China, known as the “world’s factory,” has reached a turning point. What choices are being made by businesses with overseas factories in turmoil? A look at overseas production when survival is on the line

In this era of advancing globalization, relying solely on factories in specific regions makes survival a difficult prospect. Even in the culturally mixed manufacturing industry, differing business practices can make for considerable trouble for the stable provision of products.

Soldering technology is indispensable with the advancement of electronics in fields including automobiles, home appliances, and digital equipment. This report examines the streamlining and optimization of soldering in overseas factories and its benefits.

■Labor costs are soaring and good workers are hard to find. The world faces a turning point regarding the streamlining of overseas factories.

Backed by a billion-strong cheap labor force and massive consumer market, China has amassed so many factories that it is known as the “world’s factory.” However, it has now reached a turning point due to the rapid economic growth of recent years.

Over the past decade or so, rising levels of education have led to a decline in manpower for manual labor. As a result of soaring labor costs, the advantage offered by the cheap labor force is no longer what it once was. In the wake of the growth of Chinese owned businesses and improvement of production technology and worker standards, the mobility of individuals within the labor market is increasing, and it is becoming increasingly difficult to acquire high quality personnel.

■Three options: Remain in China, move overseas, or return to home countries

Broadly speaking, businesses are responding to this state of affairs in one of three ways.

The first is to realize a high quality, high productivity production line while remaining in China.

The billion-strong Chinese market is still attractive, and production in that market will also be a major advantage from the standpoint of sales. However, soaring labor costs are an urgent problem. The “low quality, low cost” situation in China is changing.

In order to survive in China, many businesses are producing varieties of equipment with greater added value and shifting toward high margin sales models while reining in labor costs by partially automating existing processes.

The second solution is to relocate to a region with cheaper labor costs.

Recent years have seen an increase in expansion to locations such as Southeast Asia, Bangladesh, and Myanmar. For a time, the cheap labor force can bring about a reduction in production costs. However, the education levels and stabilization of quality accumulated in China over the past 10 years will need to be built starting from scratch. When reinvestment in education and infrastructure are taken into account, reduction of production costs becomes less likely.

For this reason, there is a trend toward automation of the production line from the very beginning in the most recent developing nations. People are responsible for work unlikely to affect quality, with operations affecting quality partially automated, ensuring stable production volume and quality.

The third solution is to return from overseas to home country.

For production in homeland, high quality materials and components are easy to acquire, and infrastructure is in good shape. Moreover, the levels of education are far beyond those for overseas production. However, high labor and material costs are an obstacle.

In this case, full automation is assumed from the start of business, and the requirement for few or zero personnel makes it possible to construct a system for 24-hour operation. This trend has been seen in North America, Japan, Korea as well as other developed nations in recent years.

No matter which path is taken, “streamlining” of production is unavoidable from a variety of respects. In particular, as products become more highly functional and soldering becomes more complex, know-how regarding “automation” entailing more than robots alone has come into the spotlight.

■Example of automation of an existing production line at a Chinese plant. High quality products are delivered using people and robots.

Even in the Chinese market, which has grown through cost competition, the increasing trend toward premium products is unstoppable. Consumer confidence has increased and the Chinese public is demanding better products, with consumption focused on products with high added value. In order to make the most of existing production lines and ensure stable production of high value added products, a division of roles between people and robots is imperative.

At one Chinese EMS factory, soldering was performed by hand on a scale utilizing hundreds of workers. However, significant environmental changes such as rapid market growth and increase in circuit board density far outpaced the speed of personnel education. For this reason, several dozen desktop form robots were introduced, and cell manufacturing based soldering system was implemented, transferring surplus personnel to processes unlikely to impact

product performance such as assembly. With people no longer responsible for soldering operations, advanced skills are not required, and product quality has also been made more uniform.

In addition to the miniaturization of connections, the increasing density of circuit boards has also made weight management essential. For this reason, high precision feeding equipment was installed. Being able to feed 0.6mm of 0.15mm diameter solder wire enabled weight management with a precision of less than the amount of solder for a single point, a mere 0.1mg.

The resulting reduction in the number of workers by roughly half and reduction of required skills also led to a reduction in cost of greater than 50%. At the same time, production quality with a quality rate over 99% was also achieved.

Overseas factory after introduction of the UNIX 41S

■For introducing partial automation. The versatile desktop robot UNIX 41S series enables quick start up.

The UNIX 41S series features a desktop form factor, and is specialized for rapid introduction and start up. The series offers easy operability, and delivers high quality soldering without requiring advanced knowledge. It has been widely adopted for a broad range of manufacturing purposes, including automobiles, household appliances, smartphones, and renewable energy, and is capable of supporting virtually any soldering need when paired with options. One thing that must be paid attention to when setting up an automation line in a new region is maintenance and control of the quality rate. In addition to equipment robustness, management of the initially configured soldering conditions is an important factor in determining whether it will be possible to maintain the initial quality rate.

