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INFOCUS:



Working closely with the factory – key to a successful result



The NCAB Groups office in China has 57 employees who possess a thorough and broad knowledge of PCB production. They monitor and follow up on site.

Anyone can buy PCBs in China, but how do you attain the right quality at the lowest total cost? NCAB Group has long taken full responsibility for the quality and delivery reliability, while customers benefit from the company's strong and extensive purchasing power. But how does NCAB use its local presence in China to realise its promises to customers? To find out, we turned to Chris Nuttall, Chief Operations Officer at NCAB Group.

NCAB is an integrated PCB producer, what does that involve?

"Being an integrated PCB producer is basically all about taking full responsibility for the entire delivery process. We support the customer in everything we do and at each and every one of our offices, we are one hundred per cent focused on our customers to ensure that their demands, needs and expectations are met in the factories.

"We work locally, close to our customers, while at the same time interacting closely with factories at their sites. Getting to know the customers, and working jointly with them, both at the technical and commercial level, enables us to add real value through the way we can really understand their needs and select the right options so that we meet the expectations. At the same time, it is easier to define and implement any solutions on the manufacturing side simply by being on site at the factories, something which is also helped by our strong purchasing power.

"Our office in China has 57 employees who possess a thorough and broad knowledge of PCB production. They monitor and follow up on the spot and should we see any issues arising, then we see to it that they are remedied quickly. We take care of problems and are always absolutely transparent and honest with the customer with regard to what has happened. That is what we mean when we speak of our integrated approach to our work and it applies throughout NCAB globally."

"Our office in China has 57 employees who possess a thorough and broad knowledge of PCB production. They monitor and follow up issues on the spot."

CHRIS NUTTALL, CHIEF OPERATIONS OFFICER, NCAB GROUP

How would you describe NCAB's overall strategy when it comes to the factories?

"When we choose a factory, we don't just look at pricing or cost, but at all possible indicators that help us evaluate and select the right partner for NCAB, our customers and the projects we place with them. These would include quality, equipment, materials, stability, capacity, capability and other special needs so that we cover the entire spectrum and always find the most suitable factory or factories.

"Other key elements of our strategy include being geographically close to the factories, aiming for triple sources so that we make sure of having a choice of at least three factories within each technology segment: from standard multilayer boards to complex HDI PCBs, from boards designed for medical equipment to those destined for the automotive, railway and aerospace industries. We never rely on one sole factory. Also, we would never try to fit a job into a factory

that doesn't have the experience, capability or skills to handle that specific job.

"Another focus is the role we have at each of our factories. We want to be a major customer, the aim being to account for more than 15 per cent of their turnover or be among their five biggest customers. Today we are working with nine major factories in Asia, as well as plants that produce special types of circuit boards. Our mix of factories ensures we have the width we need. We only add more factories when we need to grow, either through increasing capacity needs or through the development of specific technologies."

"Quality first is an important value within NCAB and it's something we want to see in our factories as well."

CHRIS NUTTALL, CHIEF OPERATIONS OFFICER, NCAB GROUP

What does it take for a factory to qualify as a potential partner?

"The short answer is: a great deal. NCAB is one of the world's biggest PCBs producers engaged in outsourcing production. Within our sourcing activities, we have high expectations regarding what we expect from our potential partners. Factories that want to work with us must meet our requirements.

"Quality first is an important value within NCAB and it's something we must see in our factories as well. We can for example, help factories to train their staff. However, the corporate culture and values are more difficult to change or to get right if those qualities are not already there; so we want to see those 'soft' values already in place. Our factory management team in China can evaluate these aspects in a detailed fashion due to the fact that they are there, on the spot, and this enables us to find the right factories that want to grow with us.



Chris Nuttall, Chief Operations Officer, NCAB Group.

"We also evaluate equipment status, the level of the facility, [their knowledge of] chemistry and material brands used and, by no means least, they must have a management system that reflects our own desire for sustainability / CSR."

And what demands does NCAB put on its factories?

