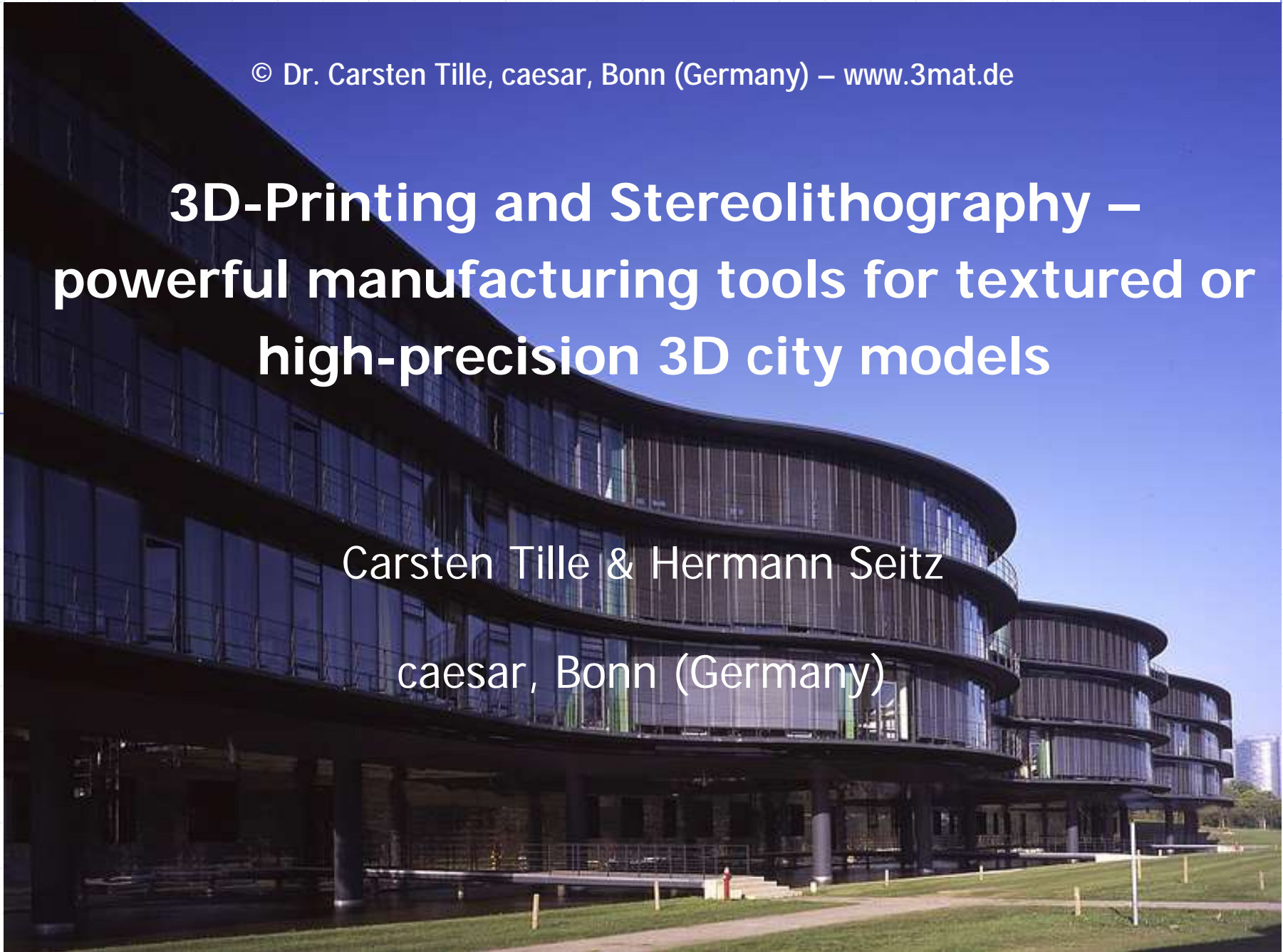


© Dr. Carsten Tille, caesar, Bonn (Germany) – www.3mat.de

3D-Printing and Stereolithography – powerful manufacturing tools for textured or high-precision 3D city models

