WEBER:TECH 02.06

CURRENT INFORMATION ON WEBER SCHRAUBAUTOMATEN GMBH

Teamplayer

Just over three years ago, when Audi were writing the specifications for the new TT range, one of the main chapters was on screwdriving systems, which were to be used on the floor and sides of this model. After a great deal of engineering discussion Weber was selected to design and implement 15 new "robot-mounted" screwdriving systems in the main body assembly area for the new TT – a job that could only be done as a team. (see Page 4)

Technology carrier: Every new Audi TT has a bit of Weber 'know-how' built in.

Even more ZSL…

Meanwhile, Weber France has pushed the envelope and developed the ZSL 351, which is the "big brother" of the ZSL 151, and has released this for sale to the market. The change of name indicates a higher capacity and size of the stepfeeder unit: 1.5 litres for the ZSL 151, and 3.5 litres for the ZSL 351.

The ZSL 351 can handle even larger fasteners, up to 24 mm head diameter, and up to 80 mm long. The first models have already been delivered to customers in Europe.

The Weber ZSL 151 and 351 are already on the way to becoming the best sellers of the in-creasingly popular 'stepfeeder' market, with more companies adopting this technology every day.

Market Leading: The ZSL 151 and ZSL 351 Stepfeeders set the standard for a whole class of products. There is no other product on the market that works as quietly, gently and as fast.

Whispering giants – flexibility in perfection

"The new Weber ZSL 151 stepfeeder by the Weber is remarkable in it's high feed performance, low operating noise and gentle handling of the fasteners. The ZSL 151 is a smooth, reliable step feeding device for all common fasteners, in particular for those with 'chromate-free' surface coatings, says the press release.

It's true! At this time, there is no comparable product on the market. The Weber ZSL 151 combines all the features and advantages that the competition only a few, if any. For instance, the Weber stepfeeder can even handle pins – that is, fasteners and set screws i.e. screws without heads. Even non-standard parts (e.g. longer screws) an be fed with ease from this new departure from Weber. But let's go back to the beginning! Why a stepfeeder anyway?

In automated fastening, stepfeeder systems ensure continuous, 'process-optimised' feeding of screws, bolts, nuts and other fasteners. It is this uninterrupted supply that makes automation possible and reliable in the first place. Conventional helical vibrating bowls are soon at their limits when high-volume delivery is required, or when parts with sensitive surfaces are to be fed and are prone to changes in feed rates as the mass of the fasteners change when the fill level changes.

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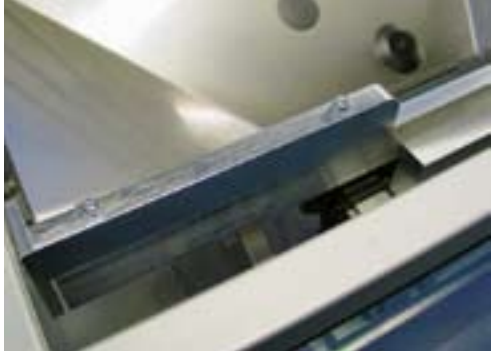

The Clean Machine: The ZSL stepfeeders manufactured by Weber, are designed to response to the EU directive on scrap vehicles handling: stipulating that, as of the 1st of January, 2007, only 'chromate-free' surface coatings are permitted in vehicles.

continuation of page 1

... Whispering giants – flexibility in perfection

We developed the ZSL series to be able to offer an alternative in feeding technology. Early in the development of the ZSL 151, we gathered ideas to ensure we had a comprehensive specifica-tion that would reflect the expectations of the market. One of the challenges that we faced in the implementation of the first design was to ensure an 'end-to-end' flow of fasteners to the screw-driver; the other was the feeding of the parts in step with the process, i.e. the parts had to be available at the correct position at the exactly the right time if the installation process was to be carried out successfully within the desired parameters – and all that had to happen in very short cycle times. The objective was to handle the processed parts gently and reliably, but at the same time to achieve extremely high volume output.

