



# WEBASTO

...relies on catman® AP –  
the new data acquisition and analysis software from HBM

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Webasto, the international automotive supplier of auxiliary heating, air conditioning systems and sliding sunroofs, has designed the retractable hardtop for the Volvo C70 Cabriolet. Webasto relied on the MGCplus amplifier system and catman® AP – the new data acquisition and analysis software from HBM, for testing of the hardtops during development.

## The following tasks were needed:

- stiffness measurements of the entire roof system and components
- recording the natural frequencies and highway patterns for the entire roof system and complete vehicle
- locking forces
- closing speeds
- functional measurements on the roof system and its components (stresses, currents, forces, pressures, torques, angles, displacements, etc.)

## Aim of measurement

When measuring locking forces, Webasto needed to ensure that the roof system components could tolerate locking in the intermediate positions without damage and subsequent functional impairment. The tests were also used to align with the FEM calculation.

## Measurement setup

To make it as easy as possible to measure the locking forces, the drive of the C-segment was set up as a component test bench (Fig. 1) and transducers were fitted to capture the following quantities:

- cylinder force - HBM's U3 10 kN force transducer
- cylinder displacement
- cylinder pressures at the piston and rod end - HBM's P8AP 500 bar pressure transducer
- locking force at the driven link - HBM's U3 2 kN force transducer



catman® AP



The new generation of data acquisition and analysis software



Fig.1-3: Measurement setup on the component test bench for the hardtop



The chart (Fig. 4) shows the measured quantities of pressure and force, evaluated and displayed as examples by catman®AP.

### Conclusion

catman®AP software is easy to operate and helped Webasto in its daily evaluation. The sensor database saved valuable time, particularly when setting up amplifiers and there was a significant reduction in possible errors. As well as being easy to operate, the flexibility of the software proved important, as it ensured a fast response to different measurement jobs.

The second area of application for catman®AP is analysis and documentation. The filter functions and frequency analyses of catman®AP proved particularly useful for the analysis and documentation of the Volvo C70 hardtop. ■

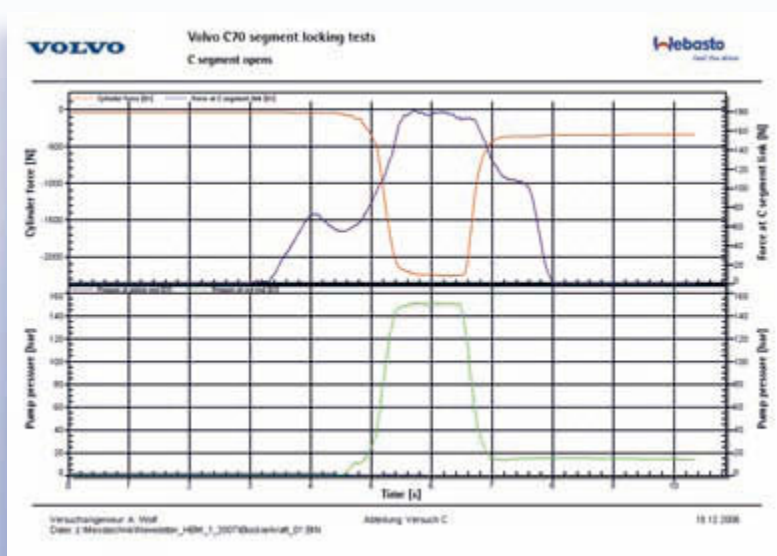


Fig. 4: Force and pressure over time



Fig. 5: Volvo C70 Cabriolet with the roof in motion

- U3 Cylinder force
- Cylinder displacement
- P8AP Cylinder pressure
- U3 Locking force

**MGCplus**  
Data acquisition



Data analysis and visualization