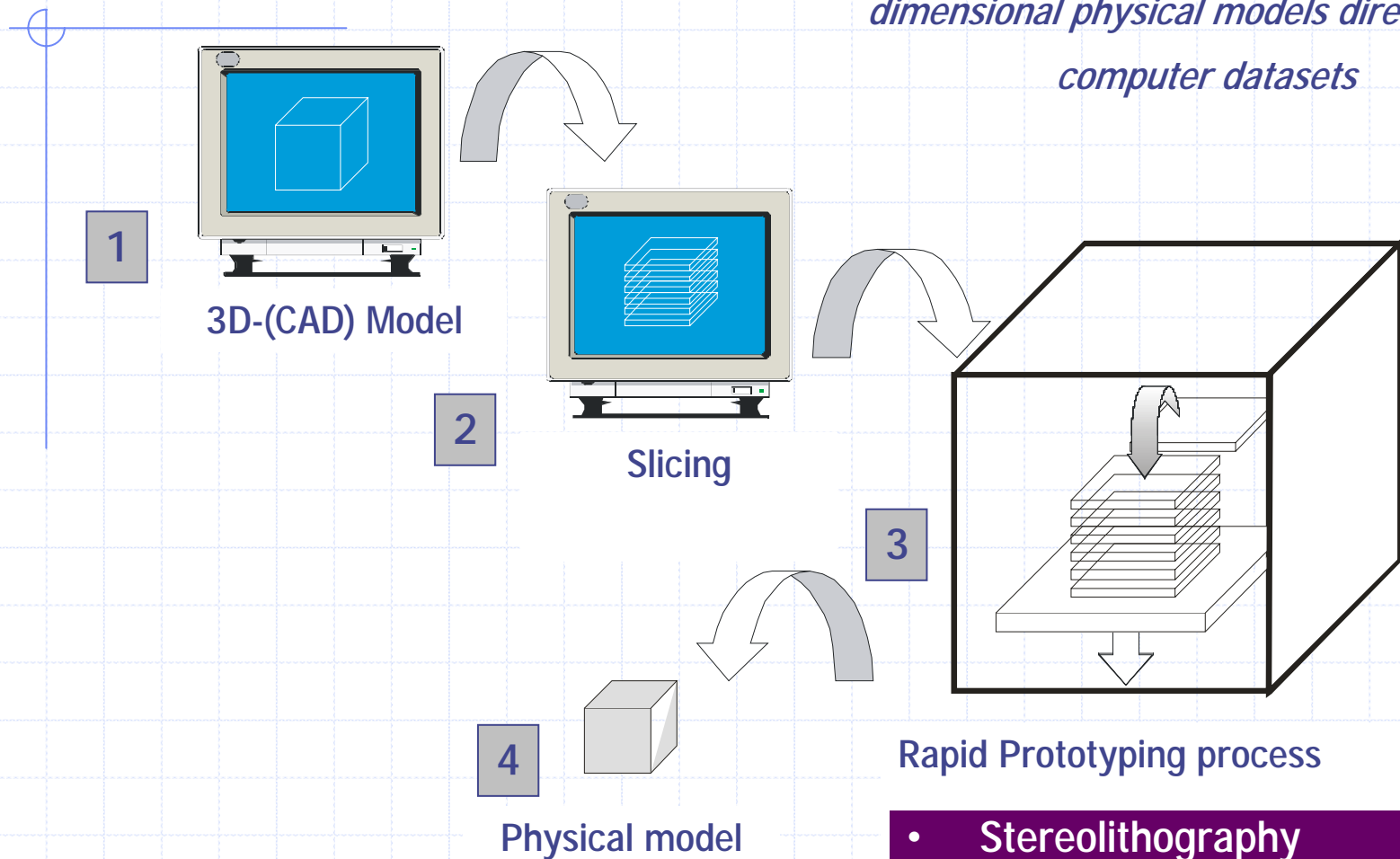
Carsten Tille & Hermann Seitz

caesar, Bonn (Germany)