For fasteners with a sensitive coating

With automatic vibratory feeders, material abrasion and contamination in the feed system on one hand, and damage to the fastener surfaces on the other hand. This often leads to interference with the process, or impaired quality of the final product. The Weber ZSL 151, was developed and built by Weber, France and sets the new standard for a products of this type. The design of the ZSL 151 allows parts with particularly sensitive coatings to be handled. The reason is that in contrast to other feeder systems, the parts are not abraded in the hopper area and are carefully lifted with the moving step and active inline right up to the feeding point. Abrasion is minimised, and sensitive surface coatings are not damaged, retaining their desired protection from corro-sion, or their cosmetic appearance for the customer. An internal PLC that integrates the controls of the screwdriver, the feed system, screwdriving process, and pneumatic systems, ensure a tight implementation of all system controls and process requirements.

The fact that the fasteners are not adjitated unnecessarily at any time during the feeding proc-ess, delivers exceptional in health protection and the environmental contol. The low-vibration feeding guarantees a significantly lower noise level 73dbA. And at the same time, producing sig-nificantly less contamination created in the hopper and in the air. Less contaminants mean re-duced pollution in the unit, and this is a significant advantage for the product cleanliness, espe-cially in the case of assembling sensitive electronic and medical components. This further applies to all users who are obliged by the recent legislation to use screws with 'chromate-free' surface coatings on their fasteners. So Weber are now receiving large numbers of requests from companies particularly in the automotive industry who want a solution to these problems, and it is available in the ZSL 151 stepfeeder.

Uncompromising Flexibility: The ZSL 151 can process fasteners of (almost) any shape or size.

No compromise on quality

When it comes to quality, the Weber remains true to its high standards with the ZSL 151. The magazine and sliders of the staged conveyor are all manufactured in stainless steel. While the compact, smooth operation and quality construction, significantly reduces the possibility of fail-ure, and allows long maintenance intervals. A quick clean once a month is enough to guarantee full functionality and processes reliability indefinitely.

Special purpose systems are one of Weber's three cornerstones. From the preparation of a tender to the "handing over of the key", all the strings come together at the project engineers' office. Mr. Frank Fillep, manager of the "Planning and Sales, Systems", gives us some insight into the work of his team.

Of Architects and Networkers

What do you mean by the term "systems"?

F. Fillep: Weber is active in two product sectors: the company develops, manufactures and sells individual components, i.e. screwdriving machines for specific workplaces. Over and above that, we are involved in conception and implementation of system solutions, an area in which we have considerable knowledge. In this context, 'systems' are complex devices that implement the fas-tening processes – in our case, mainly screwing, riveting and press-fitting. Weber takes care of both the actual screwdriving or insertion process, and of the additional assembly processes, such as positioning the screwdriver units, and also handling or storing the components.

You are a project engineer. Where does your work start – and when do you consider a job com-pleted?

F. Fillep: You might say that, as project engineers, we steer the project through its entire creation phase which involves planning and quoting, through negotiation, contract signing, design, assembly, test and commissioning. Everything, right to the final "handing over of the keys". Or at least until acceptance of the machine on the customer's premises, as the contact for initial service questions.

So you ensure that the design matches the project demands?

F. Fillep: As project managers, we are the ones who select the teams we need for each stage of project. Here's an example: As early as the quotation stage, we involve the 'in-house specialists' from several departments, thus creating a coherent technical business solution. When the order is placed, we cooperate closely with the designers, planning, manufacturing and assembly. We have to coordinate the staffing and logistics capacities we need to keep the project within the planned timeframe – so that makes us "architects" and "networkers" rolled into one.

No two projects are alike. That means flexible network structures …

F. Fillep: This flexibility is one of our strengths. But flexibility should never be confused with arbitrariness. Each person involved in the project is a specialist in his own area, and is deployed by project management according to his qualifications.

Strength in unity: Frank Fillep knows that he can and must, rely on his talented teams at all times.

The sequence and the time requirements of each step may vary from project to project – but at the end of the process, the quality is always at the same high level. In the course of time, we have developed something like a sector and system competence. My colleague, Mr. Josef Probst for instance, is the specialist for customers in the airbag industry.

Mr. Michael Widenmayer looks after complex system solutions in all sectors of industry, Mr. Andreas Breuer takes care of riveting and insertion technologies, and Mr. Mathias Schmid deals with new fastening technologies.

What do Weber's customers get out of this kind of project management?

