



# INNOSOUND & REEDDESIGN

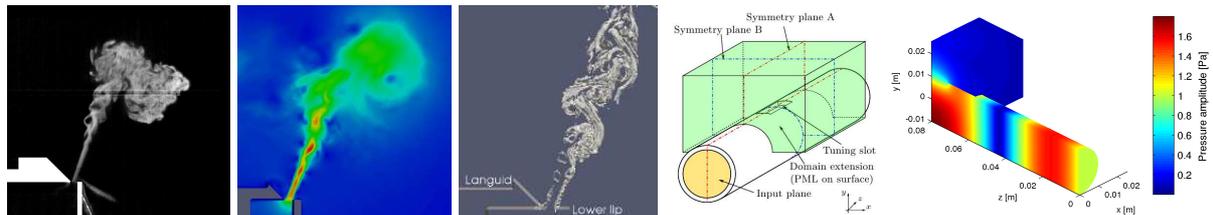
(Project duration: 2008-2010, 2011-2013)



Wooden pipes with different scaling setups

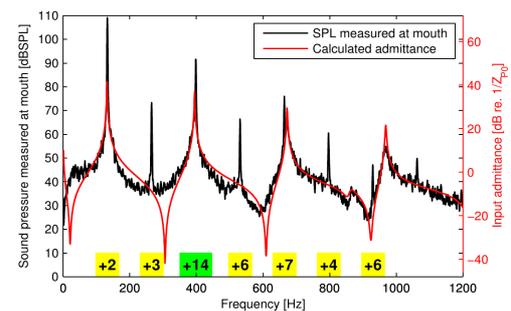
Organ building is a traditional craftsmanship deeply rooted in Europe's history and culture, which entails valuable know-how transmitted generation after generation. The organ builder SMEs have recognized that the quality and the effectiveness of their work can be considerably enhanced by adopting scientific and technological innovations in their craftsmanship. The EU funded, collaborative research projects aim at developing innovative design methods, technologies and software, which can be applied in the daily practice of organ building in order to optimize the design and production of labial and reed organ pipes and, more importantly, without endangering the valuable traditions inherent to their fabrication.

In spite of being a traditional musical instrument the sound generation mechanism of organ pipes is still not completely understood and is currently an active field of research. Since the process involves acoustical, mechanical and fluid flow phenomena inherently and non-linearly coupled a realistic pipe model has to be able to simulate these effects at the same time. Numerical simulation of different pipe forms with various scaling setups were performed by the members of the Laboratory. Simulation results were validated against measurement data and finally, the optimized models served as a basis of the development new scaling and tuning techniques.



Measurement and simulation of the air jet of a labial organ pipe (left), simulation tuning slots (right)

In the framework of the projects coordinated by the Fraunhofer Institute for Building Physics (Stuttgart, Germany) the Laboratory of Acoustics and Studio Technologies participated in the development of novel simulation and optimization methods, by which optimal scaling of pipe resonators can be achieved. The members of our laboratory have also actively participated in the development of software tools, such as SoundAnalysis (a tool for analyzing recorded organ sounds) and INNOScale (an innovative scaling software that implements both traditional and novel mensuration techniques).



Optimization of a chimney pipe

**Project partners:** Fraunhofer Institute für Bauphysik (Germany, Organizer), Steinbeis Transferzentrum Angewandte Akustik (Germany), Oficina e Escola de Organaria Limitada (Portugal), Pécsi Orgonaépítő Manufaktúra Kft. (Hungary), Orgelbau Schumacher GmbH (Belgium), Johannes Klais Orgelbau GmbH & Co. KG (Germany), Flentrop Orgelbouw B. V. (The Netherlands), Werkstätte für Orgelbau Mülheisen GmbH (Germany), Famiglia Artigiana Fratelli Ruffati SNC (Italy), Orgelmakerij Boogardboog (The Netherlands), Manufacture d'Orgues Muhleisen G. Walthther et Associés (France), Blancafort Orgueners de Montserrat SL (Spain)



Péter Rucz (PhD. Student)  
H-1117 Budapest, Magyar Tudósok körútja 2.  
Phone: +36-1-463-2543  
e-mail: rucz@hit.bme.hu