Rapid Prototyping

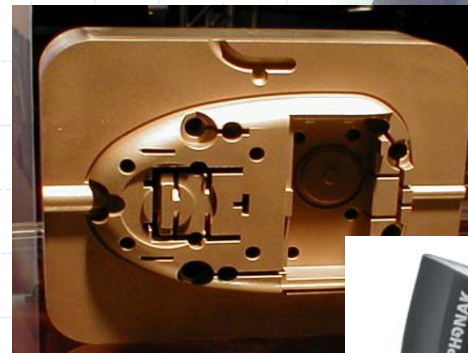
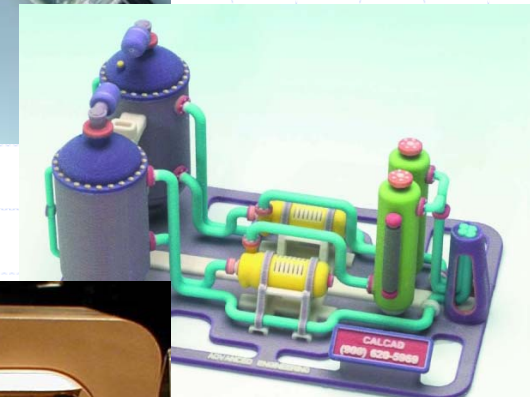
Layer-by-layer fabrication of three-dimensional physical models directly from computer datasets



- Stereolithography
- 3D Printing

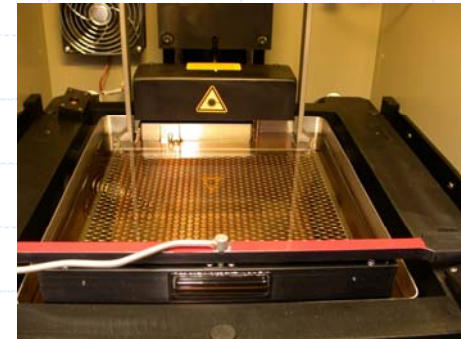
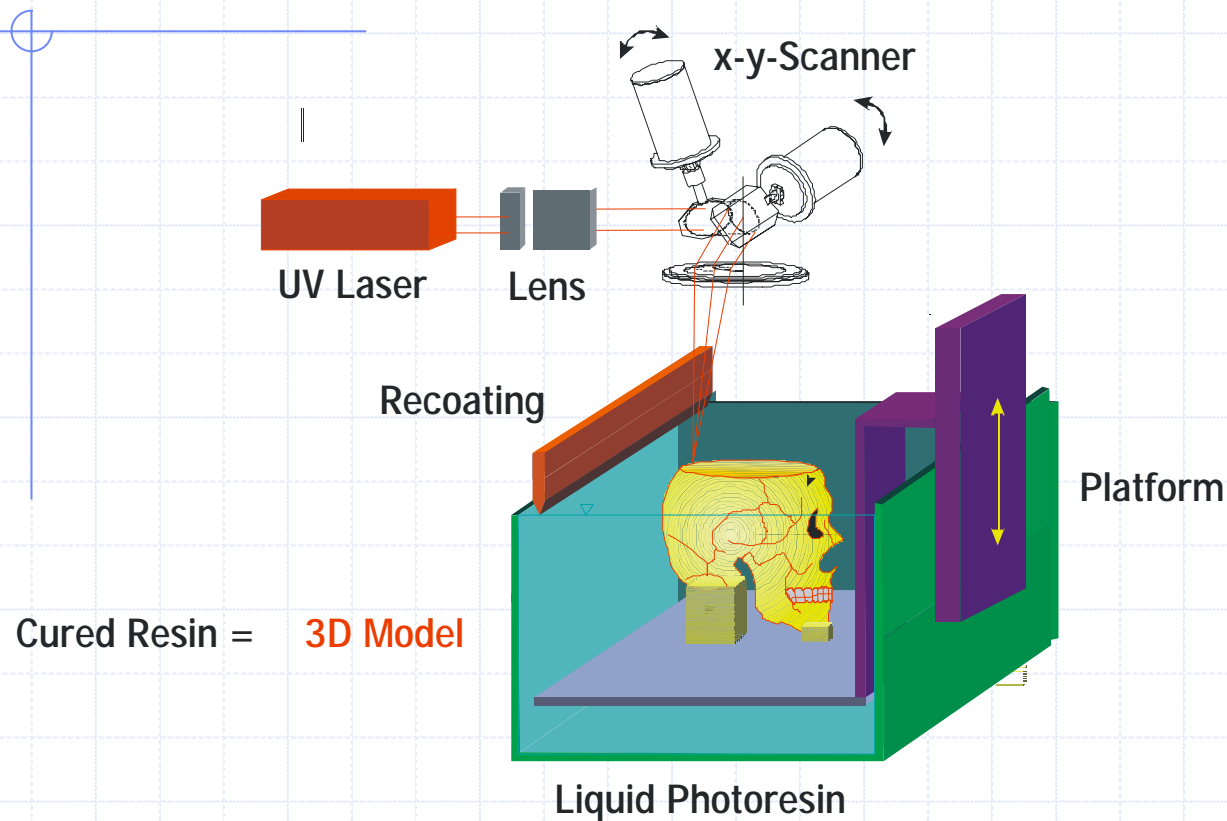
Application of RP models

