JU 52 LIFT OFF SUPPORTED BY LAP HIGH-TECH

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AVIATION

EXACT POSITIONING OF THE WING SPARS WITH XtrAlign LINE LASERS FROM LAP

Deutsche Lufthansa Berlin-Stiftung

LAP LASER

At the hangar on the Lufthansa base in Hamburg, the Ju received six new surface spars. Each spar is eleven meters in length and consists of six to eight segment tubes tapering towards the wing tips.

"Thanks to the line laser technology, we were able to detect and correct even the smallest deviations. The Ju now has the air it needs under its wings to reach its 100th anniversary safely."

DR. HORST ZÖLLER,
Deputy Technical Manager,
Deutsche Lufthansa Berlin-Stiftung

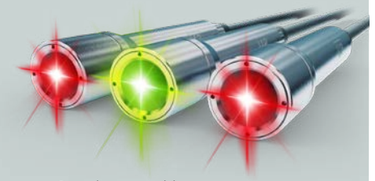
THE PROJECT

The legendary Junkers Ju 52 D-AQUI aircraft received a complete overhaul at Lufthansa Technik in Hamburg. During the layover, the aircraft was completely dismantled. Taking over one and a half years, the extensive overhaul involved a complex structural renovation of the wing spars. The aircraft – belonging to the Deutsche Lufthansa Berlin-Stiftung – had three of each wing's four wing spars renewed. Spars are safety-critical components that are essential for the stability of the entire aircraft. In order to ensure the exact alignment of the spars, line lasers from LAP were used for the job. And the project was a great success: supported by high-tech laser technology, the aircraft was recommissioned in 2017.

THE CHALLENGE

Twenty structural mechanics, eight aerospace engineers, an 80-year-old historic aircraft and one goal: make the Ju to celebrate its 100th anniversary in top shape. As part of this wing spar restructuring project, special attention was paid to the restoration of the lower spars, which bear heavy loads during flight. Lower spar 1, which is particularly important for the statics, had already been overhauled; lower spars 2, 3 and 4 were up next. This was no easy task since the spars had to be removed piece by piece, replaced, and then reinstalled in exactly the same position. The challenge was maintaining the absolute precision needed – because the slightest deviation in position could affect the stability and thus the flight safety of the historic machine. To enable the stress-free mounting of the wings, the mounting nuts on the fuselage have to match exactly, with an accuracy of a 100th of a millimeter to boot!

XtrAlign Laser

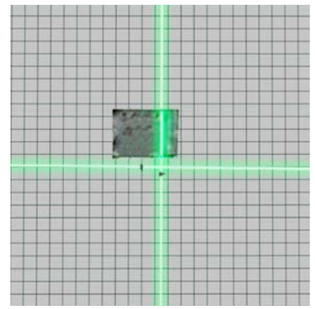


- Stainless steel housing, enclosure rating IP67
- Shock resistance IK10
- Line accuracy of ±0.05 mm
- Service life of more than 30.000 h
- Manually focusable

THE SOLUTION

How can any potential deviations in position be measured accurately and detected at an early stage? LAP's laser technology was the ideal solution for the engineering team headed by project controller Dr. Horst Zöller: two positioning lasers were mounted on each wing and aligned parallel to the spars. LAP's XtrAlign HY lasers with green laser diodes, which project precise laser crosses with a line straightness of ± 0.05 mm/m on a projection surface, were put to use. On the basis of this optical marking, the Lufthansa engineers were able to continuously check whether the actual positions of the spars deviated from the target positions. And as it turns out, the use of this laser technology paid off: using the lasers, small but crucial changes in the position of the spars could be noted and corrected – and in time, before the entire wing was assembled.

The photo shows a deviation when opening the fourth segment on the right wing. Thanks to the line lasers, it was possible to detect it and then correct it.



