



# Factory management

– how to get the optimum out of a PCB factory



NCAB's factory management work is wide ranging, from selecting appropriate factories to work with, to continually monitoring and evaluating the quality they deliver, training personnel and dealing with problems and complaints. This picture shows Wendy Liu inspecting material storage at Suntak Jiangmen.

NCAB Group has a strong presence in China. This to ensure their production is geared towards producing the best possible quality PCBs. The task is extensive and many faceted, includes being present in the factories, having dedicated NCAB focused teams among factory staff and carrying out regular audits and other follow-ups.

An ever-increasing part of the world's production of PCBs is concentrated in China (Read more in [InFocus No. 2 2017](#)). There are about 1,600 dedicated PCB factories, fully geared towards producing PCBs and if we include those factories who are only involved in specific segments of the industry such as sub-processes focusing on surface finishes, lamination or drilling, that figure grows to around 3,000 factories.



Jack Kei, Managing Director, NCAB Group China

Those looking to manufacture PCBs in China thus have a wealth of different options to choose from. However, finding the right factory capable of meeting customers' specific needs can be a challenge in itself. When sourcing factories, NCAB closely assesses their ability to deliver at the right price and right quality, as well as their ability to deliver on time, both consistently and reliably. We also evaluate and assess how the factory conducts itself when measured against our own high sustainability standards. This is a major challenge, which the NCAB Group have successfully solved by setting up a Factory Management operation in China, close to the factories. Since 2006, NCAB's Factory Management has grown from 10 employees to more than 60 in 2017.

Jack Kei, Managing Director of NCAB in China, describes the task of finding the right factories and getting the best out of them as a comprehensive and continuous process.

"At NCAB, we take full responsibility for our customers' board production. We are a "one-stop shop" for PCBs. That is why we not only go about selecting factories with the greatest of care, but also look at what aspects of product technology each factory is particularly strong

at. Then we combine these capabilities from our different factories into our factory panel or preferred supplier list (PSL), thus enabling us to deliver the best possible value to customers. No single factory can be best at everything; when customers turn to us, they get the best of what NCAB Group's factory panel can produce," he says.

**"No single factory can be best at everything; when customers turn to us, they get the best of what a factory can produce."**

**JACK KEI, MANAGING DIRECTOR, NCAB GROUP CHINA**

NCAB's factory management work is many-sided, from the selection of factories to work with, continuous monitoring and evaluation of the quality they deliver, to providing training and handling problems and complaints. Jack Kei tells us more here about the different parts of that process.

## **1. CHOOSING FACTORIES TO WORK WITH BASED ON MARKET NEEDS**

"There are two stages to our factory selection, or sourcing process. The first one involves scanning all the 1600 factories in China, as well as a number of other factories in other parts of Asia. We subdivide them into different types, based on the kind of PCBs they manufacture, as well as how their business is developing. This first stage comprises a ten-step evaluation process in all. On the basis of the information we've gathered, we draw up a detailed list of the factories that we feel we could work with and feed it into a database, which is then continuously updated by our sourcing team. "In phase two of the sourcing process, we take into consideration our customers' future PCB needs. This will give us an indication of what parts of our production capacity we need to adapt or build up. We then check the database of selected factories and draw up a short list of appropriate manufacturers who might be able to help us meet those future requirements. The next step will see our sourcing team carry out detailed evaluations of those factories. The whole process comprises over 20 steps and includes meeting their top management and conducting pre-assessments and on-site visits to evaluate if

they meet the standards required to qualify as an NCAB class factory.

“Our evaluation does not only take in the commercial aspects. Our PCB specialists in the sourcing team evaluate quality issues and we also look at the logistics and sustainability side of things. It is when we are focusing on the latter area that we conduct an audit specifically geared to determine how the factory in question works with sustainability. We then identify what may need to be addressed before we can start working with them. For us, sustainability is not just about water emissions and child labour, we have, for example, found faulty emergency showers, fire fighting equipment that has been blocked and unpaid insurance premiums. Obviously these things hardly affect the quality of the board, but can definitely cause problems when it comes to ensuring sustainable deliveries; a fire that is not extinguished quickly, can soon turn into a catastrophe.”

