

# Digital Archive of Mathematical Models

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## The collection of mathematical models in Dresden

- is one of 40 university collections at the Technische Universität Dresden
- comprises over 400 registered objects from the mid-19th century to the present day
- contains models made from wood, plaster, cardboard, wire, metal, silk and 3D prints
- embraces topics range from descriptive and analytical geometry to function theory and three-dimensional fractals



Selection of mathematical models from the collection at the TU Dresden. Photographs: Lutz Liebert

## DAMM

- provides an multilingual infrastructure for multidisciplinary research
- fosters the dissemination of previously hidden treasures of exemplary scientific collections
- supports the preservation of mathematical artefacts as a cultural heritage
- enables a new approach to the perception of mathematical models through digitization
- brings together many collections from around the world

## The Mediabox

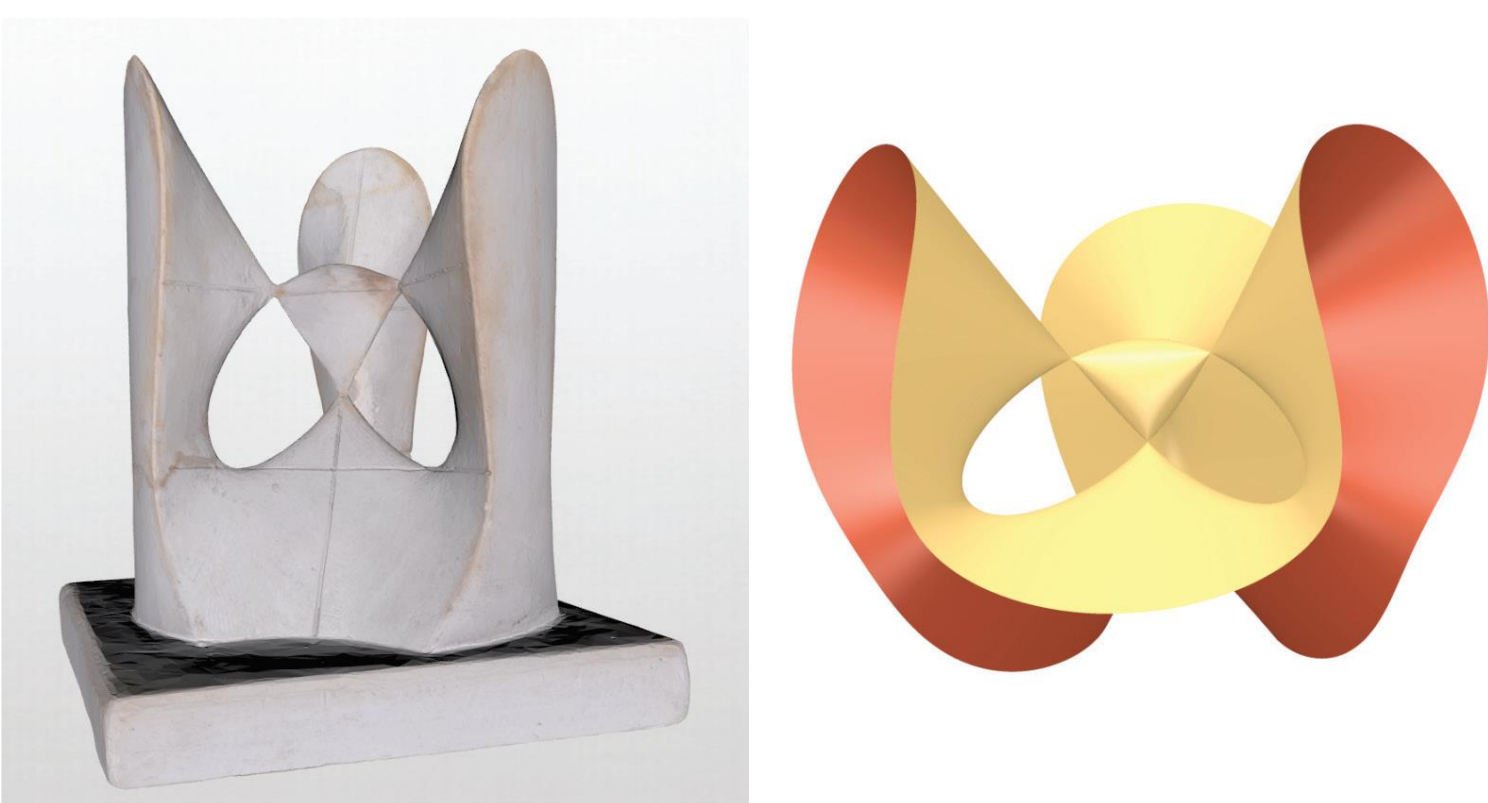
- is a data framework, which as a whole is loaded by the website
- technically is a special structure of files in a directory on a web server
- can be used as a container for any interactive content
- is especially used to provide 3D representations
- makes use of technologies like JavaScript and WebGL
- allows virtual sections and individually chosen illuminations
- allows a direct visual comparison of the scanned model with calculated data



Ruled surface of third order (Catalogue Schilling, VII 20)  
Left: Photograph of the historical model  
Right: Rendering of the digitized model inside of the Mediabox

