ALMÜ INSIDER

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ALMÜ – A POPULAR PARTNER OF THE AVIATION INDUSTRY

Today, flying itself is no longer a great challenge. Around the globe, zillions of planes take off every day. But in spite of the fact that planes have become a means of mass transport, airplane production has to cope with great challenges. The individual ranges of products require the highest quality, paired with minimal tolerances. ALMÜ can contribute a lot to safety in the air. This Insider focuses on an essential component of every airplane: the main landing gear's brake caliper of the Airbus A320.
In fact, a jetliner uses the wheel brakes only during the very last phase of slowing down. Immediately after touchdown, it is still so speedy that reverse thrust is much more efficient than braking. However, without wheel brakes, such an airplane would not come to a final standstill in time.

CONTENT

ALMÜ's tool solution for producing a main landing gear's brake caliper.

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FACTS & FIGURES A320

Seats:	174
Length:	37.57 meters
Height:	11.76 meters
Wingspan:	34.10 meters
Max. take-off weight:	73,500 kg
Empty weight:	64,500 kg
Tank volume (fuel):	18,700 liters
Fuel consumption:	2,500 kg/h
Max. range:	5,500 km
Ceiling:	39,800 ft
Max. standard thrust:	2 x 27,000 lbs
Take-off speed (full):	285 km/h
Landing speed:	248 km/h
Cruising speed:	858 km/h

The Airbus series of the A318, A319, A320, and A321 is one of the manufacturer's most popular lines. The so-called single-aisle series is operated by airlines around the globe. Regarding the production of the raw part of the main landing gear's brake caliper, the bulk of the process steps are carried out using individual tool solutions made by ALMÜ. In the old days, that production required lots of tool changes and shifts, which often led to fluctuating results and tolerances. Now, the result fits perfectly, and production is efficient. Moreover, thanks to this tool development, the forged raw part from aluminum has only to be processed from one side, and the former final manual flash removal is no longer necessary.

1ST STEP: FACE MILLING OF THE FLANGE SURFACE

The PCD cutter head with internal coolant supply now has twelve cutters instead of formerly eight. The result is a high-performance job.

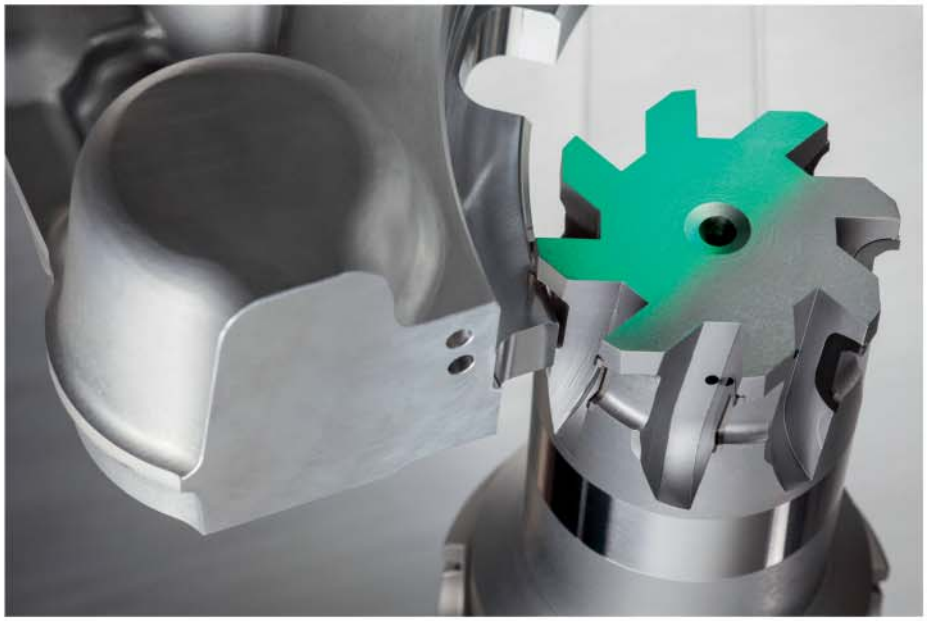
V_C = 1,500 m/min
f_Z = 0.08/cutter
a_P = 1.5 mm

2ND STEP: FACE AND CIRCULAR MILLING IN ONE GO

The cutters of this monobloc tool have a double function. Initially, it does the face milling from the front side, then does the circular milling. This PCD cutter thus replaces three tools, and saves shifting the aluminum workpiece. Thus, the parts come out more accurately, and the safety of the process is enhanced.