F. Fillep: Projects are a success for both sides, a real win – win situation. When customers, project engineers, mechanical designers, programmers and in some cases the assembly people, work together closely right from the concept phase. The project goes well and the customer benefits accordingly.

Single machines are to systems like …

F. Fillep: The Weber name is synonemous within the industry as being a high-quality screwdriving machine for single workplaces – our standard units. And it will stay that way in future. Additionally, production of special machines & systems plays an important part I what we do for our customers. We started this new offering about two decades ago when we built highly suc-cessful systems for the airbag industry. Each area is just as important as the other, and we pro-vide the best results in both. One of our tasks as project engineers is to utilise the knowledge and experience from one area in the other – for the benefit of our customers, of course!

Audi's new TT attracts covetous glances. Even the people around Dr. Robert Klingel can't get its classic lines out of their heads. That is the "fault" of the over 200 fasteners installed in each car by Weber equipment. This challenging and exciting project went to Klingel, (manager of the Design & Development Department at Weber), who assembled a team of engineers that were re-sponsible for the design and implementation of 15 robot-mounted screwdriving systems for the TT body shop at the Ingolstadt plant.

Technology that connects

Connecting aluminium parts securely and with a perfect fit in car production is a particular chal-lenge for engineers. The task becomes even more complicated when the material has complex curves, or the aluminium has to be joined to other materials in a composite structure. Add to that the fact that the location & positions of the fasteners – in particular in body production – are often accessible only from one side. Audi, too, was confronted with these questions in the design and manufacture of the new TT.

Just over three years ago, Audi started to develop the requirements for the new vehicle. An es-sential part of these was the screwdriving systems which were to be used for this model, par-ticularly in the area of the floor and sides. Mr. Norbert Hornbostel, responsible for technological development of fastening techniques at Audi, was in contact with the Weber early on, initial de-sign sketches followed, and the size & performance requirements for the screwdriving systems was defined. Norbert recalls: "Even at this stage it was clear to everybody involved, that a task of this complexity could only be mastered by teamwork."

Team players needed

At Weber – best known for innovative solutions for tier suppliers of the automotive industry – the order from Audi opened up new territory. The scale of the project and the complexity of the pro-duction process, demanded new approaches by the development team. For the fastening op-erations, the time tested and proven assembly technique for RSF screwdriving was to be used – the method known internally at Weber as (Robot Supported Fastening… a system for having screws Flow the backing material). Here, the screws are blowfed automatically to the screw-driving spindle, which is positioned on the part to be assembled, then with high thrust and fast RPM the screw is driven through the solid material in one single operation. The system will advance the screw, create then thread the hole, screw in and tighten up to a predefined torque – all that in one cycle. This technique, also known by the screw manufacturer EJOT's designation FDS®, has significant advantages in body manufacturing. Mr. Dirk Runkel, Product Manager at "EJOT", says, "Our FDS® screw can be screwed in very reliably, even in complex applications – such as the aluminium space frame of the TT. It can be used to fasten sheets up to 4 mm thick aluminium, or up to 2 mm in steel. This can be done single sided access, without pilot drilling, and without swarf being created inside the workpiece. This exciting technology gives greater flexibility in the case of modifications or re-work to the parts, and this is what finally convinced Audi."

Universal satisfaction with the result: (l. to r.) Dr. Robert Klingel (Weber), Norbert Hornbostel (Audi) and Peter Heigl (Audi)

What looked like a simple process on the drawing-board turned out to be different in design and test, and proved to be a highly complex process with many parameters. The regular consulta-tions between Audi and Weber design were intensified. Mr. Peter Heigl, (responsible for mechanical maintenance in the TT body shop), and Mr. Mathias Schmid, (responsible project en-gineering at Weber) and Mr. Florian Hinterauer, (contact person for service and maintenance of the Weber equipment), were called in to supplement the team. With Weber's designers, work was going on at a fast pace. Mr. Wolfgang Wagenstaller dealt with the mechanical aspects, Mr. Erwin Pfaffenrath with the electronics and cable packaging and Mr. Claudio

Fit to size : the screwdrivers must fit in all areas of the production process

Time is money: The Weber screwdriving systems ran extremely stable from the start – process reliability is assured at all times.