## The creation of content

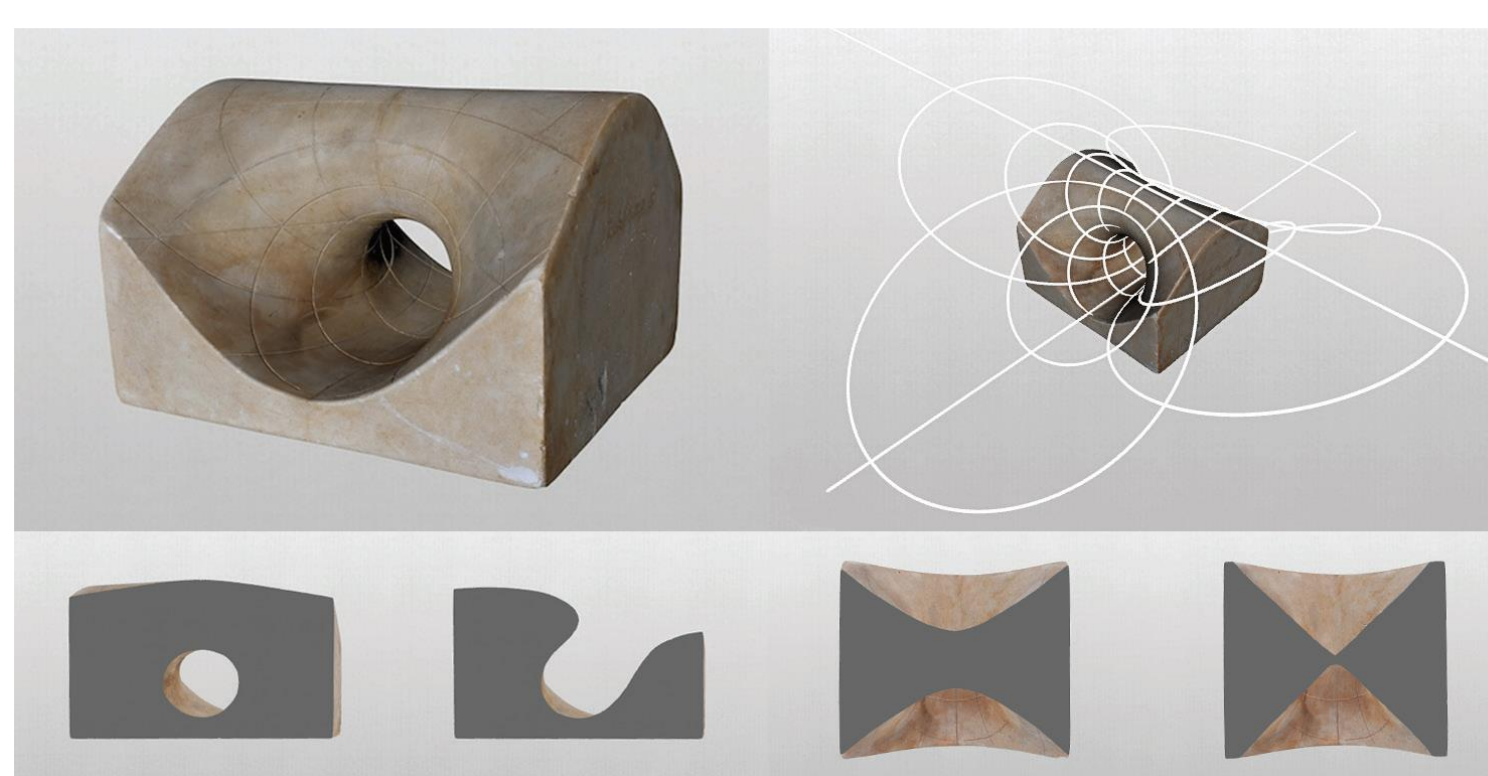
- is critically dependent on the material properties of the respective models
- for plaster models is done by an industrial optical 3D scanner. The 3D scans are textured by a subsequent process, in which the models are automatically captured with a full frame camera
- for models, which do not apply to the previously described process, are for example represented as interactive multi-row object movies (QuickTime VR objects)
- for string models, usually given through a metal framework, is done by a mixture of scanning all sides with a flatbed scanner and remodeling the strings (generators) in a 3D software based on the scans



Surface of third order (Catalogue Schilling, VII 2) from the formula  $4x^3 - 12xy^2 + 3x^2z + 3y^2z - 6x^2 - 6y^2 - 7z^3 - 12z^2 - 3z + 2 = 0$   
Left: digitized.  
Right: rendered by the software Surfer.

## We would like to

- add collections from institutions from all over the world, which like to use the DAMM framework and technology allowing for synergy, direct connections and comparison
- provide downloadable 3D data of models
- provide an export function for Metadata and annotation options
- connect to collections with similar topics like crystallography and physics
- create additional technical features for kinetic and movable models
- invite you to DAMM:  
<https://mathematical-models.org>



Parabolic cyclide (Catalogue Schilling, X 5)  
Left: digitized.  
Right: with additional circles.  
Bottom: cut by clipping planes.

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