the business of perfection

tbp ELECTRONICS

WAY of life

edition

38

May 2015

smart industry

column

education

During the creation of a presentation about the history of electronics production I discovered several striking things. One of them was an advertisement for Amroh, as it was then, located at the time in Muiden. It was an advertisement from 1959 for a kit of a crystal radio by Step by Step. The advertisement was accompanied by text which stated: "The electronics industry, the industry of the future, is calling out to young people with curiosity, common sense and technical ability. This appeal will only become stronger in the future."

And I began to wonder: "What has actually changed over the years? This text could have been published in today's paper...or in online campaigns." The only thing missing is a new application in the form of such a kit. One year previously, in 1958, Philips launched the so-called Pioneer range, beginning with a crystal radio, which could be extended with an extra transistor, such as the OC13, and a loudspeaker version with an OC14.

What has happened to the time when large companies tried to encourage young people - at a very young age, from age 10 upwards - to be enthusiastic toward technology? You got a technical explanation of your radio in easy-to-understand language and you learned to recognise, assemble and solder components yourself! In the Amroh Step by Step kit, you even got the soldering iron itself, in the form of a copper stylus, mounted on a wooden handle, which you had to heat up over the flame of a Verkade wax tea light. This was actually included as part of the kit. I think it's of paramount importance for young people to discover whether they have a talent for technology at such an early stage. Ultimately a great many companies such as Philips, Verolme Scheepsbouw, Fokker – even with its own MTS in The Hague - etc. have created a great many professional people, from whom we are still benefiting today.

The EMS sector has a need for pragmatic people who carry out physical work. In the end, there must be a well-assembled and functional product on the table for our customers, and that cannot (yet) be done virtually.

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CEO

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Contents

Errors discovered on the inline 3D AOI (Automatic Optical Inspection) were sent by the AOI review station to the Manufacturing Execution System

MES is progressing, but it can be (even) better

You can read about the progress of the implementation of MES (Manufacturing Execution System) in previous Way of Life's. This all-encompassing control system from Aegis collates and presents information on the entire production process. We reported that a lot of work is being done on the design and presentation of work instructions for our operators. We also mentioned that this activity generated more work than was originally anticipated. In addition to the editorial interpretation - how do you create a clear instruction which will be interpreted by everyone in the correct way - the sheer scope of the project did not make it easy for us. Out of our weekly requirement, around 70% of our work instructions are now in Aegis.

PIM

So what was the situation then? To produce a pcba (printed circuit board assembly), the application of components, soldering, testing and any finishing required, there must be work instructions available to the machine operators for each process step. This type of work instruction is also called a PIM, which stands for Product Instruction Manual. There can be up to 60 of these for each product and they can contain all types of information, for example design, layout, how and where a component must be placed, which programme must be set for the machine, whether coating is required etc. A major requirement is that these instructions must be conveyed in such a way that the meaning is clear and unambiguous to each operator.
The MES is now arranged in such a way that the complete PIM for a new product can be available in only a few hours.

reports and dashboards

At the moment we are working hard to be able to retrieve all of the required reports and so-called dashboards from the system. In conclusion, it is very important to see how quality develops during the production of a batch. Imagine that faults occur during the production of pcba's; any disruptions are reported in real-time. Those messages are immediately visible on the dashboards. The quality controllers and/or operators can then intervene immediately to prevent these faults occurring in future products. The reports which appear after the completion of the production batch provide detailed information for study at a later date. The fact that the system does not yet function totally automatically is mainly a question of time and fine tuning of the software. The cause can be traced partly to the fact that not all test machines can be fully linked. What has to happen in a given situation, who does what etc.

The complexity of the messages is so extensive that the procedural structure causes headaches. So-called false calls and supposed errors still cause too much contamination of the information. Nevertheless it's still a challenge to bring this to a satisfactory conclusion.

user group

tbp is not alone in having difficulty in getting the MES package to fulfil the role for which it was acquired; fellow EMS companies are experiencing the same problems. This has even led to the foundation of a user group. Together with the supplier - who works to American standards and is learning that their experiences are different to those in our country - we are now seeking optimisation of the software link. In Way of Life 39 we expect to be able to report further on the progress of MES.

Aegis software
www.aiscorp.com

smt-operators (surface mount technology) view line balancing using the Aegis MES-dashboard

** Electronics Manufacturing Services*

early involvement that's...

one small step for tbp

one giant leap for manufacturing

In previous editions of Way of Life we have explained the importance of early involvement: this service contributes to perfecting the product to be produced. The underlying concept is that an EMS company, [1] which must convert designs into products, is involved at the very beginning of development and advises on the creation of the product. All from the moment that an electronic circuit is conceived. If a designer takes into consideration issues such as manufacturability, testability and logistics, this yields the highest quality combined with the lowest dropout percentage and at the lowest costs (the most favourable Total Cost of Ownership (TCO)).

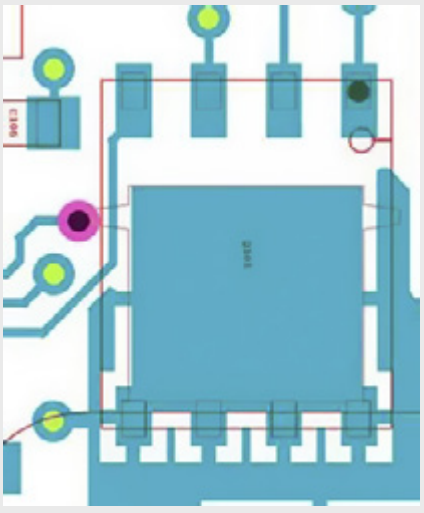
At tbp, so-called DfX-engineers (Design for eXcellence) advise designers and assess whether their designs comply with the stated features. This is a service which the company has offered for some time now and which has enabled it to achieve a unique position in the world of EMS.

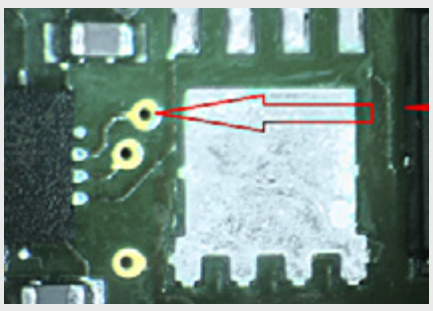
manufacturability

It sounds obvious: a design must be suitable for production. An electronics designer can invent an attractive design, but it must be possible for it to be manufactured. Assessing the manufacturability of electronics is the work of the DfX-engineer. He looks at the features which affect production through the eyes of the manufacturer (the EMS company). This begins with the choice of components. If we focus on the end product, the intention is for all components to be finally assembled on a pcb [2]. In doing so there is a choice of various production methods: fully manual application of components to the pcb, automation using a pick-and-place machine or a combination of both. Practice shows that in terms of speed and reliability (a mistake is always made quickly) human labour must defer to the automated pick-and-place machine. Not to mention the delaying factor that in the case of manual installation, pre-processing is often necessary such as the movement of wires, clipping to the correct length and so on. Manual assembly still occurs, especially with older products, but new

[1] *EMS = Electronics Manufacturing Services*

[2] *pcb = printed circuit board*





Figures 1 and 2 - the pink "via" is too close to the "QFN" (integrated circuit without joints, which is soldered directly to the pcb) creating a short circuit with the protruding fins of the central surface

designs are usually assembled using smt [3]. In addition to the production method, other issues also play a role. Does the customer use the EMS company's standard stock list? tbp uses something called the ABC list, which contains three types of components: standard components (always available), less frequently occurring types (only used by a few customers) and specials (used for only one customer). Needless to say, it is more advisable to make use of the first type: in principle, there will be no problem with supply and there are no storage costs.

choice

Automation in production is not only cheaper for the customer, it also increases production yield. Regular readers will recognise that concept immediately: the percentage of pcba's [4] that contain no production faults during the first production run. Machines now make fewer faults than people and work more quickly. For illustration: our machines install more than 10 components in one second. Try doing that by hand!

Components are often made in different specifications: in conventional casing with wires or as an SMD (surface mount device). This latter category lends itself to automated handling by the pick-and-place machine. During component selection, the DfX-engineer will ensure that as many smt components as possible are used. Most components are available in this form. And the share is increasing. Whereas it was not previously possible to install through hole connectors by machine, there is now a solution available for this (so-called pin-in-paste technology). The manual application of this type of component is therefore no longer necessary. So designers should be constantly aware of what the market has to offer in terms of reflow technology.

faults

when a pcba is manufactured, it is preferable for this to be done in one go. Right first time, as we say at tbp (see page 14). It is logical therefore, for all production details to be closely inspected at an early stage. However, wherever work is done, mistakes are made.

