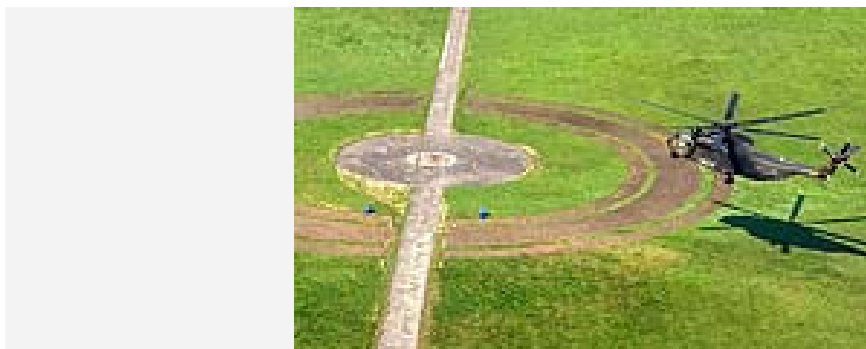


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DLR in international collaboration to analyse flight characteristics of large transport helicopters

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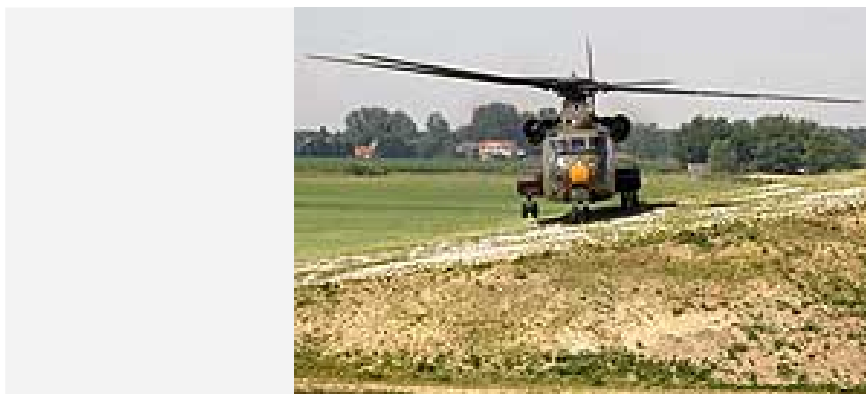


Helicopter performs a pirouette

As part of a collaborative project with the German Bundeswehr (Federal Armed Forces) and the US Army in the field of helicopter research, the German Aerospace Centre (DLR) has for the first time performed flight tests in Germany with the aim of analysing mission-specific flight characteristics of large transport helicopters.

DLR's Institute of Flight Systems, the German Army's Technical and Airworthiness Centre for Aircraft (WTD61) and the US Army agreed to carry out flight tests in Germany using a Bundeswehr Sikorsky CH-53 G helicopter as part of a collaborative effort in helicopter research. The helicopter, with a maximum take-off weight of 19 050 kg, is the Bundeswehr's largest transport helicopter. It has a conventional design with one main rotor (22m in diameter) and one rear rotor.

Following a preparatory phase between August and December 2004, a special WTD61 helicopter equipped with monitoring instruments took off on its first data-gathering flights in April and May 2005. Through July, pilots practised representative low-flying manoeuvres and evaluated the aircraft's flight characteristics in accordance with international standards. Dynamic flight parameters were recorded by an onboard measuring device, while the flight path was optically mapped.



Helicopter landing sideways on a slope

Further flights were undertaken with the involvement of US test pilots and engineers to evaluate the pilots' own assessments.

During this phase, manoeuvres were performed using both internal loads and a 4000-kg external load to test the effect of various loading scenarios on flight characteristics. Together with flight tests carried out by the US Army using a Boeing CH-47D Chinook (a transport helicopter with a maximum take-off mass of 22 000 kg and a tandem rotor configuration), the collected data and the results of the research will contribute to preparations for further development projects for transport helicopters in Germany.

The effect of an aircraft's flight characteristics on pilot workload, and thus on how well he or she is able to complete specific flying missions, has been recognised since the earliest years of flight. The first specification to include a 'flight quality requirement' was published by the US Army in 1908, just five years after the first successful flight made by the Wright brothers. This was a one-page document which stipulated that a manned flying device should be easy enough to handle such that it could be mastered by an intelligent person within a reasonable space of time.

The year 1941 saw the first of more complex lists of requirements for aircraft flight characteristics. Stationary and dynamic stability, the characteristics of the controls and an aircraft's response to stalling were all factors taken into consideration. The first specification for helicopter flight characteristics appeared in 1952.

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