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Press Release

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"Potential savings in production"

Although sophisticated constructions made of aluminium modular system components tend to be more expensive than their steel counterparts, Eurocopter Deutschland GmbH opted for the Building Kit System made by item Industrietechnik und Maschinenbau when they designed the assembly lines for their helicopters. Apart from the enhanced flexibility and speed with which different constructions can be set up, the world leader in helicopter manufacturing has also been able to accelerate its assembly throughput for helicopter components by employing the modular system.

Eurocopter, with its headquarters near Marseilles, is the world leader in the production of helicopters for both civil and military use. Besides its rotor blade manufacturing facility near Paris, the company has a production facility in Donauwörth, Germany and a product development facility in Ottobrunn, near Munich. "Helicopters are not mass production items. They are made in small series of up to 500 units and specifically fitted out to meet the customer's specifications", explains Reinhold Grosskopf, Manager of Production Machinery Design, Central Production, at Eurocopter in Donauwörth. Grosskopf and his 23-strong team of designers are employed in the company's in-house production machinery department. "One can easily imagine that designing our production machinery to be highly flexible demands an open-minded approach in terms of the various assembly set-ups required for helicopter components", Grosskopf points out.

Steel has been used up to now

These solutions have, in the past, always been provided using steel constructions which needed welding, straightening, sandblasting and, finally, painting. "This was extremely complex if one bears in mind that, with many of these highly

complicated, heavy assembly jigs, we had to take into consideration not only maximum rigidity but also tolerance accuracy down to tenths of a millimetre. Every series launch involves a large number of modifications to the jigs since we cannot run pre-launch series, as in the automotive industry", emphasises Grosskopf.

About four years ago, the designer was standing in the helicopter final assembly section with one of his staff observing the old assembly jigs for the prototypes for the BO 108, a highly successful model now known as the EC 135. "Our task was to cooperate with the production department to reorganise the assembly workplaces. We were well aware that this was also a unique opportunity to do away with the steel assembly constructions used hitherto", Grosskopf recalls. Only a few days before, he had visited an automotive supplier in the immediate vicinity and had seen the benefits of system profiles made of aluminium for designing flexible workplaces. "That company was forced, due to the types of orders it received, to completely reorganise the production equipment at several workplaces several times a year and had been very impressed with the application of aluminium profiles".

First assembly jig using modular aluminium components

Although Eurocopter production required completely different solutions, and steel had been mainly used for previous assembly jigs mainly for reasons of rigidity and precision, Grosskopf was particularly intrigued by two key characteristics of the aluminium profiles: "The cross-sectional shapes were laid out like the original master metre and, as a result the heat expansion properties in all three profile planes had to be highly homogeneous. At the same time, I was shown the slightly raised grooves on the outer sides of the profiles. This design characteristic would enable us to use prestressed bolts in the riveting areas, where high dynamic forces are applied, without having to keep retightening them."

Reinhold Grosskopf contacted the manufacturer of the Profiles, item Industrietechnik und Maschinenbau GmbH. The objective was to design and build a large-scale assembly jig using these aluminium profiles. "We knew that if that worked, designing and constructing smaller jigs and assembly aids using a modular system would not cause us any difficulty."

First of all, Reinhold Grosskopf and his team of designers constructed the jigs for the final assembly stage of the EC 135 civil helicopter using Profiles and Fastening Elements from item. During the design stage, the production machinery

department recognised the enormous potential the modular system components offered for vast improvements in the production environment.

Versatility in design

"We had always designed our assembly jigs as enclosed constructions for reasons of rigidity. But this had a decided drawback. In order to reach the inside of the jig, our assembly staff always had to climb over a threshold. To reduce the risk of injury, we then had to supply wooden steps to get over them. Using components supplied by item, we were able to build openly accessible constructions for the first time, which left nothing to be desired in terms of rigidity and also allowed unrestricted access at floor-level into the assembly area", Grosskopf points out one of the advantages. Pipes and hoses, for example for connecting up compressed air for power tools, no longer need to be laid within the jigs. "We simply connect up the supply from the mains to the hollow profiles making up the jig and then provide outlets within the jig exactly where we need them." The modular system components also provide a high degree of flexibility in an assembly environment due to the ability to adapt additional elements such as column guides, V-guides or pneumatic motors. "Even minor modifications to an assembly unit can now be put into practice within the shortest conceivable time since we do not need to worry about welding and can simply remove or replace individual components directly in situ, and without interrupting production. The new elements are then also adjusted in situ using a laser tracker", Grosskopf points out delightedly, even if he does concede that, in terms of just the materials purchase price, solutions using aluminium system components are more costly than the previous steel equivalents.

Production benefits

On the other hand, the new jigs have meant considerable advantages in terms of production machinery manufacture and this will have long-lasting effects on the assembly times for individual jigs. Reinhold Grosskopf quotes some concrete figures. "The design of the assembly jig for the EC 135, the successor to the BO 105, using item system components, meant a saving overall of 15% in comparison with the previous steel constructions. This is partly as a result of the simple integration of the individual system components in our own CAD drawings via the item CD-ROM, which enabled us to generate detailed parts lists. item then provide

us with ready cut Profiles and components as construction kits which we then just have to assemble." The advantages of this new concept in jigs had an immediate effect in the production department. "In comparison with the assembly work for our old system, we now have a saving of 25% due to the new concept." The figures speak a clear language. The use of modular building elements made of aluminium is not only an alternative to using steel in terms of design work, it also makes sense as regards the options for optimisation in the manufacture of production machinery.

The new face of assembly systems

Now visitors to Eurocopter in Donauwörth will come across item profiles in almost every section of the production area. Since its introduction at the production facility of the world leader in helicopter manufacture, the production machinery department has been responsible for around 50 large scale production set-ups and a further 150 assembly aids for, amongst other things, landing gear, the central section of helicopter bodies, and also for the production of Airbus doors and hatches, which are also made in Donauwörth. In addition, there are numerous fitting jigs, e.g. for jet engines, and aids such as drilling and milling jigs. And is if that were not enough, the workers at Eurocopter were so impressed by the versatility of the item components that they also made use of the profiles to design their individual workplaces and the periphery, such as the Kanban storage areas.

"This extremely flexible design principle of the modular units has had a very positive effect on the creativity of our production machinery department", Reinhold Grosskopf is convinced. "This enables us to create solutions that have not been possible using steel constructions. The classic example of this is the production of the narrow-body cargo doors for the Airbus, the production of which uses no end of modules that, in the final analysis, have completely changed the entire face of our assembly section. The racks and components made from the aluminium profile sections have not only opened up a considerable freedom in terms of design and much improved productivity in production, they are also very attractive to look at. A very much appreciated feature when we take visitors round the company."



(Figure: Eurocop1-kl.tif)



(Figure: Eurocop2-kl.tif)



(Figure: Eurocop3-kl.tif)



(Figure: Eurocop5-kl.tif)

Assembly jigs at Eurocopter for helicopter production. The use of item system components guarantees a high degree of flexibility in assembly work. Adaptation of additional elements is possible with relatively little effort.



(Figure: Eurocop4-kl.tif)



(Figure: Eurocop6-kl.tif)

The flexibility of design afforded by the item modular system elements has a very positive effect on the creativity of the production machinery department. Making it possible to create any manner of assembly jigs – from filigree to complex designs.



(Figure: Eurocop.tif)

Individual workplace arrangements using the item MB Building Kit System.

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