Designers also occasionally drop the ball. It is the task of the DfX-engineer to discover errors and to report them to the designer. We highlighted several such examples in the previous Way of Life. In this issue we will also show you a few practical examples (see figures 1 to 7 inclusive). The chance of the electronics produced in one run complying with the client's expectations is greatest if imperfections are corrected early, during the design stage.

testing

Faults can occur not only during the design phase but also during production. A component is damaged or does not comply with the specifications, a flaw causes a poor solder connection or a component is incorrectly positioned etc. Faults which must be discovered as quickly as possible during the production process. The earlier a fault comes to light, the simpler it is to rectify. That is the reason why measurements are taken at various locations in the production process. In addition to optical inspection equipment in various locations on the line p06 >>>

[3] *smt =surface mount technology (components which are soldered directly onto the pcb)*

[4] *pcba = printed circuit board assembly (electronics consisting of a printed board containing all of the components)*

Figure 3 - components which are placed too close to the edge run the risk of being knocked off during transport along the various "conveyors" on the production line

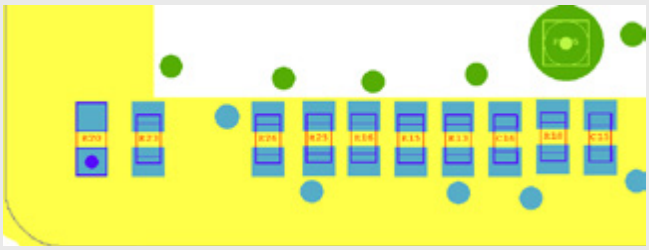


Figure 4 - fiducials (markings, red) which are too close to the edge of the pcb, remaining concealed in the placement machine whilst the pcb is being held. They are unusable as a reference point, as a result of which the placement accuracy of the machine diminishes

Figure 5 - "hostile" copper (blue) which is too close to other copper surfaces, causes a short circuit during the production of the board or during the soldering process

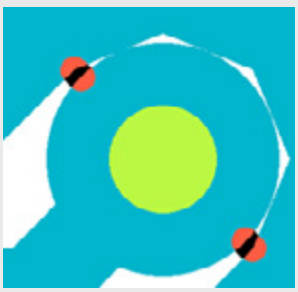


Figure 6 - faults in the BOM may lead to the ordering and installation of components which do not fit the anticipated footprint

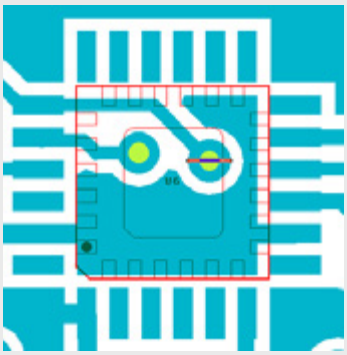
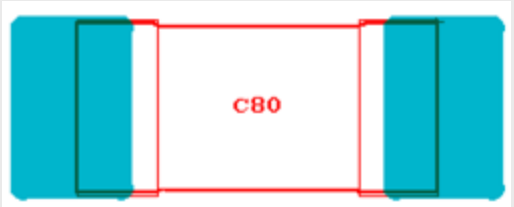


Figure 7 - the large distance between the solder pads can cause poor solder joints and even tombstoning

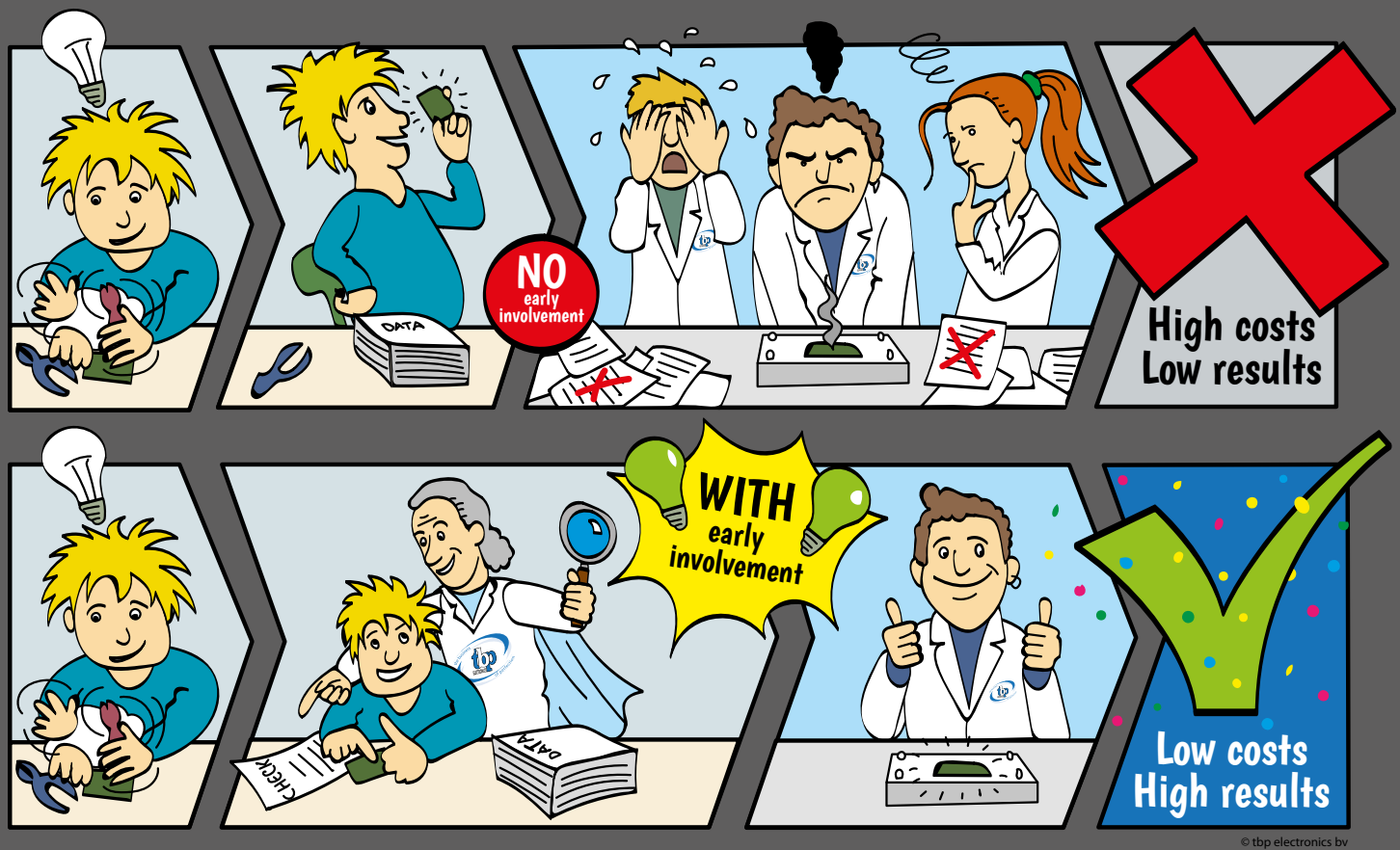


p05 >>> - even three-dimensional measurement! - electrical tests are also carried out. The selection of the test strategy is a task for the DfX engineer and is designated DfT or Design for Test. The engineer indicates his findings in the form of a test analysis. In this he states the measuring methods required to achieve the lowest possible slip through percentage. A wide selection of tests is currently available, such as: in-circuit testers, flying probes (a measuring instrument with a fast-moving measuring pin) and a boundary scan. In order for a pcba to be testable, the designer must create test access. This might be the application of extra pads (copper islands) where measuring pins make a temporary electrical connection and the consideration of the application of boundary scan components. DfX-engineers control and advise on the subject of pcb testability. Occasionally, imperfections which obstruct the functional operation of a pcba come to light. A practical example: the incorrect wiring of an integrated circuit. The connections according to the specifications differ from the electrical connections (printed conductors) applied to the board. The circuit will never be able to work like this!

"all pcba's are not created equal"

The best measurements are carried out on pcba's which make use of boundary components. At tbp this method even goes so far with the use of extended boundary scan that when testing, the operator can not only see that the board is defective, but also receives a message on his screen advising how the problem can be resolved. No lengthy fault-finding then, but immediate instructions on how to resolve the fault.
Naturally, fault-finding costs time and money. But the production of defective pcba's, or pcba's which no-one knows the quality of, is not an option either. The DfX-engineers therefore make suggestions as to the best test strategy. With certain pcba production quantities, it may be preferable to create a one-off test fixture to be deployed for individual testing of each pcba. This method has higher test coverage and as a result contributes to a much lower slip through. This will save the customer (usually an OEM manufacturer) money on the products that he himself manufactures. Fault-finding and replacement always incur costs.
The interest of our customers in specific test set-ups in which test fixtures are used is increasing significantly. No wonder, if you are seeking a high quality product. In doing so, tbp wishes to differentiate itself from other EMS companies by making the statement "all pcba's are not created equal".

Are you curious about the possibilities for your organisation? We would be happy to inform you personally, by telephone or email:
T +31 187 602744
E info@tbp.nl



ELECTRONICS & AUTOMATION

2/3/4 JUNE 2015 JAARBEURS UTRECHT

Electronics & Automation

Does electronics appeal to you? Then you mustn't miss it: the Electronics & Automation Fair, or E&A. From Tuesday 2 to Thursday 4 June around 130 exhibitors will welcome you to the Jaarbeurs in Utrecht. Organiser FHI considers this trade fair as a breeding ground for managers, buyers, engineers, designers, scientists and students who have a connection with electronics. Some 4,500 visitors will make or maintain personal contacts, seek solutions to electronics problems or simply familiarise themselves. Or they may take part in one or more seminars. Naturally, tbp will be there. Our regular fair visitors will recognise our stand immediately, alongside the Live PIL (Production Integration Line, the mini-factor for manufacturing the gadget): 8B032. If you are visiting the fair, make a note of our stand number in your diary. Also, if you are intending to go and you don't yet have your admission pass, visit www.tbp.nl for a free entry pass. Now you're all set!

the fair

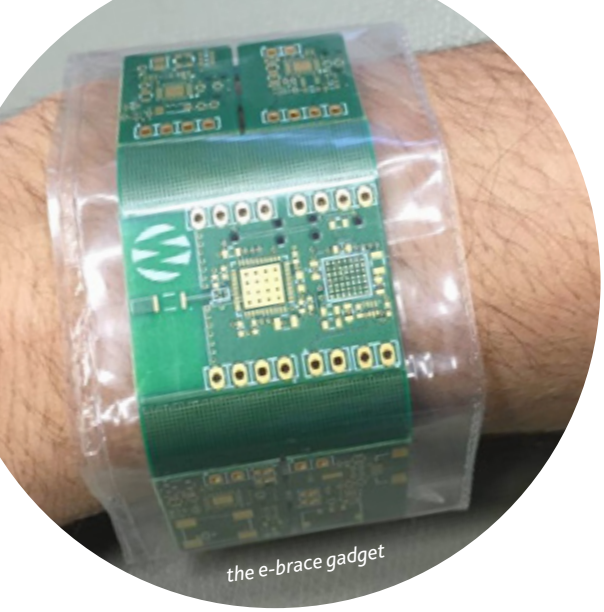
It's not just down to the enthusiasm of the standholders; E&A 2015 also promises to be an interesting fair.
A great many seminars are being held, with various titles:

- Tomorrow's Electronics
- Reliability
- Wearable Electronics
- Collection and handling of big data
- Electronics & Product Development
- Internet of Things (IoT)
- What can be done virtually in the electronics chain? (with a contribution by tbp)