"At NCAB, we have drawn up our own PCB specification which consists of 133 points. This specification provides a platform, a benchmark for a defined level of consistency of quality that we expect from our factories. We have a large variety of customers whose needs and demands may vary greatly, yet we know that in order to achieve consistency of product quality, the factories must perceive all orders from NCAB as having a consistent base level in terms of acceptance criteria. In most cases NCAB's PCB specification will cover customers' demands, in those cases when certain needs exceed the specification, these additional needs are clearly highlighted to the factory.



Ellefen Jiang, PCB Design Manager at NCAB Group China, examining a printed circuit board during a factory visit together with colleagues.



The annual audits are supplemented with monthly meetings, process audits in areas that need special attention, as well as audits of the plant's sustainability and CSR work. To learn more about that, please see our film about audits. See film >>

“Apart from asking the factory to deliver according to our specification and acceptance demands, we also require them for example, to only use NCAB approved materials, in some cases processed on NCAB approved equipment and that they meet specific lead times. NCAB also makes a point of clearly describing, right from the start, how we would like to work with a factory. We insist on training teams within the factory to ensure they understand our specification, our way of working and implement it in the factory's processes.

“Only dedicated pre-production engineers that we have evaluated and approved may handle our data and they work directly

with NCAB's own technical teams both in China and locally. The same applies to other staff in the factory as we hand pick the most experienced employees and those with the best track record to work on our orders. If a problem occurs, we identify it and then part of any necessary corrective action is to provide appropriate supplementary training to the individuals involved.

“We also continuously monitor key indicators for quality and delivery performance, as well as the measures applied with any problems that may have occurred. We also conduct extensive audits at the factories and we supplement our annual audit with monthly meetings, process audits in areas that need special attention as well as audits of the plant's sustainability and CSR work.”

How would you describe the process of integration with the factories?

“As I mentioned earlier, we work on the spot, close to the factories. We measure, evaluate, follow up and work on improvements. If the factory fails to achieve its targets, we can follow it up immediately. We keep a close eye on the process and the product and can apply the necessary corrective measures - being on site is key, otherwise it just won't come together.

“NCAB devotes 180 days a year to auditing our factories, on site. The major audits we perform at our factories annually, involve three of our people working on site for three days. Our approach is a tough one, yet fair. Apart from that, we implement 90 process audits per year. We decide what processes to monitor two months prior to the audit. That allows us to define areas where we have had issues, which in turn enables the issues to be promptly remedied.

“We always follow up our audits and actions as part of the monthly meetings with the factories. We are well aware that follow-ups are crucial to ensure that the necessary improvements actually happen. We won't see the same level of improvements if we go in once a quarter. It's not enough. In some cases, we may be back just a few days later to check up. The fact that we have such a strong presence in the factories, makes it easy for us to push for change.”

IMPORTANT COMPONENTS THAT MAKE A DIFFERENCE

- > **NCAB Group PCB Specification with 133 points:**
The specification provides a platform for quality and a consistent benchmark for the factories used.
- > **Audits:** A locally based team carries out regular extensive and detailed audits. The focus is on production and the conditions at the factory. Any issues detected are then carefully followed up.
- > **The sourcing process:** By carefully reviewing factories' status, experience, knowledge and attitude, NCAB can identify factories that would qualify as manufacturers of its customer boards.
- > **Approved equipment/staff:** NCAB identifies specific equipment to be used, as well as selects and trains the best staff in the factory to work on producing PCBs for NCAB's customers.

How would you describe your work on-site? What characterizes NCAB's approach?

"I'd say that it is above all a combination of a number of different components. As I previously mentioned, there is our PCB specification, comprising 133 points, which is an important factor behind the high quality standards of our boards. But right at the very start of working with any factory we have our sourcing process. Our sourcing work comprises of two steps. In the first step, we start from a database that contains more than a thousand factories active within different product groups. We evaluate them on the basis of their status, market position, experience, technology use and approval ratings. Building on this screening process, we draw up a shortlist of 20-25 potential plants. We do this continually, even when we do not have any immediate need for new factories.