Vallebona took care of the process controls. Each member of the team, contributed in his own specific field of exper-tise. The challenge of integrating powerful DC motors running at high RPM's, enormous axial forces and an install cycle rate twelve screws per minute have to be accommodated – the proc-ess itself also had to be monitored end to end. Finally, the question of the optimal use of the Weber RSF screwdrivers on the existing robots had to be solved.

The customer's requirements are the yardstick

As Klingel says, "The production process doesn't adapt itself to our products and solutions – we have to take our technology and align it with the requirements of our customers." Weber gath-ered valuable experience with the RSF process during an earlier project at Lamborghini. How-ever the faster pace and shorter cycle times required at Audi were the real challenge.
Mr. Peter Heigl says, "To be able to conform exactly to the screwdriving process specifications, and given the high axial thrust, the facility was fitted with a measurement system that registers the position of the screw, relative to the respective assembly, thus guaranteeing precision in-stallation."

Test runs on a 'reference system' followed in Neckarsulm, with consultation between the service technicians on the feasibility and efficiency of the design – this occasionally included emergency stop manoeuvres. Mr. Florian Hinterauer says, "As a service person, I had the task of reconciling the creativity of the developers, with the ease of servicing and maintenance." In projects like this, fine tuning takes up the most time and staff. In the final analysis, however, not all the variables can be ascertained 100% on the drawing-board. Some of the weak points are not visible until the system is completed and de-bugged. Every change in the upstream assembly has a direct effect on the screwdriving process. This kind of system goes through different phases Heigl says, "The Weber technicians assisted production on-site for several months, making fine adjustments. But even after the handover of the system, there is still some small room for improvement. In extreme cases, this can go as far as modifying the TT body components to optimise the process."

Single source: from consulting to employee training

All those involved with the Audi-Weber project see it as a goal-oriented process that requires specific team consultations in each phase. The result is a system that delivers consistently good results, and is flexible enough in its design, to allow alteration to parameters at any time. In this case, all the Weber RSF screwdriving machines used at Audi were standardised, i.e. all their components are interchangeable, reducing the costs of replacement-part, minimizing storage requirements and allowing commonality of systems for the workers.
Speaking of workers: the package that Weber has offered to Audi naturally includes the training of the users on-site. Audi has ordered an additional screwdriving machine to allow training on the equipment off-line and away from production location.

And what is special about this project? When such a complex facility can be ramped up "from zero to a hundred" in the short allotted time, with no major issues worth mentioning, it is indicative of a certain work ethic". As Norbert Hornbostel says, "that is what Audi sees as the strength of Weber; they give us an overall solution that meets and exceeds with our requirements in every respect, and is not just catalogue of parts." To be continued … at Audi and other car manufacturers who want to make use of Weber's know-how in the future.

All in one cycle: Position the screw, create the hole, roll the thread, run the screw down and tighten up to a predefined torque.

Systematic Service: The structured procedure for fault reports makes for short reaction times.

What makes the "Weber Service System" so effective? One thing is clear: the service area de-cides how durable the customer relationship is. Weber utilizes this concept, and through their proven team of specialists, ensures direct, personal, professional help is at hand in case of trou-ble.

Weber Service Oasis

Does this sound familiar? A call on a hotline: "If you have a problem with Product 'A', please press '1'. If you have questions about Product 'B', dial '2'." After 15 minutes in the loop, you give up in exasperation. Even "average" companies can do better than that. Weber's outstanding support as evidenced by the Service Technicians at Weber Schraubautomaten GmbH. Mr. Klaus Schardt, (Manager of Technical Service), says: "Between 8 a.m. and 10 p.m., you can always get in touch with a member of our department. No loop, no overseas call-centre."

His 12-person service team takes care of a large number of tasks:

- Maintenance of screwdriving machines
- Commissioning on site
- Consulting in the area of replacement parts
- Repair of defective machines on-site or in-house
- Planned maintenance contracts
- Training of customer employees
- Machine-capability investigations, i.e. regular inspection and certification of the machines – analogous to an M.O.T. test
- Customer Application Testing, i.e. Weber makes recommendations on possible fastening techniques for specific components to customers' orders

In spite of their varied demands, even these tasks can be planned. Service does not mean just being a "Fire Brigade" when things get too hot. "We are proactive and advise customers up front," says Schardt, "… and we ensure, for instance, that sensitive components are always available right on site. That way, in the case of a fault, we are able to solve a lot of immediate problems by phone, because the replacement parts are available. Generally we have also trained the customer's technicians." The ability to plan in advance also plays a major role in the case of maintenance agreements, because it allows the necessary service intervals to be adapted to the production demands. Additionally, planned inspections are less expensive because they are scheduled in advance.

