

MUSical Instrument-Computed tomography Examination-Standard

Newsletter 2015/02, May 2015



During the first project months, the team road-tested the range of possibilities to investigate musical instruments by means of the computed

tomography facilities in Fraunhofer development center for X-ray technology (EZRT). After having scanned a square piano in one run, recorders and ocarinas, a large bowed string instrument (Viol by Rudolph Boshard, inv.no. MIR 791) was examined using the measurement field expansion method (spatial resolution: 125 μm), as well as a brasswind instrument using a comparatively high X-ray voltage of 600 kV.



Viol, Rudolf Boshard, Augsburg (?), 17th century, with alterations until 19th century

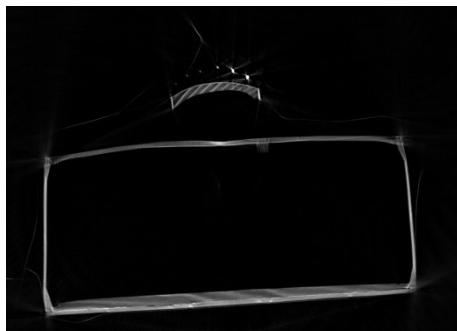
The scan of a cornet by František Václav Červený (inv. no. MI 826)

was supported by a new simulation procedure. Highly absorbing materials like metals, especially with higher thicknesses, favour the occurrence of

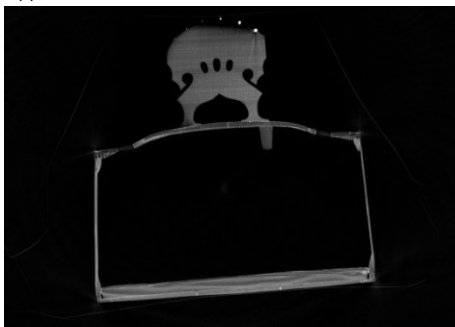


Cornet, F. V. Cervený, Hradec Králové, ca. 1910

artifacts that may affect image quality. In order to determine the best parameters, a simulation was carried out before the measurement. As a result, positioning the instrument at an angle of 45° to the X-ray beam appeared to be the best way to reduce artifacts. Comparing two actual measurements at 45° and 90°, respectively, confirmed the result of the simulation: the 45° measurement led to a visibly better quality in regions of higher material thickness, especially the valve cluster.



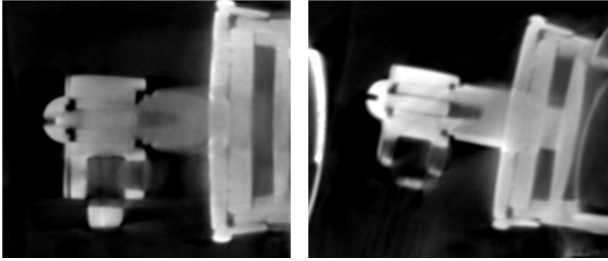
Viol, cross section through the body at the level of the upper ribs



Viol, cross section through the body at bridge level



Simulation model of the Cervený cornet, by Richard Schielein



Cutout from the scan of the Cerveny cornet. To the left control scan at 90°, to the right scan at 45° based on simulation results with under other things a more precise rendering of the angle between outer casing and rod of a valve

First expert meeting

According to the project plan, a first expert meeting was organised, joining the local project team, the German co-proposers (Musikinstrumenten-Museum Berlin, Ethnologisches Museum der Staatlichen Museen zu Berlin, Musikinstrumentenmuseum der Universität Leipzig) and the international cooperation partners (Musical Instrument Museum Brussels, University of Edinburgh, Philharmonie de Paris).

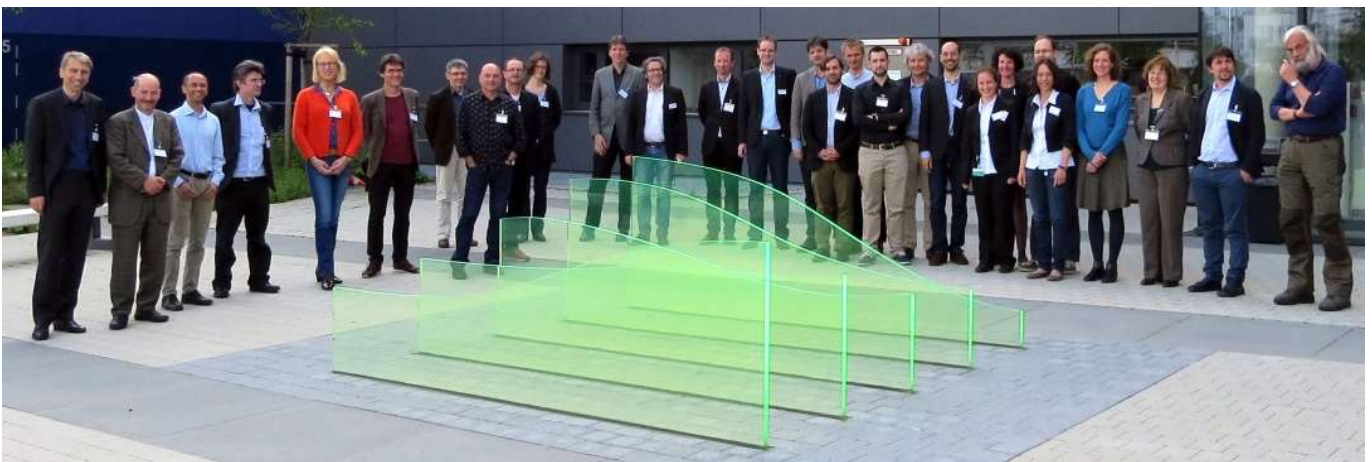
The group was enlarged by eight researchers as delegates of the COST-action „WoodMusICK“ (www.woodmusick.org), representing six European countries (Belgium, Italy, Norway, Spain, United Kingdom, Netherlands; unfortunately two persons from France and Switzerland couldn't attend the meeting due to train strikes in Germany).

A first session of the conference started in GNM's musical instrument exhibition space on May 20th 2015, where instruments already scanned or to be scanned in the future had been labelled. On May 21st a guided tour through Fraunhofer EZRT was followed by a second conference section.

The sixteen talks and the following discussions provided important hints about which subjects the project should discuss in close contact with interested stakeholders:

- Demands concerning measuring precision and image quality
- Benefits of single cross sectional still images per type of instrument
- Possible effects of high-energy radiation on the objects
- Scientific expectations, possibilities and limits of 3D-CT technology
- Appropriate orientation of the data files for measurement procedures superior to conventional measuring methods
- Metadata management and persistent storage methods for very large quantities of data

Contributions of the expert meeting are accessible through the project web site.



The participants of the first international expert meeting with delegates of the COST-action WoodMusICK in front of the Fraunhofer development center for X-ray technology building in Fürth, May 22nd 2015