work the same schedule of long and short weeks, with shifts three and four covering the alternate weeks. Employee training was scheduled in four-hour blocks on one of the days during employees' short work week. Employees were paid for training time and could pick the day and time block that worked best with their schedules.

A training program was developed and delivered in three phases during the first three quarters of 2014. Phase I focused on Core Training for all employees, Phase II provided Advanced System Training and Phase III defined and implemented Certified Operator Training (COT) Evaluations and Classifications.

While recruiting employees was not difficult, it became apparent by early 2015 that newly hired employees were leaving in large numbers. Fourth shift turnover was highest, topping 6% per month. Virtually all of the turnover involved employees with less than a year on the job and the majority of that turnover came from people who had less than six months on the job. The unfortunate reality was that employees with no concept of what a manufacturing career entailed were finding it wasn't what they expected.

The Quality and HR departments studied the situation in greater depth and found:

- Not all employees hired were a good fit for the jobs they were hired to do
- The amount of training given to new employees over a relatively short period overwhelmed some employees
- Employees on smaller shifts felt isolated and had more limited coaching resources
- The large amount of classroom training was not as effective in teaching key skills as on-the-job (OJT) based training
- In some cases, such as the ERP system training, employees lacked the frame of reference to fully understand the concepts being taught

It became obvious that a more robust onboarding process needed to be developed. The goal of this new effort became making employees feel valued from day one. Training was re-

vised to better balance introduction of concepts with employee acquisition of the requisite experience to understand and retain the information. The new employee integration into production operations process was also redesigned to ensure those employees weren't put in situations where they felt they didn't have a strong enough support network as they were learning their jobs.

To address the challenge of applicant lack of understanding about manufacturing careers, AccuMax, a third-party employment screening firm, was hired to administer tests designed to analyze job applicants' competencies and aptitudes, with the end goal of matching them to the positions for which they were best suited. Under this system, applicants are scored as A, B and C. As are hired, Bs are evaluated carefully prior to hiring, and Cs are not hired.

The team then began work on a formal onboarding process that had six key elements:

- Relationship building activities scheduled with new employees from the first day they arrived
- A defined trainee period and 'jacket' to make it easy for new employees to be identified and supported by more experienced employees
- Training program modifications to provide a better balance between classroom instruction and OJT to ensure concepts were introduced when employees had enough experience to understand the concepts they were learning
- A formal mentoring program was created to provide strong support during working hours
- Employees stay on first shift until they have completed their training period
- A graduation ceremony helps reinforce team membership

As part of the onboarding process HR and training communicate closely as new employees are hired. An onboarding plan for HR and trainers outlines specific training activities plus a series of relationship-building activities for each employee's first few weeks. New hires are not counted in production headcount for the first few weeks of training. The goal is to carefully pace the knowledge they will be receiving and make them feel that they are a valuable part of a team that supports them.
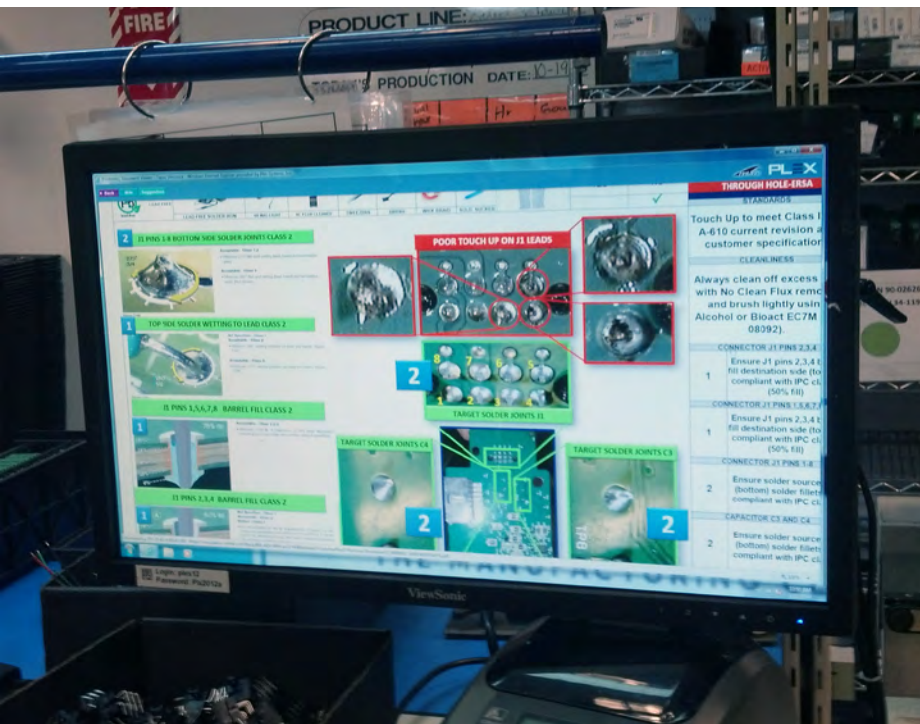
The company uses color-coded smocks to denote employee classifications on the production floor. Trainees wear blue smocks. Production operators and technicians who have completed training wear burgundy smocks. Quality personnel wear black smocks. This color coding system helps ensure trainees get the assistance they need during the first weeks on the job.