## 2. FINDING THE RIGHT FACTORY FOR EACH SPECIFIC CASE

“We look for the best factories in each of the areas where we see growth and where our customers have such needs. In the sourcing process, we apply a points system based on a number of criteria, with each factory awarded points according to the criteria it meets. The scoring system we have developed covers all relevant parameters. Thus this approach enables us to zoom in on the best alternatives for each specific case.

“Basically, we look at two main aspects of the factories. First of all we evaluate the factory’s performance, in terms of such factors as quality, capacity, price and last but not least, service. What is their customer support like? How are they structured? What are their objectives? How well do our expectations match? Of course we also have a very strong focus on determining how good they really are at making boards, as this will provide us with some level of understanding as to how they might perform as our partners. To be able to do this, it is vital the factory management team has a detailed knowledge of the industry.

“Secondly, we look at their degree of willingness to cooperate with NCAB. We seek close relationships. That’s why it is important that NCAB and the factory match each other with regard to business strategy. We want them to be on the right track, have the ambition to grow their operations on the international market, as well as build up and improve their management side. When our sourcing team are in the process of assessing potential new partner factories, they get to meet their top management, production management and quality managers. During our preparatory audit, we meet many different teams at the factory, which allows us to build a picture of whether it is a good business or not.”

## 3. MONITORING, MAINTAINING AND IMPROVING QUALITY

“We take a holistic approach to these issues and strive toward continu-



“We implement more comprehensive audits annually, where we review all aspects of production, culminating in an improvement plan. This covers improvements not only in quality issues, but also in the work environment, technology and logistics.” This picture shows Jenny Zhang, Sustainability Manager, monitoring chemical storage at the GCI plant in Zuhai.

ous improvements. During the sourcing process, we check production equipment, raw materials and process controls. We also maintain dialogue with the factory staff to monitor their skill and knowledge and compare our findings to the information we’d been provided with.

“When we finally start working with a factory, we continue to monitor things on a daily basis. We have our own staff at the factories; a Production Quality Engineer (PQE), together with one or two Quality Controllers (QCs). They keep a close eye on processes, personnel and results. We take sample checks of each delivery and if we detect any problem that may need addressing, we take the necessary steps immediately. We follow up the specific factory’s manufacturing figures. Based on our findings, we conduct mini audits of those processes that we feel should be improved. The conclusions we draw help us to formulate a list of actions and required activities that we ask the factory to implement. After an agreed period of time we then return to the factory, so that we may follow up their progress on site. “We also

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NCAB’s sourcing process: “We look for the best factories in each of the areas our customers have supply needs. In the sourcing process, we apply a points system based on a number of criteria. This approach enables us to zoom in on the best alternatives for each specific case,” says Jack Kei, Managing Director NCAB Group China.



To ensure the best quality for our customers, we set up a dedicated team from among the factory's own staff. We train this dedicated team ourselves, an approach that boosts the quality of the final result. This essentially results in us having 20 quality inspectors on-site instead of two.

**“We use an application we have developed ourselves that enables us to see in real-time whether the PCB deliveries are on track, with the system alerting us if it detects a risk of a delivery being delayed.”**

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**4. SECURING THE LOGISTICS SIDE**

“Our logistics team ensures that customer deliveries are made on time. We use an application that we have developed ourselves, which enables us to see, real-time, whether the PCB deliveries are in accordance with the agreed and confirmed schedules, with the system alerting us if it detects a risk of a delivery being delayed. If such is the case, we contact our team at the factory and discuss how to best solve it. Real-time monitoring allows us to keep a good check on the logistics. Moreover, it enables us to see the trends over time for the factory, per week or month, and tackle any issues that may arise with them.”