Electronics has changed considerably over several decades. Electronics has become very tangible. Thus, the smartphone has captured its position in a very short time, and for many has become an indispensable item. The possibilities for its use are increasing hand over fist. Smartphones themselves form part of business networks with the motto: each employee has the necessary intelligence in his pocket, so let him join the business network. Bearing in mind the necessary security, naturally. We call this BYOD (Bring Your Own Device). It's yet another aspect of Internet of Things (IoT). We are now seeing another development on the horizon: wearable technology. This is going to be a booming business according to the marketeers. Fashion designers and technicians working together on new products which can further improve our lives. Or at least change them. From an aesthetic or social point of view, in terms of work or relaxation, because it's nice, healthy or useful, or simply because we want it. A number of these new types of products already exist: clothing with light effects, safety clothing with integral lighting. And then there's Google Glass. According to the market research bureau Beecham, around 40 different applications are currently being developed (www.beechamresearch.com).
The electronics of tomorrow: let's work on them together!

gadget

The CRISP (Creative Industry Scientific Programme, www.crisppplatform.nl) is calling for a knowledge infrastructure for "designing Netherlands" in which the most diverse disciplines come together with the goal of developing creative p08 >>>



the e-brace gadget

p07 >>> and intelligent products. Government and education also contribute to this. In the category "intelligent and wearable products" - although separate from CRISP - a gadget has been created which visitors to the E&A fair can assemble themselves. It is a tradition for a visitor to acquire a gadget during their visit, if he/she is prepared to put in a little effort. For this project, electronics designer Metatronics has developed electronic 'components' to allow visitors to give feedback via their clothing in various ways. Thanks to sponsorship by 16 companies, including tbp, 1,800 visitors will be able to benefit from this.

The e-brace can be assembled in seven steps according to the instructions provided to the visitor:
1. retrieve print
2. firmware/functional test flashes
3. retrieve USB cable
4. assign gadget ID and connect via USB
5. retrieve battery
6. retrieve armband
7. activate by handshake

The functionality of the e-brace consists of data exchange between the wearers of the armband. By shaking hands, information is automatically recorded and sent to a telephone: how many hands have been shaken, and more importantly, with whom. The e-brace also contains a blue-tooth module to communicate with the telephone and accelerometers which record the arm movements. This is all based on an open Arduino-platform, due to which the owner himself can also conceive and implement applications, for example in combination with smart clothing. Apart from a small opening stock, the gadgets will all be manufactured on the Live PIL during the fair. In a "train" of production methods, the pick-and-place machine will place the components on the bare circuit board (to which solder paste has already been applied) and soldered in place via a reflow oven. Naturally, inspections are carried out to ensure that everything has been done correctly. tbp will participate in this Live PIL as the first step in smart manufacturing. Are you interested in our activities? You can exchange ideas with tbp colleagues on our stand.

the stand

We bid a fond farewell to our trusty old stand, known affectionately as "the brown cafe" after the World of Technology and Science event. You now enter an open, light environment. However we have retained a few of the good features from the past and you can still enjoy a delicious Belgian beer from the tap in partnership with our fair partner Eurocircuits (www.eurocircuits.be). You will also see a man-sized version of a smartphone. The aim is to focus attention on one of the tbp apps with which clients can receive information about the status of their order(s) on their own smartphone. So in real-time, immediately and up-to-date, regardless of location!

A must: on Wednesday 3 June from 16.00 we will be holding our atmospheric "happy hour" with live musical support from the trio De Swingers (www.deswingers.nl). You will remember these from earlier visits to tbp, so an extra reason to come along. May we invite you to our stand 8B032? More information about fair activities can be found on the website: www.eabeurs.nl.

a look back

At the end of last year, tbp took part in various fairs: WOTS (30 Sep - 3 Oct), electronica (Munich 11 - 14 Nov) and Precisiebeurs (12 - 13 Nov). Three opportunities for tbp to present within the electronics sector. At the WOTS and electronica we welcomed our guests to a completely new stand, thanks to an open and contemporary design by Cialona (www.cialona.nl).
We received a great many compliments about it. Contacts with existing customers and relations were strengthened and a number of new prospects came to check us out.
We also reached out to our colleagues in the sector via presentations. This began at WOTS with an early involvement presentation. As part of the conference programme on "developing successful electronics applications", Marcel Swinnen, test engineering team leader at tbp, gave a lecture on engineering within the subject of Design for eXcellence (DfX): "all pcba's are not created equal" But it didn't stop there. Marcel had acquired the taste for presenting and at the Precisiebeurs he presented a specialist subject, namely

the benefits of the use of the EBS test (Extended Boundary Scan test), which is a method that is taking the quality of electronics to the next level. Although the audience was smaller than at WOTS, they were very interested and there was animated discussion.

All of the events were well attended, but there was quite a difference in the types of visitors who attended. WOTS is traditionally the fair which is mainly attended by electronics professionals, whereas the Precisiebeurs focuses more on (fine) mechanics. Thanks to the strong future for mechatronics, the share of electronics has grown strongly in recent years. Finally, the electronica fair (www.electronica.de) is a famous international fair, attended by visitors from all over the world. Tbp also attended this fair with our new stand and welcomed guests mainly from European countries. This is not so surprising as there are not likely to be many Asians seeking an EMS company in Europe. Although from the point of view of quality, that would actually be quite a clever move.

and much more

The next few months will see a variety of conferences, trade shows and events being held once more which might be important for you. Here are a few.

19 -21 May 2015, Nuremberg, Germany
PCIM EUROPE 2015
trade fair and conference on power electronics, intelligent propulsion systems, energy re-use and energy management
www.mesago.de

19 -21 May 2015, Nuremberg, Germany
SENSOR + TEST 2015
trade fair and conference on measurement, testing and monitoring
www.sensor-test.de

2 - 4 June 2015, Jaarbeurs, Utrecht
ELECTRONICS & AUTOMATION

ELECTRONICS & AUTOMATION
2/3/4 JUNI 2015
JAARBEURS UTRECHT

trade fair and conference on electronics and industrial automation
tbp stand number 8B032
www.eabeurs.nl

3 & 4 June 2015, NH Conference Centre Koningshof, Veldhoven
VISION & ROBOTICS MECHATRONICS
trade fair and conference on vision systems, robotics, motion control, sensors and machine automation
www.vision-robotics.nl

24 – 26 June 2015, Shanghai, China
PCIM
trade fair and conference on power electronics, intelligent propulsion systems, energy re-use and energy management
www.mesago.de

15 -17 September 2015, Santa Clara, California, USA
PCB WEST 2015
conference and trade fair for designers and manufacturers of electronics
www.pcbwest.com

15 -16 September 2015, Nuremberg, Germany
E|DPC
trade fair and conference on the production of electric propulsion systems
www.mesago.de

1 October 2015, 1931 Congrescentrum Brabanthallen, Den Bosch
BITS&CHIPS SMART SYSTEMS 2015

bits&chips smart systems
Connecting professionals in connected devices

trade fair and conference on the development and production of smart systems
www.bc-smartsystems.nl

10 -12 November 2015, Frankfurt am Main, Germany
EUROID
trade fair and conference on identification
www.mesago.de

18 & 19 November 2015, NH Conference Centre Koningshof, Veldhoven
PRECISIEBEURS 2015

Precisiebeurs 2015

trade fair and conference for components and system suppliers, engineering companies, machine and equipment manufacture, research institutes and universities in the hi-tech systems sector
tbp stand number 210
www.precisiebeurs.nl

24 - 26 November 2015, Nuremberg, Germany
SPS IPC DRIVES
trade fair and conference on electrical automation, systems and components
www.mesago.de

smart production: the catalyst for the industry

Ineke Dezentjé Hamming–Bleumink is chairman of the business federation FME and chairman of the Smart Industry steering group and forum. The initiative for the Smart Industry Action Agenda comes from: FME, TNO, the Ministry of Economic Affairs, VNO-NCW, The Chamber of Commerce and Nederland ICT. They see smart industry in the Netherlands within top sector policy and the IT agenda as an important cross-sectoral theme.

"In the last century everyone thought it was all about service industries. But it has now become clear to everyone that industry is the future. And with Industry 4.0 or smart industry we can steer our economy to a higher level", states Mrs Ineke Dezentjé Hamming-Bluemink, the chairman of business federation FME.

"Smart industry will form the fourth industrial revolution and in fact we are already in the middle of it. Thanks to technological progress, digitalisation, the internet and the integration of robotisation, we can manufacture products quicker, better and without defects."

It is her strongly-held conviction that our industry can function even more successfully if we make production processes more efficient and respond to the latest technologies. Only by deploying automated production methods and people with knowledge and expertise to achieve this, can we maintain or improve our position in the international market. Our country can then become more competitive. Economic progress boosts exports and the employment market.

smart production then

Aren't we already doing that? Haven't many ambitious companies responded to the changes in the market and production processes for quite some time now? So what has changed now? Ineke on this subject: "That's true. But due to the developments such as the Internet of Things (IoT), these types of processes are really beginning to accelerate. Businesses are increasingly having to review their business models in order to remain successful. Unexpected newcomers to the market can make existing products and production processes redundant in an instant, with all of the resulting consequences. Vigilance is needed."
The fact that tbp can identify totally with this statement will come as no surprise. Cooperation across the chain, from customer to component supplier, from manufacturer of production resources to personnel, has been paramount for many years. Optimum communication still delivers the best results.

the role of FME

In emulation of a previous study in Germany, the FME has conducted an analysis of companies in our own country, in conjunction with VNO-NCW, TNO, The Chamber of Commerce, Nederland ICT and the Ministry of Economic Affairs. The conclusion was clear: smart industry is an absolute necessity. The report was submitted to prime minister Rutte last year. The cabinet recognises its significance and has acted on it Minister Kamp has promised co-funding and has pursued the programme bureau further. At minister Kamp's instruction, Ineke Dezentjé has set up a forum and steering group which has developed the Action Agenda further.
At the moment, some 14% of all companies are making a conscious effort to face the challenges presented by the fourth industrial revolution. As a result they fulfil the label of "smart industry". Over the next four years that percentage must raise to 40%.

