

SMART SOLUTIONS



Case study

Alps Electric Co.
Sebranice, Czech Republic

“With a total line defect rate of 27 ppm for equipment that places an average of 1-2 billion components per year, we believe that our reliability is something special”

Alps Electric Czech is committed to ‘perfecting the art of electronics’

Introducing Alps Electric Co., Sebranice, Czech Republic

If you make products for the automotive market, quality and reliability are not negotiable. The costs of field returns are out of all proportion to component costs, so for automotive customers Right First Time manufacturing is an absolute requirement. Because of this, Alps Electric Co. has created a reputation for quality in its subassemblies and other automotive products. And as a decidedly high-end manufacturer, it builds the same high quality into its Radio Frequency tuners and Low-Noise Block Converters (LNBS) for the consumer market too. The company produces for many household name manufacturers including Samsung, Sony, Sharp, Ford, Volvo, Volkswagen, Technisat and Kathrein.

Alps Electric Czech has a Sebranice-based manufacturing plant that has consistently achieved best-in-class manufacturing. The company recently needed to modernize its pick & place equipment, and the single major requirement was to retain or improve quality levels, but without increasing manufacturing costs. That of course also meant keeping uptime and production efficiency at a maximum. Alps also needed a future-proof equipment platform for placing the smallest possible components like 01005 chips that will be needed in medium to high volumes.

Alps had been using Assembléon's previous generation FCM equipment, along with Fuji CP3, CP4 & CP6 machines. This time, they decided on an all Assembléon line-up. They chose the AX-301 and AX-501 high volume machines, with the Topaz-Xi and Xiⁱⁱ for (amongst other things) their useful co-planarity testing for QFPs. The true parallel placement on AX-301 and AX-501 has established itself as the industry benchmark for placement quality at high output. The machines combine speed, flexibility, accuracy and low defect rates with the industry's lowest cost per placement.

"As important, though, was Assembléon's 24/7 technical support," says James Waddilove, Alps' RF Production Unit Manager. "We do most calibration, maintenance and repair actions in-house, so don't often need technical support. However, when we do, we need instant answers and instant solutions to problems. We have constant internet and phone access to Assembléon's engineers, and they can link into our system straight through the router. This is a very useful feature, and allows Assembléon to test the network remotely and even upload software revisions onto our system. Assembléon's partner Elso provides valuable local support with site visits when needed, and hands-on training."



*Alps' James Waddilove:
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Perfecting the art of electronics

Waddilove stresses Alps' commitment to "perfecting the art of electronics." That means the best balance between price, functions, quality, and environmental considerations like energy and resource conservation. The low power consumption of Assembléon's A-Series (around half that of its nearest competitor) was therefore a bonus, but not the main reason Alps made their decision.

Assembléon's A-Series has a fully controlled pick-to-place cycle using a parallel robot system and constant component monitoring to ensure high production yield. The machines are designed for six-sigma accuracy, with automatic calibration maintaining accuracy even with changing environmental variables like temperature. There is artwork recognition, multi-level bad-mark reading, and adaptive pick. High-resolution laser alignment brings placement accuracy of 40 microns, even in 01005 applications.



AX-501

"The Assembléon machines have greatly helped us improve our quality levels. These were previously better than 300 ppm for the whole production line (screen printing, pick & place and reflow soldering) which at the time was very competitive," says Waddilove. "The A-Series machines have helped us cut that by an order of magnitude to only 27 ppm by, for example, virtually eliminating missing and misplaced components. To reach that figure, we made several major improvements to our lines, including tighter control of solder paste delivery and improving the cleanliness of the production room to below ten 5-micron particles per cubic meter."

Maximum output per hour is 165k components/hour for the AX-501 and 99k for the AX-301 (IPC 9850 output is 121k for the AX-501 and 77k for the AX-301). “In 2007, we had eight production lines making a total of 170 million placements a month. In 2008, we added another five robots to each of the AX-301 and AX-501 machines. That pushed up production levels to 240 million components from the same eight lines and even with the same machine footprints,” adds Waddilove. “This gave us the major benefit that we no longer needed to subcontract work out. It is always difficult maintaining in-house quality levels when you farm out manufacturing to subcontractors; keeping production in-house eliminates a whole lot of possible problems.”

Most of Alps’ products combine large and small components on the same board, so it helps to control each part individually. The AX-301 and AX-501 have a placement force that is adjustable between 1.5 N and 8 N. Although Alps does not normally need to adjust the placement force, it is essential for reliably placing components like connectors on the same board as micro-miniature chip components.

Instant support

“We have been greatly impressed by Assembléon’s field support,” remarks Waddilove. “It doesn’t feel at all like a normal customer/supplier relationship but much more like a true partnership. Assembléon has greatly helped us with our continuous process improvement program, with the stress being on optimizing the production line as a whole. That has been essential for us, since we have an absolute need for reliability of both equipment and service.”

“We have very strict maintenance routines, regularly running the calibration software and checking equipment like index and stepper motors,” continues Waddilove. “We already had good experience of Assembléon’s ITF intelligent tape feeders from our FCM machines. We quickly calibrate and repair the feeders, with automated software messages alerting us when to change spare parts. With over 1000 feeders in the factory, we perform routine maintenance on each of them at least every two months. That guarantees that our production runs smoothly at all times.”

The AX-501 and AX-301 allow up to 260 and 156 tape feeding positions respectively. Alps has used up to 240 of these on the AX-501 and 144 for the AX-301. It has also made extensive use of Assembléon’s Tray Extension Module, which allows up to 47 tray positions. The machines can be configured and re-configured in 6k steps from 30k to 77k (AX-301) or 121k (AX-501) components per hour to match exact capacity requirements.



Assembléon's Tray Extension Module

Fast changeover between family products

Alps tends to produce long runs of products from a single family, and so doesn’t have to change component tapes and trolleys between runs. Changeover times are only 2 to 3 minutes between products of the same family. Changeovers between product families need to be made less often. They involve additional actions like opening up and cleaning the screen printer, and changing trolleys and occasionally robot heads.

“The average changeover between families only takes around 10 to 15 minutes. That includes checking the first board, along with all the actions we need to take for traceability – essential for automotive products,” says Waddilove. “We actually have total traceability, logging every change to the process including board and component suppliers, tapes, screens, solder batches, and even operators. That is something else that subcontractors find very difficult or even impossible.”

Assembléon’s Management Information System helps Alps optimize its factory processes efficiently. That helps minimize parts consumption and optimize maintenance practices and operational processes. The company’s CoOps program helps improve Costs of Operation. It also helps get the best from equipment by optimizing output and yield of the entire line to maximize Value of Operations. “With a total line defect rate of 27 ppm for equipment that places an average of 1-2 billion components a year, we believe that our reliability is something special” concludes Waddilove. A belief confirmed by Assembléon: even with the single-digit ppm rates of Assembléon’s A-Series, a whole line defect rate of below 30 ppm for such high volumes is virtually unique in the industry.

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