**5. SECURING THE SUSTAINABILITY SIDE OF OUR OPERATIONS**

“We place the same priority on sustainability as we do on quality. During the sourcing process, the factories have to pass a sustainability audit as part of the qualification process. We have had instances where qualification has been delayed, while the factory completes the required sustainability related measures. The same applies for our existing factories, as they are also subjected to the same sustainability audit, where they have to meet the very same sustainability requirements. Our people are trained and certified in this area and we help the factories (through audits and management and staff training) not only achieve our demands but have a broader impact in these areas. The attention the PCB industry in general pays to sustainability falls well below that of NCAB's. (Read more about our sustainability work in *InFocus No. 3 2017*)

**6. CHOOSING AND TRAINING FACTORY PERSONNEL**

“Our own quality personnel at the factories have received thorough training in, among other things, IPC standards. This in turn equips them to take on leadership roles at the factories; monitoring, guiding and supporting their employees as part of the journey towards improved performance. To ensure the best quality for our customers, we set up a dedicated team from among the factory's own staff. We train this dedicated team ourselves, an approach that boosts the quality of

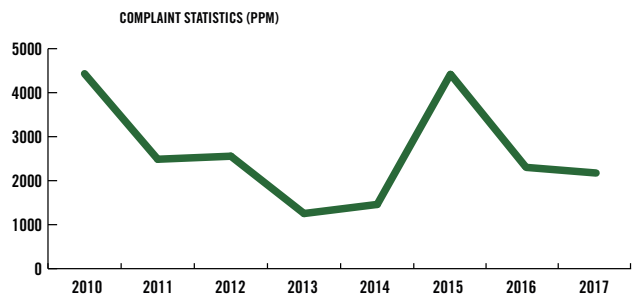
the final result. This essentially means we have 20 quality inspectors on-site instead of two who we know are both focused and well versed in our, and our customers' demands. This is something that we firmly believe helps to increase customer satisfaction and improve logistics/delivery performance. We also follow up our dedicated teams through tests and other means of evaluation.

“This also shows how important our overall purchasing power is. Since we are major customers at the factories, they listen to us and are comfortable with making the necessary efforts to meet our requirements and expectations. At the same time, their factory management is fully aware that through our know-how and quality thinking we can help them develop. Thus, NCAB has an excellent reputation among PCB manufacturers in China.”

**7. DEALING WITH ERRORS**

“Learning from our mistakes is paramount for us and I can confidently say that within NCAB, we always strive to find the real cause of the problem, to find out why there has been an error and what caused it? We work on two fronts when something within the production process, or our own internal processes, does not go to plan. Firstly, to minimize the effect on the customer through containment actions and also to establish a prompt recovery plan to cover immediate needs. We then work with the factory to identify and remedy the root cause of the problem. The outcome is that the customer minimizes their costs through reduced downtime and reduced problems, while the factory saves costs in the long term by having improved its production.

To handle quality problems in the correct manner, it's vital to have a total grasp of the PCB manufacturing process. We should not get put off by complaints, but see them as an opportunity for improvement. This is also what taking full responsibility for customers is all about.”



Our figure for defective parts per million produced PCBs decreased slightly in 2017 through continued proactive and reactive quality work. The figures show the number of defective parts per million PCBs produced. (Defective Parts Per Million (PPM) PCBs produced).

## Work in the field

To get a better idea of how NCAB Group works in the field, we turned to Wendy Liu, Quality Manager at NCAB in China.

### How do you handle quality issues in your relationship with the factories?

"Firstly, we want NCAB's orders to make up at least 15% of our factories turnover, or that we are among the five biggest customers. That means that they take our demands seriously, considering them properly during our annual negotiations with each factory. We set our objectives on the basis of the performance of each respective factory and produce a plan designed to improve quality to be implemented during the coming year.