Would you like to receive a digital copy of the Action Agenda? You can request this via info@tbp.nl.

More information
www.smartindustry.nl and www.fme.nl

FME POWERED BY DUTCH TECHNOLOGY

smart industry

EMS
the smart way

past, present and future during tbp customer & supplier days

Two great afternoons and all of our guests' reactions were positive. This year, tbp once again organised its tbp customer & supplier days, for customers on 14 April and suppliers on 15 April. These were informative afternoons with scope for networking, entertainment and a delicious buffet. Since 2007, when our company moved to its current location, such events have been held regularly.
The concept is wide in scope: some nice food and drink, relaxed networking, an external speaker with a vision of society and technology in the future, tbp reporting on the ins and outs of the company from various perspectives, all with a sense of humour thrown in. A permanent fixture of these days is the factory tour, where visitors are introduced to the machinery (currently) in use and can follow production live. On these days Ton Plooy, CEO, reflected on the past: a reminder of what electronics was like fifty years ago and where we are going as an EMS company.

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Following the opportunity for networking - and a drink on the terrace - our guests were able to take part in a "voyage around the world": the ample buffet. There was a choice of Dutch, Indonesian, Spanish or Italian cuisine.

Klaas van Duin and Rolf Nagtzaam


Jeroen Snoek, Maaike de Vogel & Arnold de Vos


John Koot, ICT Automatisering


Arno den Engelsman


Wiljo van Okkenburg


Ton Plooy

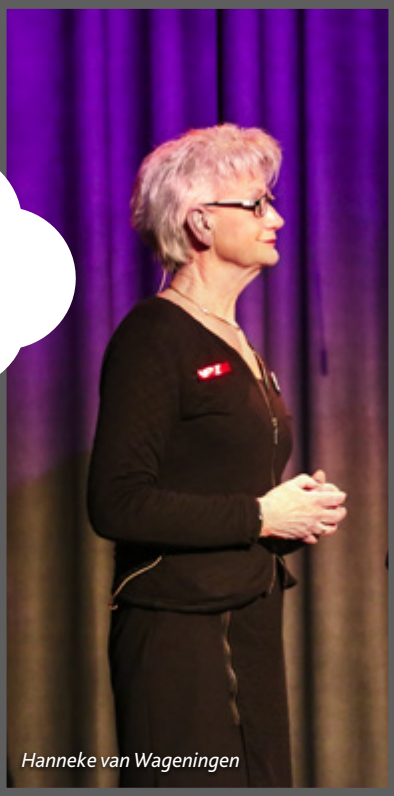
p11 >>>

internet of things

As the external speaker, John Koot, IoT Business Development Manager at ICT Automatisering (www.ict.eu), posed the questions: can you tell me what internet of things (IoT, or if you prefer, the 4th generation and/or smart industry) means and whether it's just hype or a logical consequence of unstoppable technological developments? The Wikipedia definition is not exactly enlightening. In fact, with IoT, it involves the unlocking of information that you wish to use at a particular moment. "You can't stop technology, only the general public can restrict it, due to social impact and safety", states John. The smartphone has created a boost which means data can be linked anywhere at all. Our need for information is only going to increase. Technically speaking, anything is possible. In response to his question to the room of whether anyone continues to doubt the persistence of IoT, it was surprisingly quiet: the majority are convinced of its ongoing nature. The availability of data will therefore increase massively. There are however two sides to the coin. Acceptance of this availability however appears negative. The implementation of the EPD (Electronic Patient Dossier) failed due to the lack of acceptance by ordinary citizens. It appeared to be a handy system for hospitals and other medical institutions, but the fear of personal information being made public is great. On the other hand we are all working on the increased distribution of our personal details. We all use an AH card en masse, with which we not only get discounts but also unthinkingly provide marketing information to this large retailer.
But there are many more applications which stimulate the provision of data. An example is Nest Labs, which, with its intelligent room thermostat and additional sensors has become attractive as a data supplier, which resulted in its takeover by Google.

tbp in 2020

What changes does John expect for tbp in 2020? Most will be found in partnerships and collaborations with other businesses. How we think and how we act will be driven by the fact that (data) communication will create new opportunities. A central databank as an assembly point for all business activities forms the hub around which everything else will revolve. The continued expansion of EDI (Electronic Data Interchange) is an essential part of this. Alongside this, run-up services, or early involvement and DfX (Design for eXcellence) will increase. The influence of IoT will undoubtedly play a major role in this. With the right information, added value can be offered to customers. At tbp this has been envisaged for some time: the tbp-app track 'n trace and the online offer tool are evidence of this. that is what customers demand, in addition to a perfect product at the right time and at the right price, of course.



Frans Geerts

Marcel Swinnen

Hanneke van Wageningen

Kees du Pree

Marco van der Slikke &
Bert Hennink, KROHNE

our Marcel's dream

This time, no standard presentations by tbp people, but a true drama, in which those same people were able to demonstrate their hidden in future expectations toward smart manufacturing. Marcel Swinnen, in everyday life the team leader of the DfX-engineers, became entangled in the wishes of a virtual customer who wished to create a new product. He sought a suitable EMS company via the web. He made his wishes known on the basis of a questionnaire. The next day a product which would comply with his specifications lay on the doormat. Then the alarm clock went off. Wake up! This is a utopia! But let's see how things are done these days. One of our customers, KROHNE, who are famous for their flowmeters, joined in. At the company there was a pressing need for a processor which had to be available in a very short timescale. That board was only at the prototype stage and was not yet production-ready. How do we resolve this? Plenty of work for the engineers to test the pcba against DfX requirements, and parallel to that, for logistics to ensure that production is feasible. All of the components must therefore be available! The design may well require a re-design using boundary scan components to take testability and therefore quality to the next level. A tbp report provides insight into all aspects of manufacturability and testability, criteria which determine success to a great extent.

kick-off

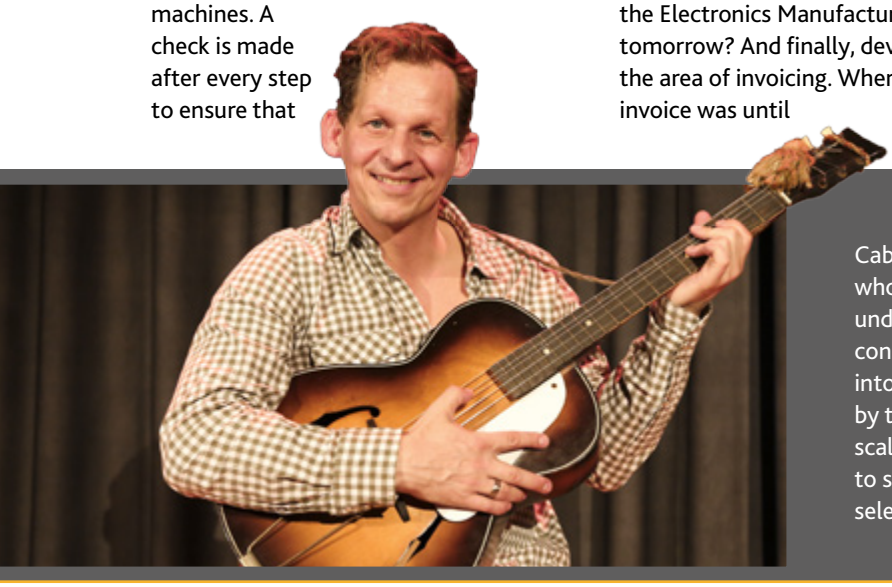
Time for the kick-off meeting: cooperation between purchasing, order processing and work preparation should clear the way for the production of the required product in the requested timescale. This means the smart input of the necessary data into the ERP system: item lists of components (preferably from the ABC list), printed circuit board data, placement data, test data and so on. Requesting component prices and delivery times is time-consuming. Entering all of the information received has been manual work up to now. Times change - we dream of global part numbers – but thanks to EDI (Electronic Data Interchange) great time savings will soon be achieved. There will be more time available for more effective activities such as maintaining contact with suppliers, risk management and QLTC monitoring (quality, logistics, technology and costs). All of these factors affect the quality of the product to a great extent. And traceability rises to a much higher level. Because component history, production and testing activities are closely monitored and stored in a database, all of the required data for each product during its product life cycle can be interrogated.

smart manufacturing

After the preparation phase comes the actual production process. But p14 >>>

p13 >>>

before it begins attention must be paid to the implementation of the selected test strategy. Modern, advanced 3D test equipment detects faults quickly. The implementation of test programmes (de-bugging) takes things to the next level, but it can sometimes take a long time. No wonder then that there are benefits to selecting a test strategy which restricts this time to a minimum. Naturally this accelerates the progress of the process. Back to the production process. This begins with the supply of all of the materials from the logistics centre. In accordance with the First In, First Out principle (FiFo prevents the ageing of materials) all components are assembled. Naturally that takes some time. When the blank printed circuit boards (pcb's) are loaded onto the start of the production line, the production process can begin. We described this in detail in Way of Life 36 (you can read this again via the Way of Life app or via our website). As a guideline to keep everything running smoothly, the Aegis MES system (Manufacturing Execution System) provides all of the information to the operator of the machines. A check is made after every step to ensure that the process has been carried out correctly. Whether it's the application of solder paste or the placement of components: inspection and approval is condition number one for the step to the next phase of production. The earlier a potential fault comes to light, the simpler it is to rectify. After the soldering process the product is ready for the testing department and after cleaning and any post-processing such as the application of a (selective) coating or the running of a so-called durability test, the product is ready for packaging and dispatch to the customer. All in all, despite the use of automated machinery, human involvement is necessary for the production of a pcba. For the future, all eyes are now on robotising certain (repetitive) actions. The principal reason for this is not to save personnel costs, but to prevent human errors. To what extent will the pcba enjoy a long future? There are films on the market in which electronics are integrated which occupy very little space and offer enormous functionality. There are already 3D printers in existence which are able to manufacture products, including electronics. Are these the Electronics Manufacturing Services of tomorrow? And finally, development in the area of invoicing. Whereas the paper invoice was until recently the method whereby a customer could fulfil his financial obligations, we are now seeing the EDI application speed up this task. The bank plays an important role in the chain between the customer/ supplier and the EMS company. Every day it sees which invoices are authorised for payment and who is due to pay.