- Concept models
- Functional models
- Tooling
- Casting
- Manufacturing



Source: www.cadcamnet.com; Phonak AG, Phonak Schweiz

Stereolithography



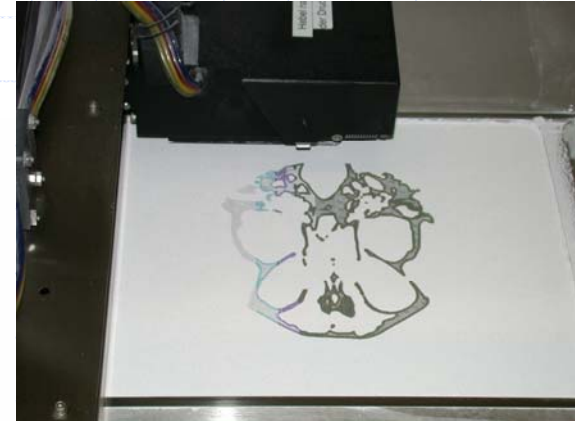
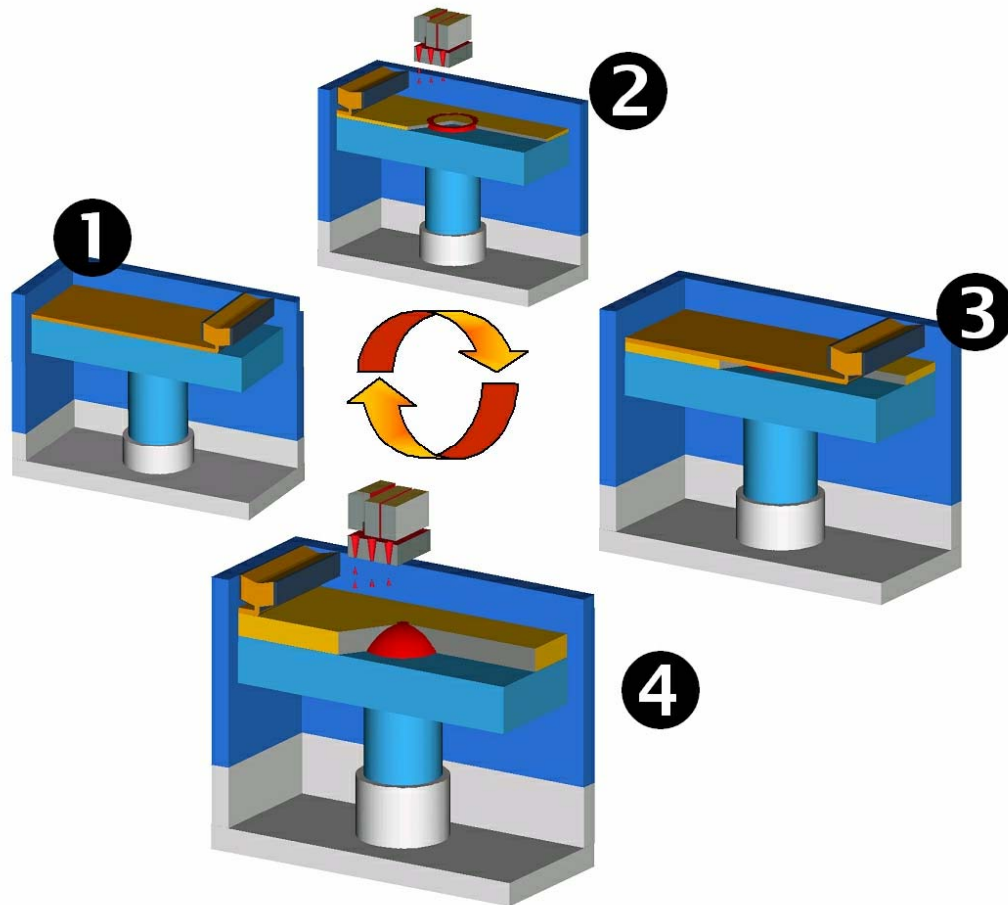
VIPER Si, 3D Systems

- High resolution and standard SLA (1 - 250 μm^3)
- Smallest feature < 20 microns