**"Once a year we conduct a full audit of the entire factory. This involves having three people on site for two days at least, who go through everything."**

**WENDY LIU, QUALITY MANAGER, NCAB GROUP CHINA**

"The process that factories are put through to qualify as a partner for NCAB Group, usually takes about six months following the triggering of the sourcing process during stage. It's an extensive process that tells us what their real strengths are, and it is these particular strong points that we base our approval on. That is our way of ensuring that the appropriate factory is matched with the right type of order, which minimises the risk of substandard quality. When and if a factory wishes to change a process - such as using different materials or shifting production to another location - they are required to immediately inform us so that we have as much forewarning as possible. Whenever a new manufacturing unit is put into production or a change to a production process is implemented, we always implement a new approval process."

### What do NCAB's personnel do out at the factories?

"My team is made up of a staff of 27, with a combined PCB experience of over 380 years, the vast majority of them being Production Quality Engineers (PQEs) and Quality Controllers (QCs) who are always



Wendy Liu, Quality Manager, NCAB Group China

out in the field at the factories. There they monitor production and the progress being made with the quality goals we have set up, for example in terms of the proportion of rejects. They take samples from all our deliveries and evaluate them as well as studying production trends and conducting mini audits every three months of specific processes, to identify potential areas for improvement.

"They also train teams of selected employees, the NCAB dedicated teams, at the factories who work with our orders to ensure they understand and fully grasp our and our customers' specifications. This improves the potential of each factory to deliver better quality.

"Once a year we conduct a major audit of the entire factory. This involves having three people on site for two days, who go through everything. If high technology factories or products are involved, the audit then comprises five people on-site for three days. It's not only about checking documents and policies; we also check the actual conditions. For example, we talk with staff to ensure that they have



"Once a year we conduct a full audit of the entire factory. This involves having three people on site for two days, and they go through everything." This picture shows Wendy Liu, Quality Manager, Jenny Zhang, Sustainability Manager and Aaron Dai, Commercial Specialist NCAB Group China being greeted by factory workers at Jove Yangmen.



"Our PQE meets with the person or persons in charge at the factory every month to go through the results, whether good or bad. If a factory is having problems with a particular process, we can often share our experiences of similar issues and how we solved them. We are well acquainted with best practice and can help them arrived at the right solution," says Wendy Liu. In the picture: Jenny Zhang, Sustainability Manager NCAB Group China in a meeting at the GCI plant in Zhuhai.

actually been provided with the stipulated training and acquired the appropriate knowledge."

**"Should we identify an issue, we arrange to meet with the factory's management and request that they draw up an improvement plan to remedy the problem."**

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**How do you handle your dialogue with the factories?**

"Our PQE meets with the person or persons in charge at the factory every month to go through the results, whether good or bad. If a factory is having problems with a particular process, we can often share our experiences of similar issues and how we solved them. We are well acquainted with best practices and can help them arrive at the right solution.

"We monitor all quality performance statistics constantly and should we identify an issue, we arrange to meet with the factory's management and request that they draw up an improvement plan to remedy the problem. We require them to provide a detailed account of the actions the factory will be taking and set a target for the improvements they are aiming for in the near future. It is important that we meet their very top management in such cases, to ensure that our message is fully entrenched. The measures may require investments, which makes it extra important to get the management on board – a job which is made easier by selecting a factory with the same willingness to put quality first along with a similar business strategy."

**How do you handle situations where customers have their own PCB specifications?**

"NCAB has its own product specifications that our partner factories must fulfill. That is why we have dedicated NCAB teams among the factory staff and demand that no one but them work with our orders. Furthermore, most customers today have own specifications. In such cases this would involve our quality team going through the specifications and translating them into Chinese to ensure that they can be implemented in the factories. We also have a lab at our office in China. Prior to delivery, we conduct tests to ensure that our

customers' boards are as ordered. We then follow up these tests with sample checks once manufacturing gets underway.