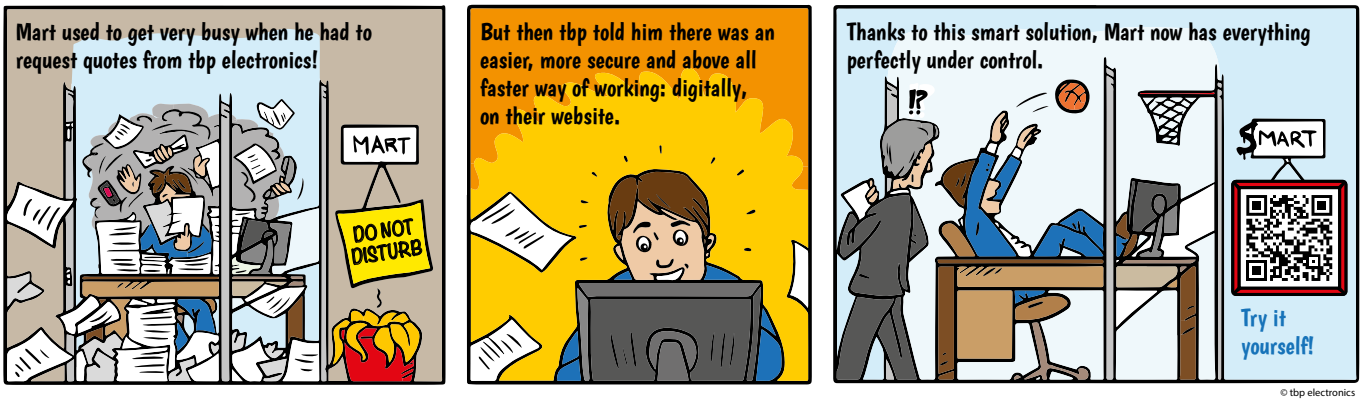
smart business

We can image how, as an EMS company, tbp might consider itself to be a smart business. By the application of early involvement and customer-focused working, tbp is a frontrunner in high-end, high-tech, custom products in low and medium volumes for the commercial market (B2B). The availability of the correct data, which is necessary to supply the right product, continues to be a success factor. ICT is the key to being able to operate as a smart industry player. Further robotisation will give shape to the production wish according to the principle of right first time*.

* *a note from a native speaker:right first time means "(implemented) correctly the first time". First time right means "(implemented) correctly for the first time" implying that incorrect versions have preceded this one*

Cabaretier Joep Onderdelinden introduced himself as someone who knows nothing about the EMS world. He claimed not to understand anything about it but he soon picked up on the concept "short circuit". He used this discovery to launch silently into part of his show "So…". It was very entertaining and enjoyed by the vast majority of our guests. With a score of a strong 8 on a scale of 1 to 10 he earned considerable applause. Would you like to see his performance? Go to www.joeponderdelinden.nl and select the button actueel.

smart quote registration

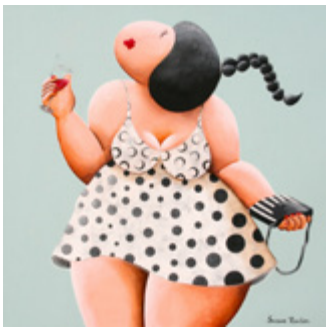


Art in Dirksland

Susan Ruiter exhibits

Susan Ruiter, an artist with a very individual style, started to become interested in design when she was still in secondary school. The initial focus of her interest was on fashion. Coming up with ideas and converting them into products kept her continually busy. She qualified in this subject at fashion academy, but very soon after switched to painting after a brief stepping stone in the world of graphics. In order to gain a firm understanding of techniques, she took various courses at the Free University and SKVR, amongst others. Her enthusiasm for the subject drove her to qualify at a higher level. She is truly self-motivated and can take on any challenge.

Inspired by artists such as Fernando Botero - you will know this famous artist for his paintings and images of voluptuous people or subjects - she has developed a distinctive interpretation of reality. As she puts it herself: the representation of movements and emotions form a new challenge for me. Her own style is visible in her work. Susan's basic medium is acrylic paint, but certain media (substances also referred to sometimes by artists as mediums) are also added. This can be useful in giving the presentation extra depth (a sort of 3D effect) or to give the paint its own relief or structure. She also prefers to use "bold colours". Attractive, bright and vibrant colours. They radiate optimism and humour and give the picture an air of joyfulness.



In recent years there has been a slight shift in the style of her work. They are less definite than before, more abstract. It's quite difficult to describe, you really need to see it. And you can. Not only is some of her work on display at tbp until the end of June, it is also exhibited in 12 galleries across the country. She is also seen regularly outside our national borders, such as in Liege and Knokke in Belgium and in other countries across the whole world in turn.

For lovers of painting: Susan also holds painting workshops (see website). For some time now she has been represented by Dutch Luxury Design who showcases her work in the Netherlands and internationally.

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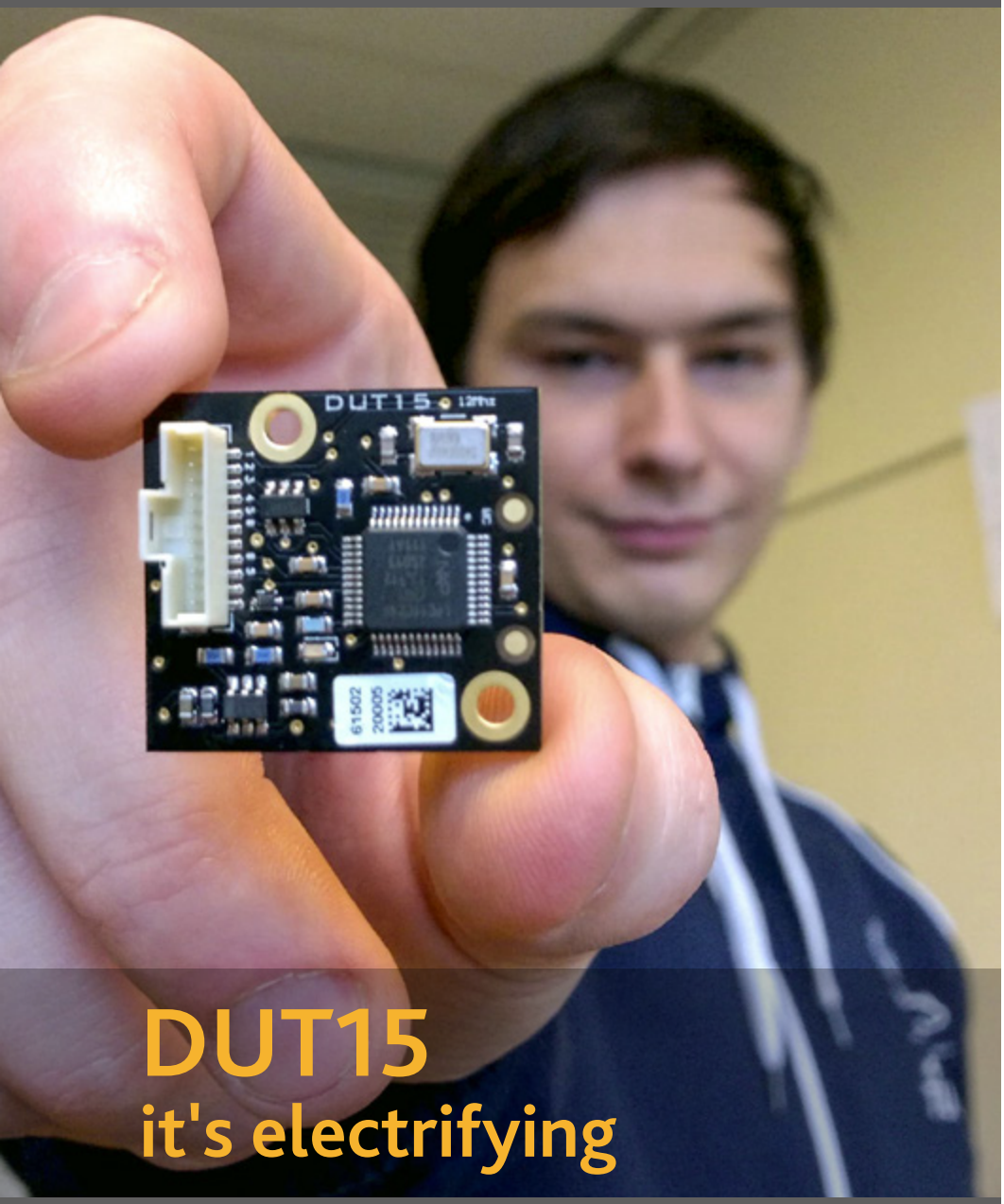
Bernard Bekker, FS Team Delft