The trainer-employee relationship was also evaluated carefully. Previously trainers had been given wide latitude in how they presented the material and that created variations in points of emphasis. Under the new onboarding process, trainers now work from a formal presentation script that consolidates the introductory training into a master presentation, which ensures consistency.

In addition to the challenge of introducing manufacturing to new hires who have never previously been in a factory, there are also generational considerations. Today's younger generations grew up in a different learning environment from those raised in the '70s and '80s. Not only are they more used to an interactive, multimedia training environment, they also require a more open and supportive attitude from trainers. The trainers were coached in interpersonal skills to ensure they were creating an environment that aligned well with those requirements.

The training program was completely redesigned to include a larger hands-on OJT component, longer training period and slower introduction to more advanced skills such as systems training. For the first two weeks, employees spend 2.5 days in class and 7.5 days being mentored on day shift. After the first 2.5 days of class, new employees get a training plan that outlines the course of their training over the next 60 days.

During the 60-day training period, new employees receive classroom training that includes general human resources-related training on health and safety; basic production related training on board handling, component

were assigned to all shifts, trainees now stay on first shift until they have completed their training period, rotating through mentors as they learn the production floor.

Relationship building activities to reinforce engagement and a sense of belonging with the team don't stop at the end of training. When an employee completes training, the blue smock is exchanged for a burgundy smock during a production floor communication meeting. This creates a sense of earning the burgundy smock, which adds another layer of engagement with the team.

The Grand Rapids results speak for themselves. Turnover dropped from over 6% to less than 2% per month while the headcount has grown from less than 50 to a total of 200 employees at the facility.

identification, ESD protection and Kanban systems; and seven modules of IPC-A-610 certification courses.

Toward the end of that period, they are also introduced to the ERP system and taught to perform the transactions necessary for their job functions.

Mentoring has become a more formal process. Instead of a model that assumes lead people or supervisors would do double duty as mentors, operation "experts" with good communications skills were handpicked to act as mentors. Mentors receive increased compensation for performing these duties, since they do their normal work plus are involved with new employee mentoring on an as needed basis. A Mentor training guide defines the correct ways to deliver and reinforce OJT training to ensure that the mentoring process is as consistent as the classroom portion of the training.

The company's holistic approach to Lean manufacturing principles requires a cross-trained workforce capable of moving among production areas as demand changes. This adds an additional level of intensity to training activities, since trainees are learning to perform multiple production operations. To eliminate the issues previously encountered when trainees

Enhancing Employee Quality of Life in Juarez

The labor market in Juarez, Mexico is different from that of Grand Rapids. Manufacturing has grown significantly over the last few decades and there is an experienced pool of workers skilled in electronics assembly, plus a continuing flow of workers from other parts of Mexico to this region. Turnover can be a problem in Mexico as companies compete to hire the best workers. As with Grand Rapids, the portion of the workforce most likely to leave are employees with less than six months on the job. Some of the improvements made to the Grand Rapids program were a result of analyzing the engagement techniques used by the Juarez facility's HR and training teams, and cross-pollinating best practices that worked well in both locations.