**How would you describe the work of NCAB's dedicated teams?**

"We know we are a demanding customer with our own demands and our own PCB specification, that's why we've opted to place dedicated NCAB teams out at the factories. A factory won't be able to meet our quality requirement unless they are fully familiar with our requirements before they start manufacturing a new order. To manage this, qualified, skilled personnel are needed. We hand-pick members for our dedicated team from among the factory's personnel, train them so that we can be sure they understand our requirements and then follow up performance on a regular basis.



NCAB's PCBs may only be inspected by a member of our dedicated team. Our own quality reviewers in the factories function as team leaders and help train and guide them. In the picture: Qianying Ding, QC Inspector, NCAB Group China.

"NCAB's boards may only be inspected by a member of our dedicated team. Our own quality controllers in the factories function as team leaders and help teach and guide them. We follow up the team members on an individual basis and provide additional training initiatives when and where needed. However, they become gradually familiar with NCAB's and our customers requirements, which makes it easier for them to meet these requirements.

"Our dedicated teams facilitate our management work and channels of communication with the factories. This enables us to help them improve their performance, and we gain effective control over our manufacturing."

# Quality – key to controlling costs

HANS STÄHL  
CEO NCAB GROUP



Quality is the single most important criterion when it comes to a PCB. Despite the PCB accounting for only about 0.5-1 per cent of the cost of the final product, it can lead to astronomical costs if a failure occurs that results in the product having to be recalled.

One of the challenges we, as PCB suppliers have to face - particularly in cases within the high mix low volume segment, is that the boards are entirely customer and product-specific. This puts considerable demands on the Gerber files, specifications and factories. To succeed with this type of production, it is vital to focus on quality at all stages of the production chain. What is particularly crucial is to make sure you always work very closely with the factories and their processes.

PCB factories are generally good at producing standard boards

of reasonable quality. That, however, is not good enough for NCAB's customers. We need to monitor and support the factories around the clock in order to be able to deliver more than just basic quality. That is the vital factor that ultimately enables manufacturers to produce final products that, with relatively few exceptions, will work for decades. You can only achieve that by having a presence on-site at the factory, through personnel with a thorough experience of PCB production.

Are we able to guarantee flawless PCBs? No, unfortunately, it's not that easy. But what I can say with absolute certainty is that without having our entire factory management team at work on site, the costs we and/or customers might incur due to quality issues would increase significantly.



## NCAB Group in Social Media

For a few months now, customers and other interested parties have been able to follow us on Twitter and

LinkedIn. We have also started a blog where we immerse ourselves in the versatile world of circuit boards! Follow us on:

» [Twitter](#) » [LinkedIn](#) » [Blog](#) » [YouTube](#)

## Join us!

We're always looking for competent people. If you are a well skilled technician, customer service or

sales person, don't hesitate to contact us or send your resume to: [recruitment@ncabgroup.com](mailto:recruitment@ncabgroup.com)

## Subjects we have covered earlier

Do read our earlier newsletters. You will find them all on our website, [www.ncabgroup.com/newsroom/](http://www.ncabgroup.com/newsroom/)

### » More electronics in smaller spaces

2017 12 15 | NEWSLETTER 4 2017

### » Sustainable Business

2017 10 25 | NEWSLETTER 3 2017

### » The PCB Industry in Asia

2017 06 29 | NEWSLETTER 2 2017

### » Engagement and competence development in focus

2017 04 06 | NEWSLETTER 1 2017

### » Future strategy

2016 12 14 | NEWSLETTER 4 2016

### » Working closely with the factory

2016 10 12 | NEWSLETTER 3 2016

## Are we taking up the wrong subjects?

We are always looking for interesting subjects that we could take a more in depth look at.

If there is something you would like to learn more about, or perhaps you would like to comment on anything we have written, do get in touch with us and tell us more.

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