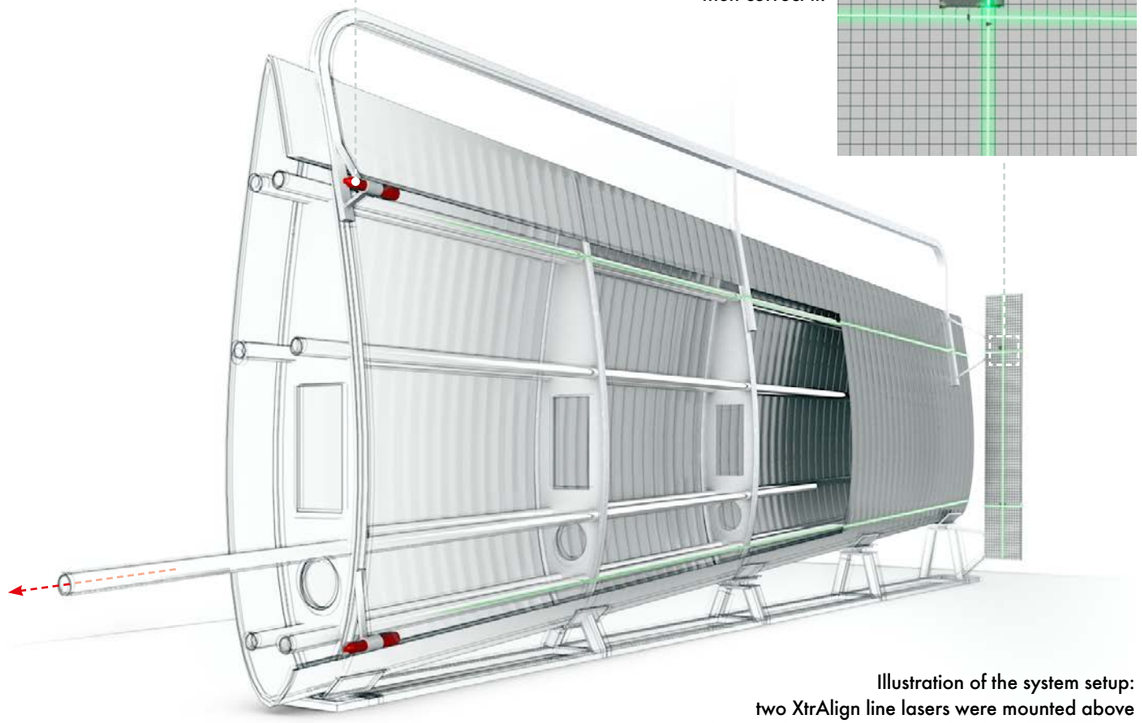


Illustration of the system setup: two XtrAlign line lasers were mounted above and below the wings respectively. The projected laser crosses showed whether the spars were located in the exact position.

ABOUT THE DEUTSCHE LUFTHANSA BERLIN-STIFTUNG

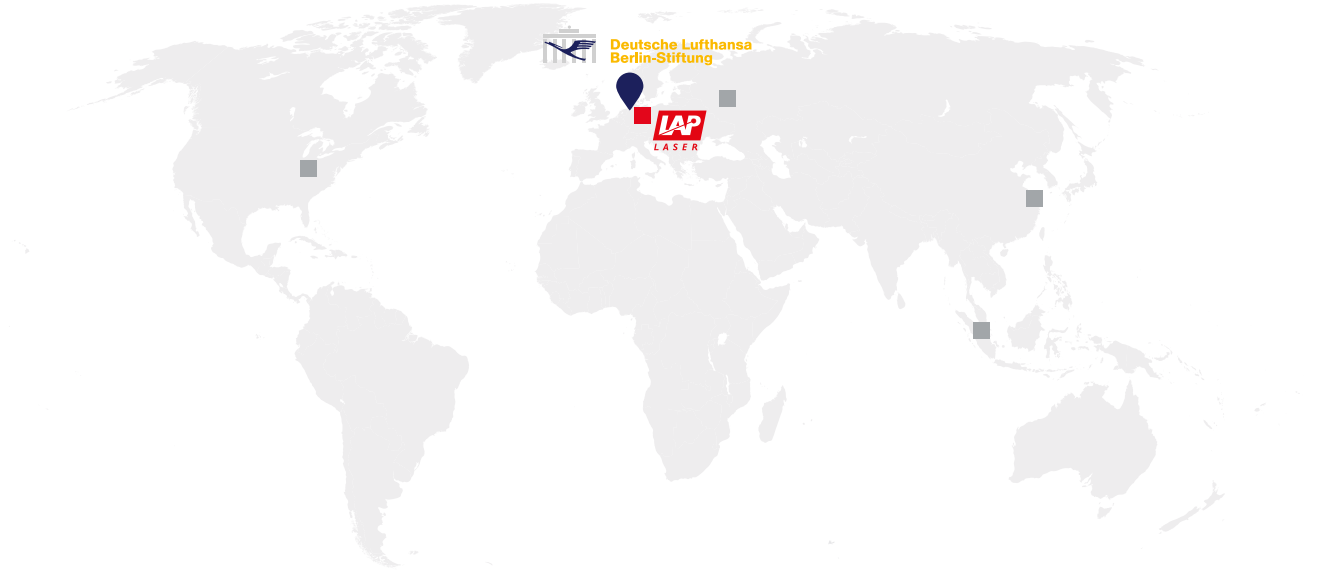
The Deutsche Lufthansa Berlin-Stiftung was founded with the aim of retaining historic aircraft and showcasing these to the public and of promoting science in the field of civil aviation. The foundation board, presently consisting of Werner Knorr (chairman), Dr. Jürgen Althans and Walter Heerdt, is committed to this guiding principle.

www.Lufthansa-Ju52.de

ABOUT LAP

LAP is a worldwide leader in the field of laser-based systems for projection and non contact measurement. For more than 30 years, LAP has developed, manufactured and distributed laser measuring systems, line lasers and laser projectors for industry and medicine. Numerous international industrial corporations rely on the precision technology Made in Germany for improvement of the quality of their products and the effectiveness of their production processes.

www.lap-laser.com



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