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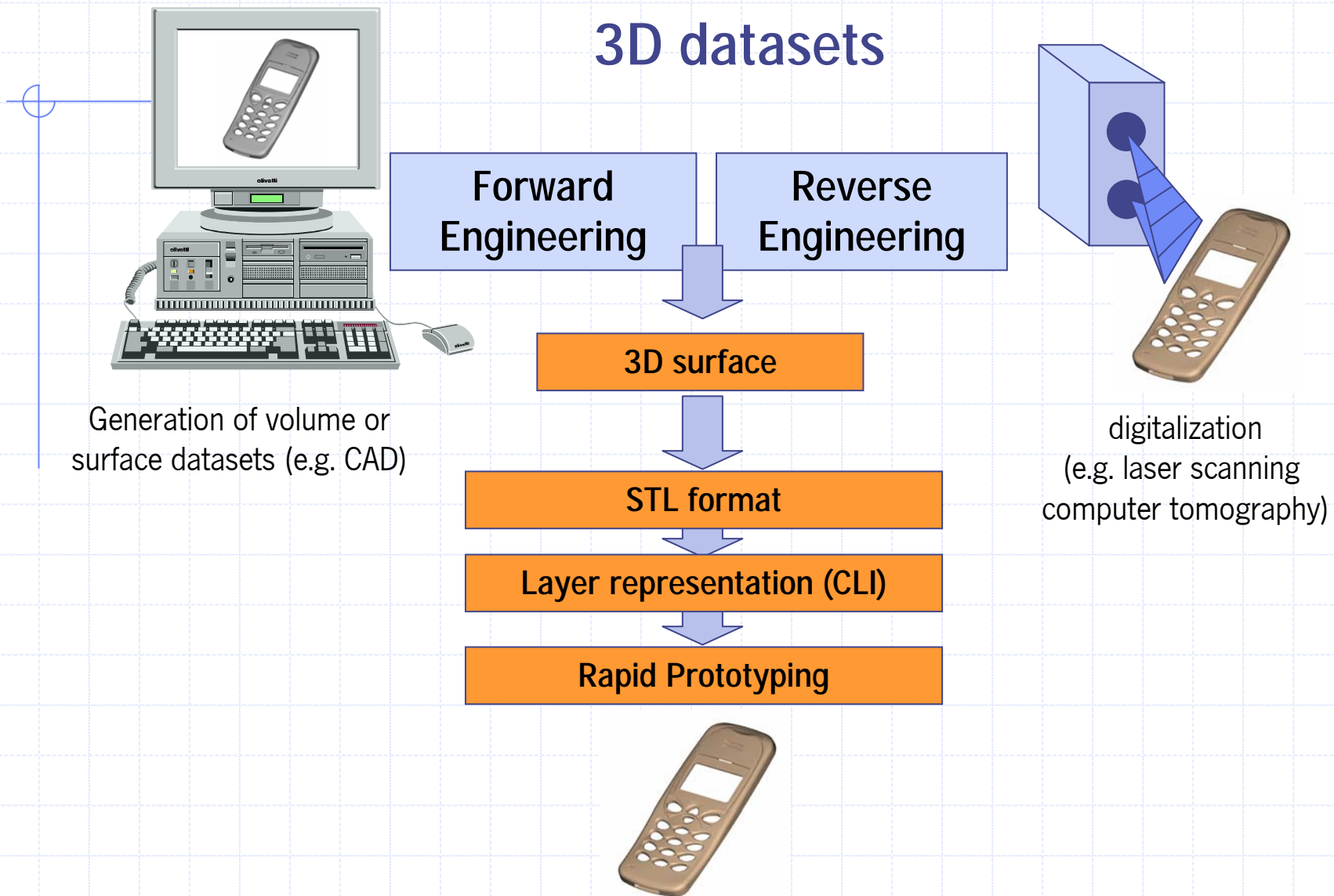
- Plaster material
- Color printer