One new factory in Southeast Asia has adopted the UNIX-413S. It comes equipped with a position correction mechanism, and corrects the solder position of the iron tip with a precision of 0.05mm. Incisions are also made into solder wire to prevent flux dispersal and solder balls. As a result, the initially configured conditions are maintained, making it possible to maintain a high quality rate.

When implementing partial automation, condition management must be sensitive to maintenance and environmental changes. Unless causes of change are understood and resolved flexibly by the equipment, management personnel increases, line stoppage, and resumption of operations will ultimately make cost increases unavoidable.

SOLDER MEISTER UNIX 413S

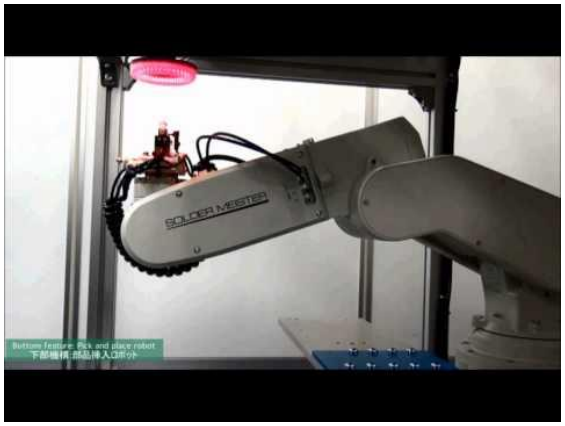
■For implementing full automation. Reduces takt time to 1/3, and simultaneously automates picking, component insertion, and soldering!

The state of the art soldering robot UNIVERSE S (Universe Series) positions the circuit board between a scalar robot above and articulated robot below, and automates electronic component picking, board insertion, and soldering as a single sequence. In the traditional process model, four processes (component insertion, board setting, inversion, and soldering) are performed by a number of workers. In contrast, the UNIVERSE S takes advantage of two types of robots to integrate component insertion, setting, and soldering into a single process.

As a result, at the Japanese factory of one automotive component manufacturer, the UNIVERSE reduced a 150-second mounting process to roughly 55 seconds, one third of the previous time. The installation area was also reduced to a third of what it had been. Additionally, the uniformity offered by automation along with the image recognition based error detection feature reportedly led to an increase in the quality rate of the soldering process to almost 100%.

In Japanese factories, unmanned, 24-hour, full automation is ideal. The UNIVERSE S is an ideal product, achieving full automation that simultaneously delivers significant quality rate improvements together with a reduction in operating space. See more details of universe on “vol1. An automotive industry turning into electronics makes hard soldering”

SOLDER MEISTER UNIVERSE S



Youtube: UNIVERSE Series

http://youtu.be/RKNwsfjPNDQ

■“The soldering and automation professionals” Expert technology to meet global soldering needs

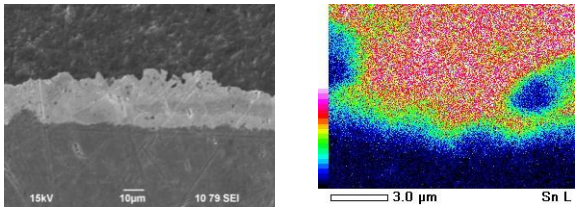
With the evolution of circuit boards and components, modern soldering is becoming more complex and difficult year by year. In order to automate advanced soldering, understanding and mastery of the basic technology is essential.

Our company employs a large number of instructors with advanced skills and knowledge about soldering technology at specialized educational facilities including the Soldering School. The Soldering Lab, our specialized soldering R&D center, has been expanded to four locations within Japan, where state of the art, advanced analysis equipment and the latest models of

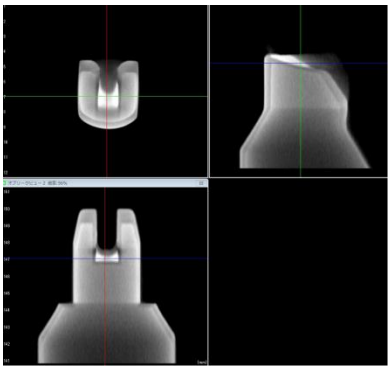
automated machinery are used to perform microlevel quality control and applied research into cutting edge soldering technology.

Amid increasing demand for soldering automation at overseas factories, our company has won high praise from major manufacturers around the world. In addition, we also offer a wide range of case examples and solutions. Please contact us regarding streamlining including optimization and staff reduction of any future soldering work at factories overseas and in Japan.

Post-soldering quality analysis examples



Interface between solder and aluminum plate



X-ray CT imaging of a Soldering tips

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