Klaus Schardt and his technicians do not see 'service' exclusively as an after-sales function. On the contrary; their know-how is in demand as early as the planning & quoting phase – at the lat-est, during assembly & test of new screwdriving machines. All designs are inspected at an early stage for the effective execution of later maintenance work.

Weber's service is also a positive factor that stands out among our competitors. The difference lies, not least in the qualification of the employees and team members. "When a customer calls our hotline, he is talking to a technician, not a administrative clerk. We ensure our levels of product knowledge and expertise through continuous training, and this way our team is always right up to date."

After all, customers have the right to expect competent, prompt, and reasonably priced support. In addition to the main Service access point in Wolfratshausen, a "Support Point North" has been established in Münster. This reduces the reaction time for that market and in the final analysis, minimises the cost to the customer. Speaking of costs: Weber don't charge a cent for their hotline and telephone assistance. Costs accrue only when the service technician is sent out to work on the problem.

As Klaus says, "There are two sides to our product portfolio with regard to service. The quality of our machines is such that major faults are the exception rather than the rule. On the other hand, each application requires customization and each one is a specific solution in it's own right. The only way to help our customers effectively, is to have collective years of experience and well-founded knowledge of each customer application."

But how effective is Weber's service in an international context? Our own service technicians who are integrated in the subsidiaries in the USA, the UK and the Czech Republic cover the needs in their markets. "The situation is a bit more complex in Asia, for example. Here, we co-operate with regional partners, so that we can offer the customers in China or India optimum service," says Schardt. But his team will deal with this challenge, too …

Important interface: In the area of service, the real test of how seriously a company takes cus-tomer care, must be "passed" every day. Weber is exemplary in the speed, efficiency and cost of its services.

Bon Assemblage

1968 – a time of change and new beginnings in Europe, and the year of the inception of the Gedic company, a middle-class firm in Annecy, specialising in the design of machines for screwdriving in wood.

Meanwhile, in Germany, the Weber Schraubautomaten GmbH with its headquarters in Wolfrat-shausen, Bavaria, was considering putting its business on a more European scale; the idea was to win new markets. 1971 saw the step westwards: Weber France was founded as a 100% sub-sidiary, and opened an office in Paris in the same year. Two company histories that up to this point had nothing in common.

That changed suddenly in 1978. Gedic got into financial difficulties, and bankruptcy proceedings were opened. Gedic's know-how and the product range seemed to fit perfectly in the portfolio of Weber France. Shortly after that, the Board of Gedic was staffed with Weber managers, and the name was changed to "Weber Assemblages Automatiques." Just a year later, Weber France purchased Gedic, moving its headquarters from Paris to Saint-Jorioz. Business went well, and the French market was gained step by step. In 1995, Weber Assemblages Automatiques experi-enced a further phase of growth through the boom in demand for mobile phones. Capacities had to be increased, and in-house development and design departments were founded.

Today, the company employs 47 people – and develops, manufactures and markets innovative machines and systems for automated screwdriving. It practises what is known in the automotive industry as the platform strategy: the systems from Saint-Jorioz are based on modules made by their German colleagues, but are further developed for the French customers, specified for each application, and finally assembled on site.

Jean-Louis Hyzard, Managing Director at Weber Assemblages Automatiques, says, "With our own development and design departments, we were able to gain even more ground against our competitors – and today, we supply all the main assembly specialists in France. Our market share is growing beyond the boundaries of the sector; for instance, we have developed a fixed clamping unit for the cosmetics industry, or units for inserting rivnuts."

The French automobile industry and its suppliers are among the main buyers of products from Weber Assemblages Automatiques, but they also have close ties with the building sector or manufacturers of home and electrical appliances. And it seems that each new product that Weber develops and launches on the market, continues the success story. The order books for the WSG11 controls or the ZSL 151 stepfeeder (see Page 1) are well filled, at any rate.