"In step two, we act upon a specific sourcing demand and we start with the list of possible new factories identified in step one. We evaluate the potential factories against the demands and select at least three factories and then visit the factories and implement audits. We then make follow-up visits before we make a decision to continue working with one or two of them. What comes after that, is a controlled ramp-up phase where we get them to agree to our expectations and our method of working as described earlier.

"Another important factor is the audits we carry out - all of them. They are a key part of our continuous improvement efforts. We have a strong team working at a great level of detail and with such an approach these are not standard audits that replicate an audit against an ISO standard. NCAB's audits, as well as looking at elements of their management system, are extremely thorough. They are based on extensive experience of manufacturing, where we ask such questions as "How do they really go about making their products at the factory?" "How well do they make them batch to batch against the demands?" "What will we get out of them?" The audit document is a very strong tool to validate that a factory is up to standard.



NCAB's annual audits, involve three of the company's staff, working on site for three days.

"The fourth area I want to emphasize is that, when working on our orders, our partner factories only use equipment and personnel authorized by us. We select the best staff and spend many hours training them, while we ensure they use the appropriate equipment. In this way, we make the otherwise generic manufacturing process unique to us. This is where we add value for our customers and give them more than they could get on their own."

What is important for a successful and long-term partnership?

"A strong relationship requires trust from both parties and willingness on their part. We have to have the right approach for it all to gel. NCAB works in an open partnership with the factories where we make it clear that a partnership means we wish to be in it for the

long haul and that is why we invest time with our own staff out on site. That is why factories in turn allocate equipment and people to NCAB.

"Transparency is also important. We are transparent with both customers and factories. The factories are transparent towards us. Trust builds transparency, which builds willingness. It's a bit like a marriage - a really long-term partnership!"

“Working closely with the factories helps us keep up to date with the rapid technological developments in this industry.”

CHRIS NUTTALL, CHIEF OPERATIONS OFFICER, NCAB GROUP

You are clearly working hard and systematically to build up your factories, but what are you learning from them?

"Working closely with the factories helps us keep up to date with the rapid technological developments in this industry. We can keep track of where the factories are heading and are able to quickly find ways of working together to meet new needs that may arise. This might involve new technologies, new materials, new production processes or even a merging of several different processes. We have to keep tabs on which way the technology develops and we learn from the factories.

Moreover, we can identify the best practices when addressing the various challenges we encounter and transfer what we learn from one factory to the other. This applies not only to issues related to manufacturing or quality, but also to such things as health and safety, the environment, employee welfare and so on."

What are the benefits of NCAB's approach?

"Here, the figures speak for themselves. Last year we set a new world record when it comes to quality. No less than 99.24% of our deliveries were completed without complaint. We also achieved fantastic figures when it comes to customer satisfaction, 4.29 on a 5-point scale. At the same time our total order intake rose. Our quality is world leading, while our customers are satisfied and buying more from us; that proves that we can put quality first without complicating things unnecessarily or creating excessive costs for customers. I think this really demonstrates the benefits of what we do. It ultimately boils down to this – better quality and better service.

"We have seen boards that we have produced, compared to boards produced from the same factory using what is a generic process, yet the comparison has shown the product from NCAB to be a better product, even if it emanated from the same factory"

What do you see as your biggest challenge going forward?

"We are a growth company in a very rapidly changing market where we need to constantly improve our skills and efficiency. It is vital we stay aligned with our customers going forward, while at the same keeping an eye firmly on the technological horizon."

HIGH QUALITY AND SATISFIED CUSTOMERS

- > **99.24 %** of the NCAB Group's PCB production was delivered without complaints during 2015.
- > **4.29 out of 5** was the figure returned by the NCAB Group's customer satisfaction survey in 2015.
- > **131 million euro** was the total sales figure achieved by the NCAB Group in 2015.

Demanding work that builds the business

The Shenzhen-based PCB manufacturer Jove has grown significantly in the past decade, with their partnership with the NCAB Group playing an important role in this development. Co-owner and marketing director Wang Lu tells InFocus more about that.

How did your partnership with NCAB start?