DUT15
it's electrifying

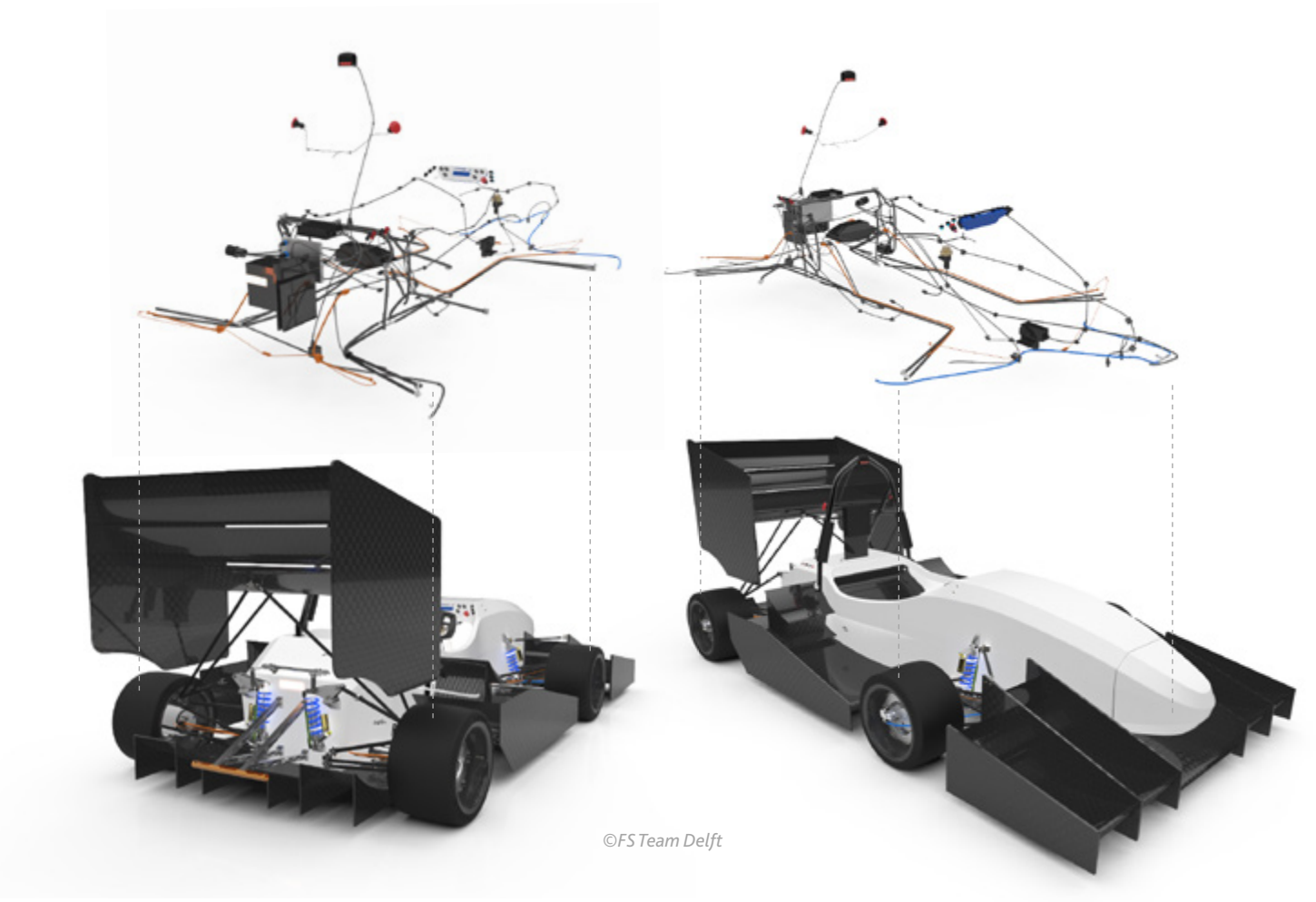
Formula Student Team Delft, known until the autumn of 2014 as DUT Racing Team, is facing another exciting challenge! Following its success with the DUT14 (last year's electric race car) on the circuits of Silverstone, Hockenheim and Spielberg, the new team naturally has ambitions to improve on the results achieved. The highly motivated team of ultimately of 75 students at the TU Delft began the design and construction of the DUT15 in the autumn of last year. Based on the experiences of the previous year, an amended plan was drawn up for its development, which allows for fine-tuning of the end result. That was the thing that was lacking the previous year! With time allowed for fine-tuning, the car's characteristics can be optimised in practice. This form of testing has been given extra priority this year.

innovations

In the brainstorm sessions during the design phase, a number of issues arose which could only be resolved by applying the very latest production techniques. 3D print technology provided the solution for the manufacture of a component in the motor mountings. This component packages extremely high forces in a relatively small component. Conventional fabrication techniques such as milling and welding using conventional metals did not yield reliable results as the risk of breakage became too great. The solution: print the component in titanium.

electronics

"In terms of electronics design, it builds on previous versions of the race car, but in terms of construction there have been a lot of modifications", says Efraïm Eland, Electronics Chief of the Racing Team. Broadly speaking, the functionality remains the same but the structure in particular has been developed further. One of the most striking changes is the action planning which is laid down between idea and finished product. It is evident from experience that the availability of electronics at an early stage is a must in order to achieve optimum results. Armed with previous recommendations provided by tbp, the team chose to strengthen itself by using the DfX-rules (Design for eXcellence). Various students took a course given by the DfX-engineers at tbp. This meant that in September there had already been contact about manufacturability and testability of the electronics and about logistics. Efraïm: "We set ourselves the target of having the DUT15 assembled by the middle of April, to allow sufficient time to test its driving characteristics. All parameters which affect its handling characteristic must be optimised by that stage. There was a real need to have the electronics working correctly on time and to achieve this we really benefited from tbp's early involvement services, both in terms of technical and logistics and in the area of work preparation there was and is still intensive contact. As a result we get a better product and of course our likelihood of success also increases. "The entire electronics system consists of nine pcba's in total (sponsored by tbp). A new pcba is the control unit for the movement of wing elements. These are located on the rear of the car and are



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known as DRS (Drag Reduction System). By making the position of these elements adjustable, grip and wind resistance can be optimised according to speed, which has a positive effect on handling characteristics.

data communication "on the fly"

Another addition is the improved communication between the car and the computer alongside the circuit which has to process all of the information in order to yield better performance. Efraïm: "On previous cars, the information was stored on an onboard flash drive, so a form of data acquisition. This meant that after a run there had to be physical contact via a plug connection and a laptop.

In the new situation we use a sort of WiFi, but with much greater coverage. We can access our measurement data quickly and can adjust the car accordingly". This measurement data provides immediate insight into the operating status of the battery pack and motor capacity. An accurate estimate can be made to seek the thresholds of what is permissible on the race circuits.

timescale

Planning is particularly tight. The DUT15 has to be assembled and circuit-ready by the middle of April. As a result, construction time is almost two months shorter than last year. The time generated will be used to set up the car optimally and if necessary to perfect certain components. The harsh reality comes in July. The first races take place at Silverstone in England (9 - 12 July). From 28 July to 3 August the team hopes to win the overall title again at Hockenheim in Germany and the last races follow at Austria's Spielberg circuit (10 - 13 August). DUT15 by FSTD: it's electrifying!

Formula Student Team Delft
www.fsteamdelft.nl

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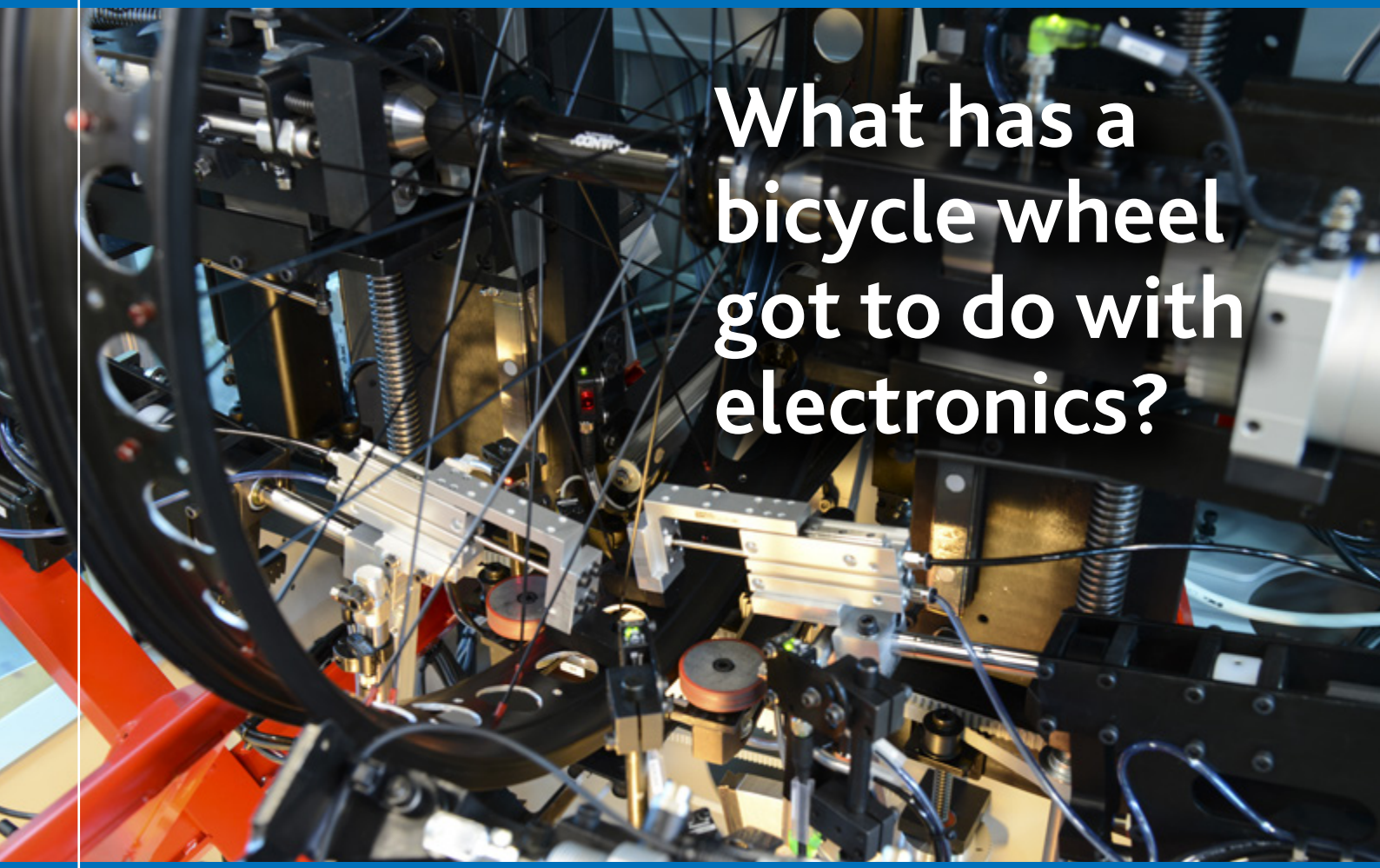


What has a bicycle wheel got to do with electronics?