Two words stand for this success: experience and service. In mechanical engineering in general – but especially in the area of screwdriving automation – there is no substitute for years of expe-rience. There is no other way but to implement complex projects 'individually' to the customer's wishes. This experience and all-round service are the working capital of Weber Assemblages Automatiques.

And the relationship with the mother company? The bridge between Wolfratshausen and Saint-Jorioz is broad and supportive; supportive in the sense of a common corporate philosophy, and supportive of cross-fertilisation effects in the work. The goals for 2007 and beyond have long since been set: supplement the product range, further optimise the service area, and enhance the market position in France. Well, then: Top, c'est parti!

What was that again ...?

Chromate-free surface coatings

In the press release on Directive 2000/53/EC of the European Parliament and Council of the 18th of September, 2000, concerning scrap vehicles (of 16th July 2000) we read:

"With the revised scrap-vehicle directive, the European Union places an obligation on the car manufacturers. In future, they will be responsible for the disposal of scrapped cars. The main points of the new regulation are:

- *…*
- *The use of certain environmentally hazardous heavy metals is prohibited.*
- *…"*

With the enactment of the EU scrap-vehicle directive on the 1st of January, 2007, the car industry and their suppliers must refrain completely from using chromate-based galvanisation and pro-tective coatings. Whilst these are effective and well known for their "self-healing" properties after slight mechanical damage, they do, however, affect safety, the environment and health. It is regarded as proven that zinc and chrome chromates are carcinogenic, and contact with the skin can lead to allergic reactions. People can come into contact with zinc and chrome chromates especially during manufacturing and assembly, and as a result of repair or recycling of the vehicles.

Not only body components are coated this way, but also screws and other fasteners that have to be unscrewed after prolonged operation. The regulation thus affects Weber Schraubautomaten GmbH indirectly. Technologically, the development of the ZSL series (stepfeeders, see Page 1) is a reaction to this legislation. Both the ZSL 151 and the larger ZSL 351 can process fasteners of this kind without trouble, although the heavier material abrasion soils the feeding equipment to a significantly higher degree. The design of the ZSL series has been adapted to these specific requirements.

Technical A-Levels via TELEKOLLEG: Christoph Götz, employee in the manufacturing department at Weber, gains new job perspectives through further education.

Speaking of qualification...

The 'half-life' of specialised knowledge is decreasing all the time. Further training and qualification therefore play a central role in people management at Weber.

With the rate at which knowledge is multiplying in the world today, whoever leaves professional and personal qualification up to chance loses contact with the job market. Employees and em-ployers share the responsibility here. Mr.Heinrich Sick, Managing Director of Weber Schrau-bautomaten GmbH, says, "Our company is active in an area of technology in which the currently available specialised knowledge has to be at the fingertips of all our employees all the time. The requirements regard the breadth and depth of the necessary additional training vary from department to department. So here at Weber, the area managers, together with the employees, work out detailed plans of who should attend a course and which topic, and when."

It is only through rigorous education planning that we can ensure that Weber can meet the re-quirements of the market, and the specific needs of the customers at all times. But that, too, is Weber: as the company sees it, professional know-how must be complemented by personal competencies – the word for that is "key qualifications". Because social competence, communi-cation and team capability, or the ability to face criticism, must be seen as just as important in day-to-day work as job-specific knowledge.

Get in Touch

The Internet presence of Weber Schraubautomaten GmbH has been restructured and visually changed. As a result, you can now find even more relevant information, more clearly presented, showing a significantly enhanced range of services. For customers, and potential customers alike, the website offers a well-defined overview of the range of Weber's products and services. Your direct contact is www.weber-online.com

Get Together

The Weber Technology Forums are not only a favourite meeting-point for the industry – they also present the customer with Weber screwdriving technology 'hands-on'. The next Technology Forum will be held in the coming year at the BMW plant in Dingolfing. One of the topics this time will be the handling of blind-riveting nuts (Rivnuts). The application and installation data will be provided by specialists from the screw manufacturers EJOT and Titgemeyer, and from Weber. By the way, the Technology Forums are free of charge, so call us on the number shown for detailed information on the next event. TEL: 0 81 71 / 4 06 – 4 70 or by e-mail at uhirsch@weber-online.com

Imprint:

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Concept/Editorship:
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