“We started working with NCAB in 2004 when we were a much smaller operation. Kenneth Jonsson (Technical Manager at the NCAB Group) was not particularly impressed when he first visited us. However, NCAB still gave us a chance and we received a great deal of help and support and learned a lot from them. NCAB helped to drive our growth to such an extent that we now have three factories - one for small volumes, another for medium volumes and a new one, which produces high-tech PCBs. Today Jove produces printed circuit boards to a value of 50 usd million, with all three factories producing boards for NCAB.

“Right from the start it was obvious that NCAB was not a buyer that was just looking for the lowest possible prices. Their focus then as it still is now is on quality and the bigger picture, to minimize complaints.”

How would you describe Jove's work relationship with NCAB?

“NCAB is one of our five biggest customers. I would describe our relationship as a partnership. Jove is dependent on NCAB in the European market, particularly in Northern Europe. They are our only real partners in Europe and we know that they represent us 100%.

“NCAB controls the manufacturing process on an almost daily basis to ensure what comes off the line meets the tough requirements on their specification list. They also carry out annual audits with a team that spends several days in our factories. We collaborate very closely with NCAB's offices in Shenzhen; whenever we have a query, we get fast responses from them.

“We always treat NCAB as our most important customer. We value them even if they challenge our prices. They are loyal and open to discussions. They expect and get good prices, quality and delivery. We try to improve all the time because we do not want to miss

out on working with them. With some projects we are even prepared to make a loss, since in the long term, we are still winners.”

“NCAB's employees have extensive knowledge of PCB technology. They help us when we run into problems and can provide ideas and suggestions.”

WANG LU, MARKETING DIRECTOR, JOVE

In what ways has NCAB helped you grow?

“NCAB's employees have extensive knowledge of PCB technology. They help us when we run into problems and can provide ideas and suggestions. If there is a problem with our quality or delivery, we arrange a meeting to discuss how to rectify matters. They help us to develop our technical capability and not least the quality of our products. We can apply what we learn from them in our production for other customers.

“NCAB's tougher demands can benefit our business in other ways as well. While other plants buy the cheapest equipment, NCAB demands that we invest in the best. It pays in the long run. We are still using, to this day, an expensive machine that we bought ten years ago. This would never happen with a cheaper machine.

“Initially, we didn't feel NCAB really needed to have such a strong presence in our factories, nevertheless we have gradually realized that this is something that also benefits us, especially with customers who make such high demands. Through their expertise, NCAB's employees help us to avoid errors. In this way, they help to grow our factories.”



Wang Lu, co-owner and marketing director, Jove, together with Örjan Ödegård, Commercial Director, NCAB Group Norway, at the NCAB Group Factory Day.

“NCAB’s tougher demands can benefit our business in other ways as well. While other plants buy the cheapest equipment, NCAB demands that we invest in the best. It pays in the long run.”

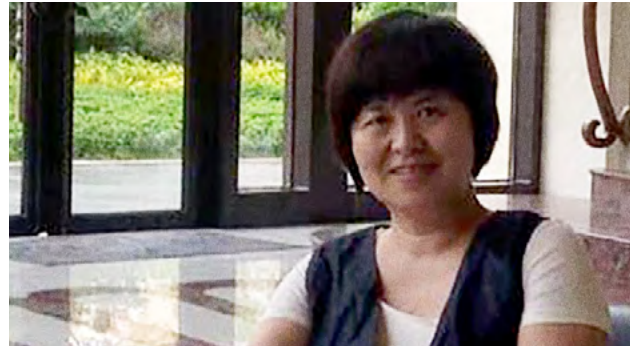
WANG LU, MARKETING DIRECTOR, JOVE

What is it like working with NCAB compared to other customers?

“The big difference is that we do not have a dedicated PCB specialist from the other customers who monitor what we do on a daily basis. Most customers use IPC2 standard for their PCBs, but NCAB’s requirements are stricter. That’s why we have a dedicated CAM engineer who looks after NCAB’s orders and who is thoroughly familiar with their specifications.