Holland Mechanics is an engineering workshop which provides solutions for cycle factories to manufacture their wheels more or less fully automatically. This involves the automated tensing of the spokes, the alignment of the wheel and the assembly of the rim, inner tube and outer tyre. This company is the global market leader in this niche market. The main headquarters, with its 35 employees is in Purmerend and is where the development and production of high-end machines takes place. Sales, service, maintenance, installation and customer training, takes place worldwide. The production facility in Yangzhou in China, with its 40 employees produces part of the range which is primarily sold in Asian countries.

from manual to automated

At the beginning of the 1970's someone had the idea of automating (part of) the assembly of a bicycle wheel. Spokes were inserted through the hub manually, intertwined in a specific pattern and the spoke ends inserted through the rim whereby the attachment of a nipple as a nut determined the roundness of the wheel. The adjustment of the nipple aligns the wheel: centring and removal of vibrations. Manual intertwining of the spokes and the alignment of a wheel was a labour-intensive activity. The idea was that it could be done more smartly. The first step toward this was the automation of the tightening of the nipples. This enabled a huge saving in the time taken for the intertwining work: from around 20 minutes to a mere 2 minutes for each wheel. This type of machine is still the most popular. Following this breakthrough machines were developed which could align a wheel. Sometime later still, the company is now beginning to focus on the manufacture of rims. Starting with a strip of extruded aluminium with the right profile, a pressing process is utilised which converts this into a spiral shape. Once this has been cut to the correct length, the application of a steel pin connector and the punching of the holes in the correct location create a circular rim. All that remains is the basic spoke intertwining task. Operators still do that manually according to the pattern required by the manufacturer. This work requires a high level of craftsmanship. There are so many different spoke patterns that automation does not provide the solution if a flexible product is also required.

The range of machines also has a number of specialities such as a machine for the application of a rim band (of special tape instead of the conventional rubber band) and an ergonomic machine for the application of the band.

sensors are watching

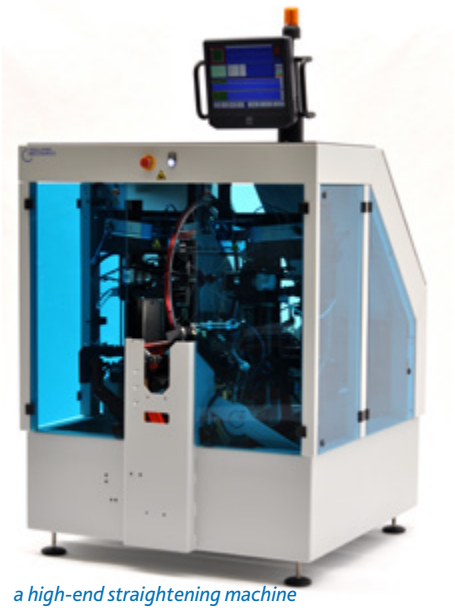
Jasper Wessels, Research & Development Manager, relates with enthusiasm the developments in the application of electronics to control production processes: "The assembly of a wheel requires a great deal of measuring and control technology to oversee it. If the wheel is pre-installed, a check must be carried out on the torque applied to tighten the nipples. A measurement of lateral run-out and radial run-out must then be taken in every location where there is a spoke. Once the measurement data has been processed, the nipples are adjusted so that so that all of the spokes are tensed and the wheel conforms to specifications. Electronics allow us to implement this process correctly."
In brief, quite a few sensors are required to determine all of the parameters. The alignment of a wheel is not an easy task; each adjustment of a spoke can have an undesirable effect in another part of the wheel. Experience plays a major role in this. However, the information gained from this experience is increasingly translated into computer models so that automatic systems can take over this task.

from relays to microprocessor

The first machines designed by Holland Mechanics for the mechanisation of spoke assembly contained quite a lot of conventional electronics such as various types of relay used in control functions. In the 1980's (last century) the first generation of straightening machines were developed, in which the micro-processor (for those in the know: the 6502 from Rockwell) made its debut. Due to the control required for the stepper motors, these arrived at just the right time. The electronics were attached to several pcba's* which were linked to a back plane**. These machines worked efficiently for the time, yet they still lacked the necessary flexibility for the type of wheel to be interchanged. This required too many actions. Considerable improvements were made with the use of the Intel 8051, which was an electronic memory storage device that could save settings, expansion of the electronics with sensors and a camera system (the so-called line scan CCD) for the detection of holes in the rim. At the turn of the century, automation took a step further with the introduction of visual, human/machine communication via touch screen monitors and Windows Embedded control. By recognising the wheel type, the settings could be configured more quickly and the right process parameters loaded automatically.

development is ongoing

Due to the increase in user requirements, the associated adjustments to the electronics and the availability of the required components becoming more difficult; a solution was sought which offered more flexibility. So a division was created between pure machine control and the user interface. Following thorough research into the availability of turn-key solutions, the decision p20 >>>



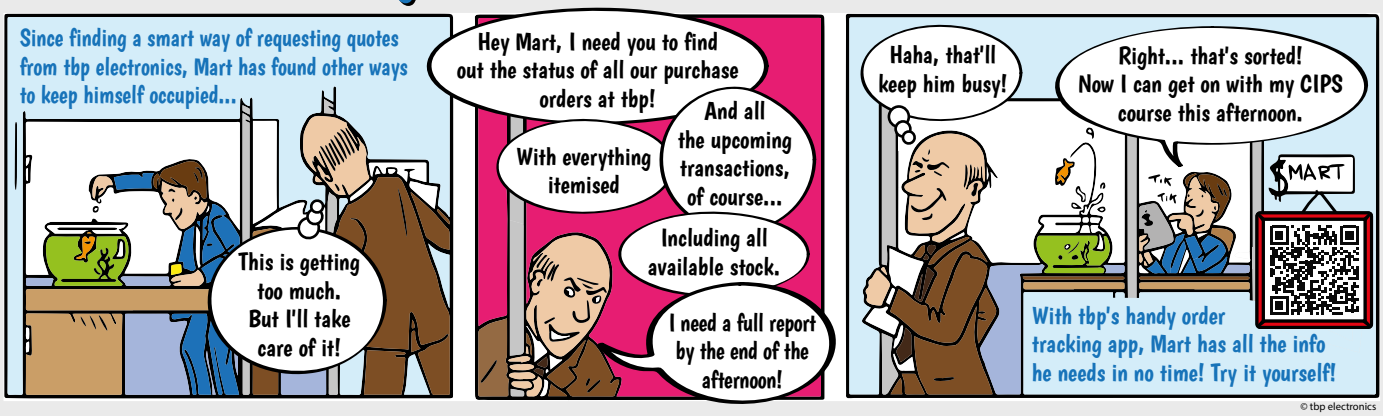
a high-end straightening machine

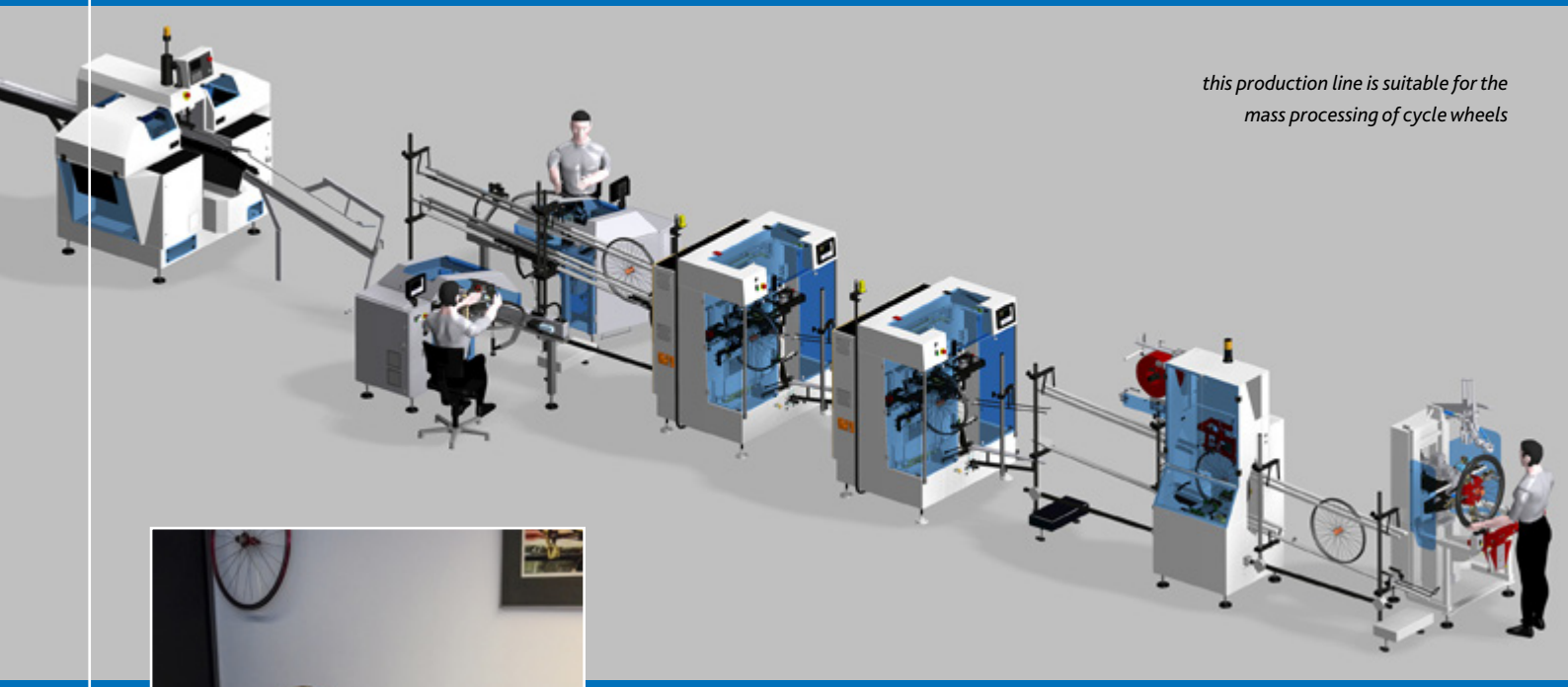
box containing the electronics which control the machine

* *pcba = printed circuit board assembly, electronics consisting of a printed board containing all of the components*