In Juarez, the onboarding and training process has also been tailored to the needs of the market. However, the employee engagement process includes a series of socialization activities. In Mexico, employees like to feel that they are part of a family at work. Companies that do a good job of addressing this through in-plant and after work activities tend to have much

lower turnover than companies that ignore this quality of work life aspect.

For example, last May, all employees who were also mothers were treated to a special Mother's Day lunch which included a live band and a new handbag for every mother. A similar event was held for fathers on June 17. Birthdays are celebrated once a month. There is also a Christmas party that includes a band and raffles.

As part of the onboarding process, a monthly cookout is held for all new administrative employees.

Soccer (futbol) is also supported. There is a soccer field on the plant grounds and different areas of the Company have organized teams. An Interworld Competition Soccer Tournament was recently held among those teams and the SMT area won. The company's teams will likely be joining the larger competition among local maquiladoras.

Firstronic's shelter provider, Tecma, sponsors a Kids Day for all the companies it is contracted with to provide large scale family fun.

Again, there are measurable results from this activity. According the Mexico Seguro Social (Social Security Agency), typical Juarez turnover runs between 4% and 11% per month. In the past rolling 12 months, the Company's Juarez facility has averaged 2.3% turnover and without a seasonal spike in June would have been under 2%.

Another factor impacting turnover positively is the company's compensation program. Production operator compensation includes a pay for skills component to incentivize employees to cross train and master multiple assembly operations, so that this leaner workforce can be appropriately deployed in specific production operations based on the demand trends at that time. The Certified Wage Scale is posted in the facility so that everyone can see what everyone else is making based on the number of operations for which they are trained and certified to perform. The net result is a higher wages than the surrounding area for many employees. It is important to note that this level of advancement is 100% the operators' choice. They can choose to learn only one operation or become skilled in multiple operations and under-

stand that the choice they make impacts their earning potential. Some choose not to advance, but everyone understands that they are each in charge of their own destiny.

Sustainable Practices with Strong Benefits

The dynamics that drove development of these programs are here to stay. In the U.S., availability of experienced manufacturing personnel continues to drop as more of that workforce retires. A resurgence in US manufacturing will exacerbate this problem. That said, many of the practices described here were used when the electronics assembly industry was in its infancy and experienced workers were also in short supply. Generational differences will also continue to be part of the new normal. The "my way or the highway" management style of the 20th Century doesn't work well with a generation that has grown up with participation trophies and the internet. This generation is also less committed to long hours, having watched their parents work 80-hour weeks with little to show for it. More flexible scheduling such as the example discussed here, provides larger blocks of free time, which is important to employees who see work as a means to fund their lifestyle vs. the primary focus in life. In Mexico, consideration for the individual is key part of societal culture. Recognition at work, social events and team spirit are important elements in the worker quality of life equation.

The end result of aligning onboarding and retention practices with labor pool dynamics is higher quality and reduced cost. Training and relationship building activities do carry cost, but the net result of lower turnover offsets that. More importantly, a stable, well-trained workforce builds higher quality products. In this company's cross-training model, they are also able to move around the factory as demand changes, improving throughput at optimum employment levels. **SMT**

Tony Bellitto is Firstronic's director of quality. He can be reached by [clicking here](#).

TOP TEN

Recent Highlights from SMT007

1 Integrated Manufacturing Solutions: an EMS, ODM, CM, and OEM!

Robbin Thompson, VP Business Development at San Diego-based contract manufacturer Integrated Manufacturing Solutions (IMS), speaks with I-Connect007's Barry Matties and Judy Warner about her company's expansion, production capabilities and product line-up, as well as the culture at IMS.

2 Naprotek: Building a Successful EMS in Silicon Valley with a Woman's Touch

I-Connect007's Judy Warner recently visited Naprotek Inc., an EMS provider in the heart of Silicon Valley. She speaks with CEO Najat Badriyeh and two of her team members – VP of Marketing Liz Davidson, and Director of Business Development Mike Brown – about their company and their plans for the future.

