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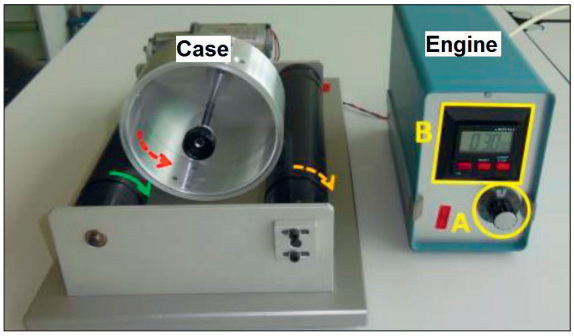
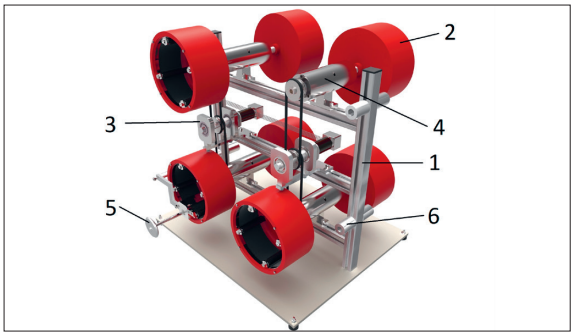
Subject Area	Konstruktion und Systemtechnik
Project Partner	Phonak AG, Stäfa, ZH

Cerumen-Tester

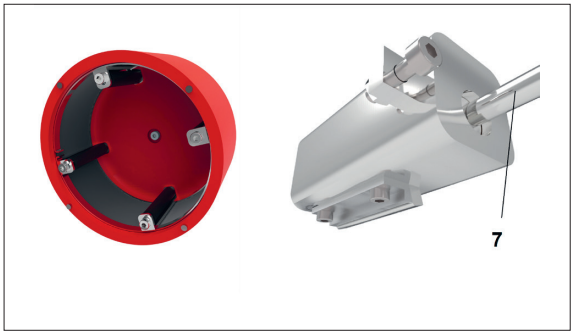
Mechanical re-design of a prototype to test cerumen protection systems in hearing devices against contamination by cerumen



Prototype of the existing cerumen-tester



The new cerumen-tester, including scaffold (1), case (2), engine block (3), bearing block (4), cerumen dispenser (5), slot (6)



The case and the cerumen dispenser of the new cerumen-tester

Introduction: Phonak AG develops and produces hearing devices in Stäfa. To protect these systems against contamination by ear-wax/cerumen, a cerumen protection system has been created. These systems protect the sound opening of a hearing device against clogging by cerumen. The cerumen test equipment is used to evaluate the quality of a cerumen protection system with further analyses.

Procedure/Result: The current prototype of the cerumen-tester was developed and built in a case study in 2013. The hearing devices drop on the inside wall of the case, on the pre-impregnated textile fabric with cerumen. Each contact between the textile fabric on the inside wall of the case and the sound opening of the hearing device results in an incremental contamination of the cerumen protection system by cerumen. Depending on the efficiency of the cerumen protection system, the sound opening gets more or less clogged over the course of the test. The time to clog and the way the protection systems clog is evaluated with further analyses of the hearing devices. The cerumen-tester is currently a prototype and not optimised for usage in a laboratory. The cerumen-tester generates too much noise with the rotating case on the drive shaft and the operator requires a long time to prepare all components for a test run. The new cerumen-tester will reduce the emission of noise and simplify the processes during a test run. A concept in the form of 2D and 3D drawings, ready to fabricate, is the result of this project.

Result: The new cerumen-tester contains 5 different parts, which can be combined to test a maximum of 8 cases (including a maximum of 32 hearing devices) simultaneously. Each of the 8 cases (2) is fixed over a magnetic clutch at a bearing block (4). The cases are driven by a dc motor on the engine block (3) over a pre-loaded O-ring-belt. To add cerumen, the cerumen dispenser (5) can be applied at the slots (6) on the scaffold (1). Each case has its own slot. The piston (7) pushes the cerumen onto the textile fabric. The cerumen-tester comprises a total of 500 parts and weighs 11kg. The construction is scaled for usage in a binder oven FD53, to temper the whole system. The new cerumen-tester saves about 40 % of time in test runs and fulfils all necessary criteria that were defined.