** *back plane = printed circuit board with connectors in which the pcba's are installed and which provide the common connections and power supply etc*

smart order tracking





this production line is suitable for the mass processing of cycle wheels

Jasper Wessels
Research & Development Manager

p19 >>> was made to develop suitable electronics for machine control in-house. This meant the retention of the distinctive scan technology and also had the advantage that the integration of new components such as sensors and peripheral equipment became a bit simpler. The supply of custom designs was considerably simplified as a result. The new system is modular in construction: a basic module for I/O, a basic module for the control of (four) stepper motors and a basic module for the processing of the camera signals. Each module is equipped with a Master Controller with FPGA*** which is programmed according to the module's function. A so-called CAN-bus takes care of communications. The design was developed in-house and a partner developed the print layout.

into production

Once the plans had been formulated it was time to seek an EMS company to produce these modules. Over to Jasper:

*** *FPGA = Field Programmable Gate Array; an integrated circuit which can be configured by the user and can therefore fulfil specific functions.*

"The first product we discussed with tbp, some seven years ago, was a pcba for the I/O module and the accompanying Master Controller module. Pre-production reports from tbp indicated some unanticipated imperfections had occurred which had not been counted on. We initially reacted to the report with scepticism but we were subsequently happy with it. Certainly, in view of the quantities of several hundred pcba's that we use each year, we didn't want any problems. A subsequent project involved the replacement of our line scan camera because the CCD had gone out of production. We were confronted by the statement that DfM and DfT were necessary to create a good product. Until that time we did not pay much attention to this important run-up path, which on occasion led to pcba's which were difficult to manufacture. Even the print designers now react favourably and see tbp as a great addition to craftsmanship."
Whereas the electrical diagram and sometimes the pcb layout were designed in-house, the tendency now is to outsource this activity. Jasper sees a clear turnaround in the philosophy surrounding the manufacture of electronics: "We want to restrict ourselves to functional diagrams and to outsource the technical details to our partner. By contributing at an early stage with what they understand as DfX, tbp can help us to achieve this. This gives us the security of a product which is reliable for its entire lifecycle, certainly for pcba's which we use frequently and which must function reliably for years. We will continue to develop the software required for the machines under our own control, as that is the added value we provide to our customers."
Developments in the near future include more new pcba's in the programme to give the machines higher levels of productivity and to allow them to meet modern requirements. Holland Mechanics has also experienced the partnership between designer and an EMS company as added value to arrive at a good end product.
"In the selection of an EMS company with which to work, tbp really impressed with its high levels of automation and its project-based working method. The company has very high quality standards and I never expected that in our country. The concept of early involvement particularly appealed to us and we can see that in the results."
It's also true here: all pcba's are not created equal.

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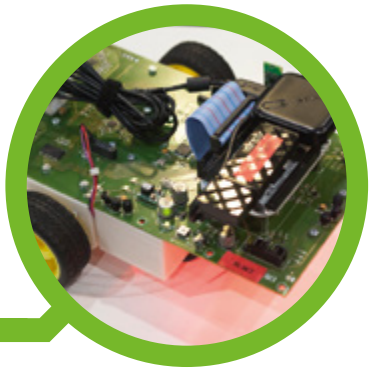

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customised supply chain management is the key to success

Every EMS company [1] uses the same basic process: manufacture electronics - a pcba [2] - on the basis of data received. Use the production facilities, machinery and its operators, provide the correct technical instructions and the necessary materials and assemble. But sometime the logistics process is not entirely under control: due to error, technical input can be incomplete or incorrect and a service such as supply chain management can provide the key to success! Logistics is a crucial factor when it comes to the manufacture of quality products. It revolves around delivery at the right time and in the right place as agreed with the customer. All departments within tbp are aware of the importance of a smooth logistics process. The tbp purchasing team in particular understand this principle.

in practice

Before a customer commissions an EMS company to manufacture electronics products, he signs a contract. This contains information about delivery quantities, required delivery dates, how many components are held in a buffer stock, and so on. Imagine that a customer - an OEM company [3] - enters into a framework contract for the supply of 2,000 pcba's annually. All that is missing is a statement of the timescales against which the EMS company is expected to deliver. This can have many different causes, for example because the OEM company makes products which are seasonal or weather-dependent. This means that tbp, together with the client, looks in more detail at a smart solution in the long term so that the OEM company's customer can receive the service they require. In practice this means that larger stocks of components must be available in tbp's automated warehouse than if the exact delivery dates were available in advance. This also means that arrangements must be made with suppliers, so that they too can deliver at short notice. The buffer stock must provide this. In other words: everyone in the logistics chain works together and provides the necessary flexibility.

the supplier

A forecast is an indispensable link in the distribution chain; tbp expends a great deal of energy in setting up that process. Meetings are often held with suppliers (distributors) in order to make the correct arrangements and to estimate potential risks to supply. We measure the performance of our suppliers in the form of QLTC (Quality, Logistics, Technology and Costs) and risk management. Risk management is still a relatively new phenomenon on which we have presented during previous customer & supplier days. The effects of good risk management are visible: distributors are more alert and recognise their importance if this is not dealt with correctly. The idea that automation in the entire chain from

[1] *EMS = Electronics Manufacturing Services*
[2] *pcba = printed circuit board assembly*
[3] *OEM = Original Equipment Manufacturer (company assembling semi-finished goods or branded items)*
[4] *ERP = enterprise resource planning (company-wide computer system)*

manufacturer-distributor-EMS company is a must is also emphasised. EDI or Electronic Data Interchange is the key to this.

EDI

EDI can only function when there is a good relationship between the two companies. Most suppliers who enjoy the status of preferred supplier due to their good performance, use EDI to exchange information on proposals, supply contracts, order confirmations, forecasts, delivery times, invoicing and so on. This requires discipline on the part of all those involved, but when everything is fine-tuned, the total process is much quicker and paperless working is facilitated.
These measures have led to a substantial improvement in tbp's delivery performance in recent years (96% to even 100%). If you consider that a pcba (depending upon its size, naturally) contains a great many components, this is extremely high. That 4% is mostly attributable to force majeure: stock discrepancies, last minute design changes or other unforeseen circumstances. Good stock management, agreed with the customer, is essential to maintaining the highest levels of delivery performance.
A good forecast and the correct buffer stocks are therefore the key concept. Logistics is customisation! Our purchasing team therefore visits our customers regularly to make agreements and to acquire market knowledge.
There is a clear difference between the high runners (product which an OEM company sells equally over a fixed timescale) and strangers (products the quantities of which vary greatly). With strangers it is difficult to determine the buffer stock, due to the lack of a good forecast. And cover with sufficient stock levels also has disadvantages: storage costs, loss of interest and products can also suffer from "ageing symptoms".
Every product has a maximum shelf life. A blank pcb for example - depending on the selected finish - may be no more than six months to one year old due to the risk of poor solder joints through oxidation. The production date is therefore an important factor. How do we guarantee that? All of this information is contained in the ERP package [4], which issues an alert if raw materials are approaching the risk zone and may therefore lead to faulty products.
EDI is not only applicable to the purchasing process, but also to deliveries of pcba's to our (larger) customers. We give them peace of mind by digitalising the information flows as much as possible. This requirement is less important to other suppliers.

traceability

This is a topic which has previously been covered: traceability is a registration system which documents the history of a product from its date of manufacture through to external commissioning. Within tbp we apply this to all components and bare boards required to manufacture a pcba. Should a pcba become defective over time, the history of all of its components and processes can be traced. This information is useful in the event of any product recalls, warranty claims, the tracing of production errors (at the supplier or EMS company), handling errors at the OEM company etc. A pcba's unique serial number is sufficient to be able to trace all of this information.

In summary, we suggest that customised supply chain management is the key to success: smart agreements and good partnerships with suppliers open doors for the manufacture of good quality products according to agreements. The customer receives what he wants at the agreed time and place.

Has this article awakened your interest in supply chain management which is tailored to your organisation?
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the government is watching

Last winter we saw a peak in the number of visits to tbp by government bodies. At the end of January we received a delegation of mayors of various boroughs in the Hoeksche Waard, on a fact-finding mission, followed several days later by members of the Dordrecht Kamercentrale) of the VVD. This delegation - some 25 people - wanted to exchange ideas on one of the priorities of this political party: the promotion of employment.*

Initiator Mirjam Nelisse (at the time a candidate for the Provincial States of South Holland and the first female candidate in Goeree-Overflakkee) considers that she has an important task in terms of the so-called golden triangle between education, government and the business sector. "As a member of the Provincial States I really want to shape opportunities for employment. South Holland has more than 163,000 unemployed and we want to help them to find a job. A good reason to discuss the possibilities with businesses. How do they see the future? What can the government do in this respect? If the conditions are favourable, you create work, as it were. It is for this reason that I attach great importance to good contact with the business sector. So at tbp electronics we have been able to test where the bottlenecks are. Example: the lower technical school is no longer as much of a specialist as previously and both at tbp and elsewhere in the region there appears to be a need for people with this type of education. And countless similar topics were also considered." According to her, innovation is the engine to stimulate employment. Innovative products create market demand; you only have to think about smartphones. 10 years ago we didn't know of their existence, now we can't imagine life without them. "To develop and build new products you need people. And businesses who want to get involved in bringing these new products to market. As a government we can stimulate innovation by putting businesses, education and knowledge institutions in contact with each other to ensure good boundary conditions. This is good for companies, employment, export and our country's economy", according to Mirjam.

Various things appealed to her during her visit:

- tbp is in a very healthy financial position, without the need for support from the banks. Not many businesses can make such a claim. "It is a real asset to Goeree-Overflakkee!";
- the very high level of automation. The swift placement of components made a real impression. The automated warehouse also impressed her;
- we rarely see it, but we all make use of the products of tbp's customers without realising it. Payment terminals for example;
- the fact that EDI (Electronic Data Interchange) was used so frequently, was also an eye opener. The ordering of components from suppliers, insight into their stock, order confirmations, invoicing etc. without any use of paper: fantastic!

The fact that the hospitality at both sessions was beyond expectations also made the visits additionally worthwhile. Inspirational and successful meetings from every point of view.

**) put simply, the Kamercentrale is a partnership of various VVD departments belonging to one of the nineteen national constituencies in our country*