3D printing



Z406, ZCorp

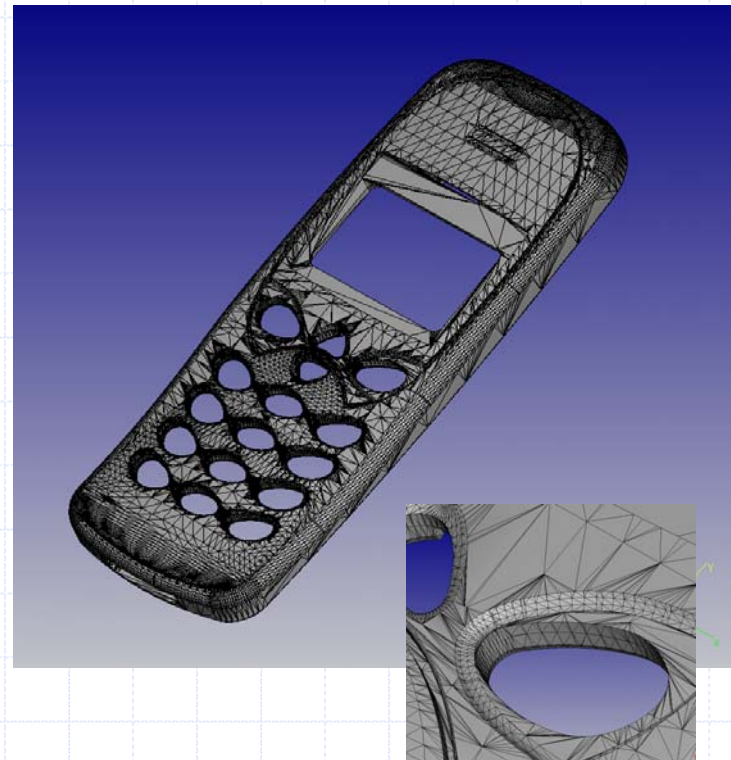
Acquisition of 3D datasets



Volume representation and triangulation (STL)

STL

- facet based surface representation
- approximate surface/solid entities
- list of facet data (unit normal plus three vertices)



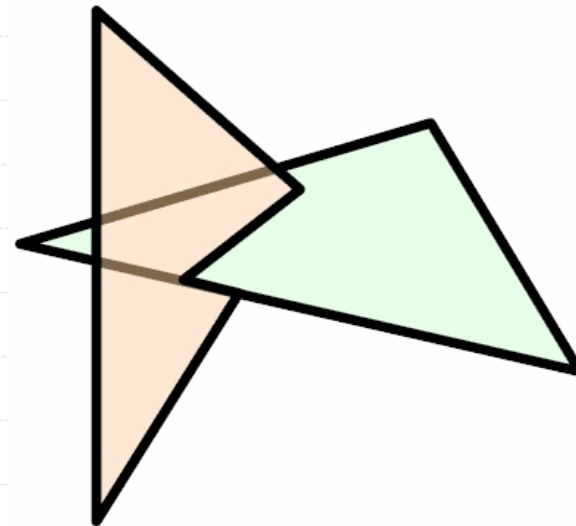
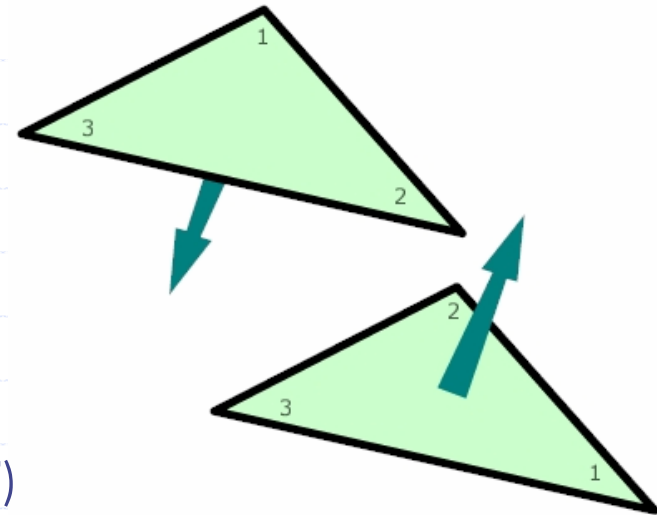
STL errors

known problems:

- closed surfaces („leaky” models)
- triangle logics errors
- (“flipped triangles, bad edges, contours, shells”)