V_C = 1,000 m/min
f_Z = 0.08 mm/cutter
a_P = 27 mm

3RD STEP: CIRCULAR MILLING OF THE INNER CONTOUR



The two mountings required are no longer designed first by an end miller, then by a chamfer miller, but they are produced in one go by this circular milling tool, fitting exactly. The eight clockwise rotating PCD cutters' shaft comes in an angle to reduce vibration.

V_C = 1,500 m/min
f_Z = 0.08 ... 0.12 mm/cutter

4TH STEP: CIRCULAR MILLING OF THE 18 GROOVES

The holding grooves required are created by the PCD miller from scratch. The zigzag milling strategy employed offers a wide range of advantages. The wrap angle of the single grooves is minimized while milling, reducing the strain on the tool's cutters, Thus, you can increase the machining speed, resulting is considerably shorter processing time. Before, this production step required two millers plus manual flash removal.

V_C = 500 m/min
f_Z = 0,05 mm/cutter

CONCLUSION

All in all, using this complete tool solution gets you the following advantages:

- **it saves many tool changes,**
- **you avoid shifting errors,**
- **and there is no more manual flash removal.**

Thus, the tolerances demanded can be observed at any time, and can even be increased. This ensures the highest process safety and reliability. Taking everything into account, we should talk about saving some thirty minutes per workpiece.

PEOPLE CREATE QUALITY. AN INTERVIEW WITH MARKUS MÜLLER AND AHLRICH SANGEN-EMDEN

Quality management and ISO certifications have become an important part of today's working world. At ALMÜ, too, this subject is of major significance. In this interview, Ahlrich Sangen-Emden, responsible for certifications and audits at ALMÜ, and CEO Markus Müller answer important questions.

Insider: It was in the year 2000 that the first ISO 9001 certification was conducted at ALMÜ. How did you proceed?

Ahlrich Sangen-Emden: A certification audit is organized in two steps. First, it is the auditor's tasks to check if the documentation provided by the company, in the form of a quality management manual, as well as the instructions for processes, procedures, etc. comply with the applicable norms. When this part of the audit is completed, follows the second part, which consists of examining the company's quality management system on the spot.

Insider: Why does ALMÜ expose itself to such challenges, undergoing such a certification?

Markus Müller: We have customers who demand that we be certified. Most of them are companies from particular parts of the industry, such as aviation, aeronautics, and the automobile industry. They have various criteria when assessing a supplier. For them, the certification is an important feature as it comes do deciding for or against ALMÜ.

Another advantage of the quality management system we have introduced is that the company's business processes have become highly transparent. This transparency has made us conceive, construct, and produce quality in a way that can be measured. In the end, that means reducing internal and external nonconformity costs, making our customers happier.

Insider: How would you define our customer's advantage by us being certified?

Ahlrich Sangen-Emden: The major plus is the transparency I already mentioned. For our customers, that means: the organization of design and production at ALMÜ is directed at manufacturing high-quality products. For every process, we define its quality, which is, in consequence, an important precondition for providing high-quality products.

Markus Müller: We are, in a way, a company in the process of learning. Always on alert and highly concentrated, we focus on possible sources of errors, to be identified and analyzed in advance. Our customers profit from steady quality, and can adhere to their plans. Thus, certification and QM mean identifying weak spots, preventing errors, and satisfied customers.

Insider: In January 2013, you returned to ALMÜ. What were your tasks?

Ahlrich Sangen-Emden: We lately carried out a recertification audit. Such a certificate is valid for three years, meaning that every three years, you have to go through a procedure similar to an initial audit. The entire QM system gets checked, thus the whole company.

Insider: And how is such an audit carried out?

Ahlrich Sangen-Emden: An audit means checking the effectiveness of the existing quality management system, compared to the norms to cling to. Such an effectiveness check means we have to talk on the spot to those employees who are responsible for the various processes within the company, or who do the individual jobs. In a nutshell: we compare the demands of the QM manual, concerning the instructions for processes, working, and testing, to the job actually done. We then consider the following questions:

- Has the requirement been described in ISO 9001? How and where?
- Has this description been implemented?
- Do the employees know it? Have they been trained?
- Is it being practiced or implemented as specified?
- Can this implementation be proved?
- Can it potentially be improved, or are there weak spots?

Insider: Herr Müller, how would you characterize the cooperation with Herr Sangen-Emden?

Markus Müller: Thirteen years make quite a solid basis for our cooperation. Herr Sangen-Emden has come to know how we work. I can rely on an "outside" eye, and our customers know that ALMÜ does a good job. In the end, a typical win-win situation.

Ahlrich Sangen-Emden, 61 years, degreed engineer, and owner of ase consulting. At ALMÜ, he is lead auditor of SGS – International Certification Services GmbH.