Advancing rotors
M

BB's twin-engined BO. 108 helicop-
ter is a technology demonstrator.
Its designers claim it will serve as a
flight-test vehicle, enabling the evaluation of new systems and subsystems, many of which the company has already tested in either the BO. 105 or the BK.l 17. The rationale behind the BO. 108 is to bring all of this new tech-nology together in one vehicle. Funding for the programme ($57 million to date) has been provided by MBB itself and the West German Ministries of Economics and Research and Technology (BMFT).
At the inception of the BO.108 project MBB set itself several major technical and economic goals;-
• Increase the helicopter's payload: empty weight ratio
• Significantly improve the aerodynamics relative to the BO. 105
• Single-pilot IFR with a cost-effective stability augmentation system
• Improve vibration isolation and noise reduction
• Improve handling qualities
• "Design-to-cost" development
• On-condition-maintenance
• Direct operating costs 25 per cent less than
those of the BO. 105
Early aerodynamic studies emphasised an optimum shape for a helicopter seating five or more, with the smallest possible frontal and surface area. Extensive windtunnel tests

The latest advances in helicopter technology have been brought together by MBB into a single design—the BO.108. The exten-sive use of composites and advanced aerodynamics are just two of the innovative features

which have been incorporated. Chris Drewer reports from Munich on this new devel-

opment.

resulted in the current fuselage shape which, MBB claims, yields close to a 30 per cent drag reduction compared with the BO. 105 fuselage. A 5° rotor installation angle gives the optimum fuselage aerodynamics with the pitch set for cruising flight. Allied to an improved nose configuration and tail section, this met the early design aim of increasing volume without enlarging frontal surface
area.

Aerodynamic considerations form only one part of the new technology incorporated in the BO.108. The main rotor system repre-sents the culmination of work which began in 1983. The result is a bearingless, hinge-

The BO. 108 brings together the very latest in heli-copter technology

less, four-blade main rotor of composite construction (designated FVW).
Loads are transmitted from the blades through an integrated glassfibre/ composite flexbeam and control cuff. The elastic prop-erties of the flexbeam eliminate the need for conventional rotor hub elements. Blade pitch bearings are replaced by a torsion section of the flexbeam, which has the static and dynamic properties necessary to model the behaviour of the bearings. Not only does this save 50kg compared with the BO.105's rotor hub, but it also leads to a considerable reduction in the number of component parts—50 per cent less than in the BO. 105 rotorhead.

Extensive testing using a 40 per cent scale model rotor has led to the development of new aerofoils, blade geometry, and transonic blade tips, which together give a power saving of 6 per cent during hover and forward flight. MBB claims that, compared with the BO.105's main rotor, the new hingeless, bearingless system also has better static and dynamic stability, combined with improved damping behaviour.
Tail-rotor technology in the BO.108, as in otherlight helicopters, closely follows that of
the main rotor. The first prototype is flying
with ihingeless two-blade tail rotor in which
elastomeric bearings replace the older needle
bearings. The next step will be to incorporate
a bearingless design. This is under develop-

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