“NCAB’s audits of our processes are extremely stringent. When we opened our new factory, we were required to go through the entire approval process from the start. Five of NCAB’s people spent four to five days checking each process. They provided us with a list of measures and we were given a month or so to make the necessary improvements. NCAB then carried out a new inspection, after which we were approved.

“If we wish to move production of a particular PCB design from one of our factories to another, then both NCAB and the final customer have to approve it first. Each design has to undergo an approval pro-



Wang Lu, Marketing Director, Jove.

cess. This approach means a great deal of homework for us, but basically, it is positive. It leads to improvements in the process and is one of the main factors that has helped Jove grow as strongly as it has.”

So Jove sees the relationship as a long term one?

“Yes, and we are investing in new offerings that will enable us to further expand our relationship. We now have the capacity to produce HDI boards, the more complex and advanced type of PCBs. All being well, we can gradually work closer with NCAB. We are partners, not competitors. It is a real win/win situation. We are committed to a long-term relationship - at least ten years going forward. That’s when I will be retiring and after that I will not know what will happen! [laughs]”

Questions around the world: What kind of response do you get from customers regarding the efforts you put in at your factories?



FRANCE
CELINE NUTTALL
Customer Support,
NCAB Group France

“Today, customers are not looking for a trader, but a company that can provide them with a comprehensive solution. Their main focus is to find high quality PCBs at competitive prices. They know that we can deliver better results, thanks to the fact that we have our own staff and processes on site at the factories. They also know that we keep to their specifications, select the appropriate plant and manage their orders better than they could themselves. One of our customers said they were convinced that our IPC Class 2 boards are superior in quality than the IPC Class 3 boards produced by some factories.”



CHINA
KATHY XIE
Key Account Manager,
NCAB Group China

“Since our local customers are also close to us in China, they are able to visit us often to see first hand how we add value. What impresses our customers is the close relationship NCAB has with its factories and the care we take to make sure they measure up to our demands in terms of, for example, quality and delivery reliability. The way we manage our factories raises customer confidence in our know how, experience and ability to provide them with appropriate technical solutions.”



GERMANY
RENSHUO LIU
Technical Support Manager,
NCAB Group Germany

“Our customers appreciate the way we assume full responsibility for their PCB requirements - that is, on time delivery in accordance with the PCB specification. A special strength is that we have NCAB employees and dedicated factory staff in the factories to assure and control the production process.”

Close proximity and integration – two key concepts in NCAB’s business model

HANS STÄHL
CEO NCAB GROUP



Judging by the way our buying habits have changed in recent years, where we’ve been increasingly turning to on line channels, it is easy to come to the conclusion that proximity is no longer an important factor. Nevertheless, I am convinced that nothing is going to replace physical presence when it comes to creating the right platform to manufacture and supply the optimum PCB. A person in the factory, working for example, on improving the soldering process, can never be replaced by an IT service, since the task they are involved in requires days of interaction with factory operators and process engineers.

PCB production is a complex process, very much due to the fact that the boards are customized – there are no standard solutions, in contrast to what we generally find in the world of components

manufacturing. Being on-site, close to the production line, monitoring and securing the specified quality, is a critical success factor and a vital part of what we call integrated PCB manufacturing. However, it is important to have an efficient IT support function to simplify administrative processes and continuously improve and develop them according to the company’s needs.

In the future, we will have to integrate even further, both with the customer and the factory, both on the IT side (for example, EDI) and on solving specific process challenges (for example, new requirements for plugging through holes).

Physical presence and integration are important at all levels, especially when facing the challenges posed by lead times, complaints handling, audits and price.



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](#)

14 of the 133 most essential criteria for a sustainable PCB – read more about NCAB’s PCB specification

» [NCAB Group’s PCB Specification](#)

Subjects we have covered earlier

Do read our earlier newsletters. You will find them all on our website, www.ncabgroup.com/newsroom/

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» **UL Approval**

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» **Purchasing PCBs**

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» **Sustainable business**

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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.

Mail: sanna.magnusson@ncabgroup.com