3 The Benefits of 3D Printing within Contract Electronics Manufacturing

The buzz around 3D printing, or additive manufacturing as it also known, continues to grow day-by-day, and it is regularly hailed as a revolutionary "new" process. This article discusses the basics of 3D printing and the different types of printing processes that exist, along with the benefits these bring to contract electronics manufacturers and the customers they serve.

4 Geek-A-Palooza: 'Who Says Doing Business Can't Be Fun?'

Geek-a-Palooza, now in its fourth year, is the new kind of business event that combines networking with fun. With a relaxed environment approach, the event is catching on and continues to grow. Dan Beaulieu catches up with Tara Dunn about the upcoming Boston and Minneapolis events…and beyond.
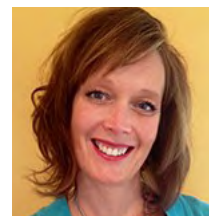
5 Local SMTA Expos Are Where It's Happening!

At the recent SMTA chapter expos, Greg Vance with Rockwell Automation and Brett Crane with Bird Electronic Corporation speak with I-Connect007's Patty Goldman about the event, and the trends happening in the electronics manufacturing industry.

6 4 Benefits of Industrial Automation in Electronics Manufacturing

In a nutshell, industrial automation is a step beyond mechanization; it is about using control systems and technology to replace human physical and mental labor in the manufacturing and engineering sector. This article talks about four of the resulting benefits of automation for electronics manufacturers.

7 Silicon Valley SMTA Chapter President Kevin McClay on Evolution and Current Status of SMTA

Kevin McClay, president of Silicon Valley SMTA Chapter, speaks with I-Connect007's Judy Warner on the activities of the SMTA in the Valley, and the challenge of attracting young talent to join the manufacturing engineering industry.

8 IPC Announces Development of Press-fit Pin Standard for Automotive Requirements

IPC has announced plans to start the development of a new standard intended to cover the qualifications and acceptance requirements for press-fit pin technology that includes the reliability needs for automotive and other industries, such as aerospace.

9 Zentech Adds Seica Pilot 4D V8 Flying Probe Electrical Testing Capability

Zentech Manufacturing is pleased to announce the addition of the Seica Pilot 4D V8 Flying Probe Test System, the latest frontier in flying probe test technology that features the highest test speed, low to medium volume capability with enhanced test coverage and flexibility.

10 SMTA 'Chapter of the Year' Award Winners Announced

The SMTA has announced the winners of its "Chapter of the Year" award in recognition of the accomplishments made by local SMTA chapters. Among the winners are the SMTA Atlanta Chapter, the Oregon Chapter, the Dallas Chapter, and the Penang Chapter in Malaysia.

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Events

For IPC's Calendar of Events,
click here.

For the SMTA Calendar of Events,
click here.

For the iNEMI Calendar,
click here.

For a complete listing, check out
SMT Magazine's full events calendar here.

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electronicAsia
October 13–16, 2016
Hong Kong

**IPC-SMTA Cleaning and Conformal
Coating Conference**
October 25–27, 2016
Chicago, Illinois, USA

TPCA Show 2016
October 26–28, 2016
Taipei, Taiwan

IMPACT Europe 2016
November 1, 2016
Brussels, Belgium

PCB Carolina: Regional Trade Show
November 2, 2016
Raleigh, North Carolina, USA

electronica 2016
November 8–11, 2016
Munich, Germany

**International Printed Circuit &
Apex South China Fair (HKPCA)**
December 7–9, 2016
Shenzhen, China

DesignCon 2017
January 31–February 2, 2017
Santa Clara, California, USA

MD&M West
February 7–9, 2017
Anaheim, California, USA

IPC APEX EXPO 2017
February 14–15, 2017
San Diego, California, USA

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Coming Soon to *SMT Magazine:*

NOVEMBER:
The Via Issue
Looking into the impact of vias in assembly

DECEMBER:
Sales & Marketing
Getting ready for 2017