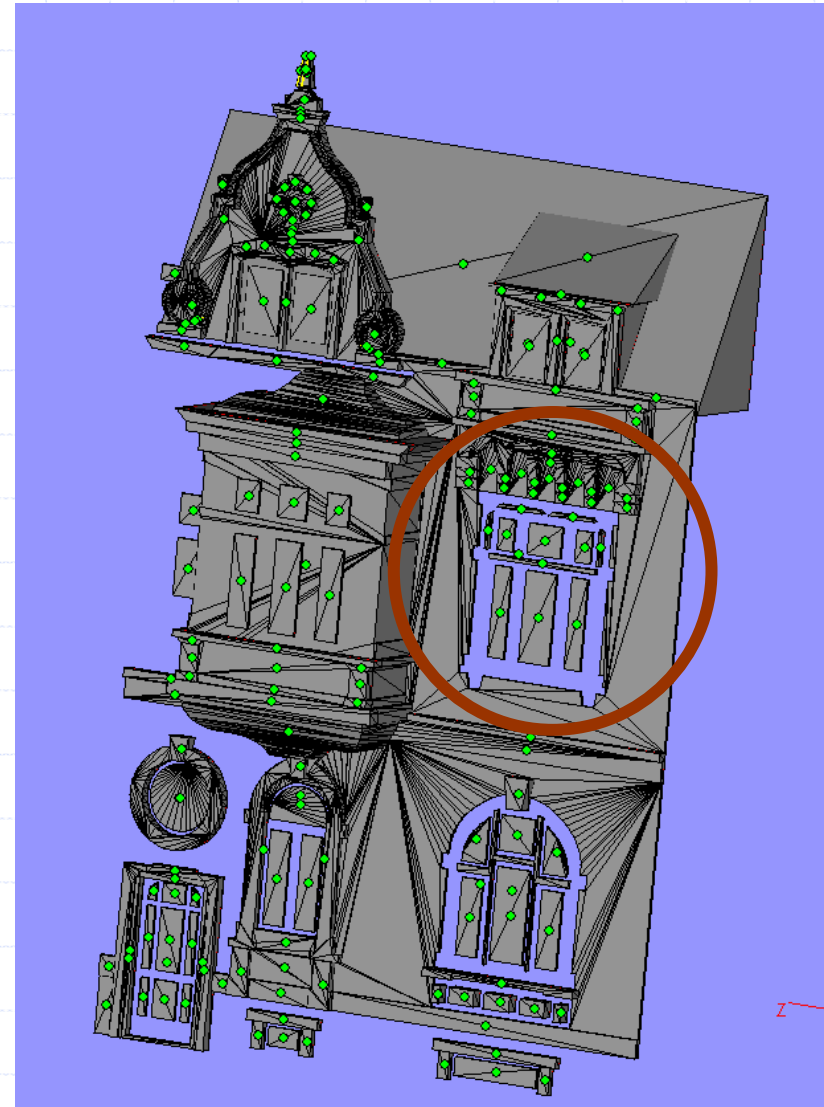
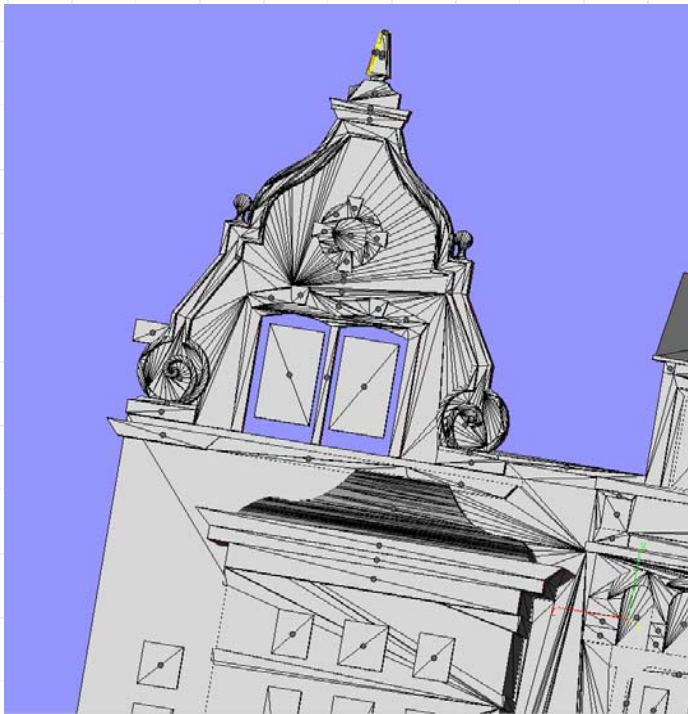
caused by:

- converter (export filter)
- solid model setup

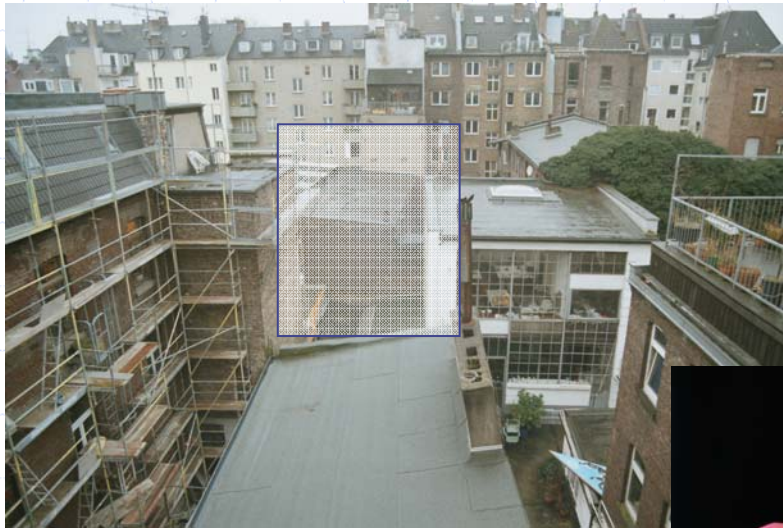


STL errors

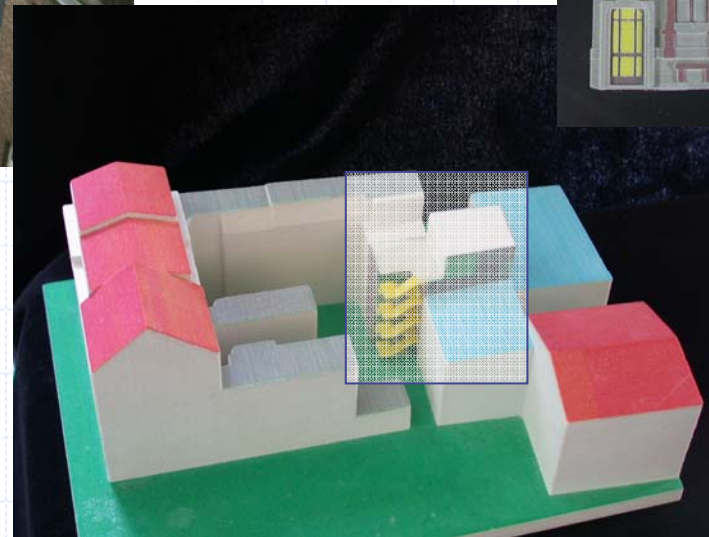
- Converted shell to parts



Architectural model – “Aachener Straße”

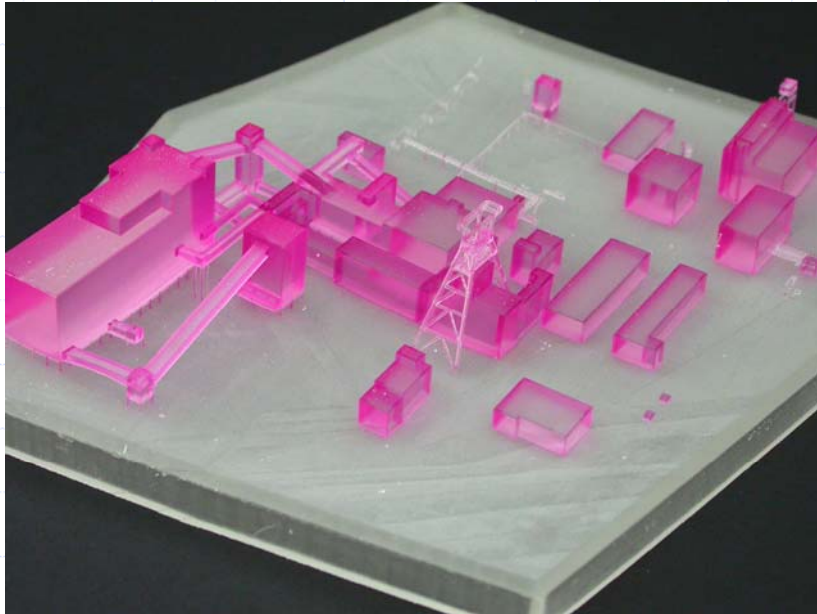


- Colored STL file
- 3D printing



Heinrich Geerling, architect, St. Augustin

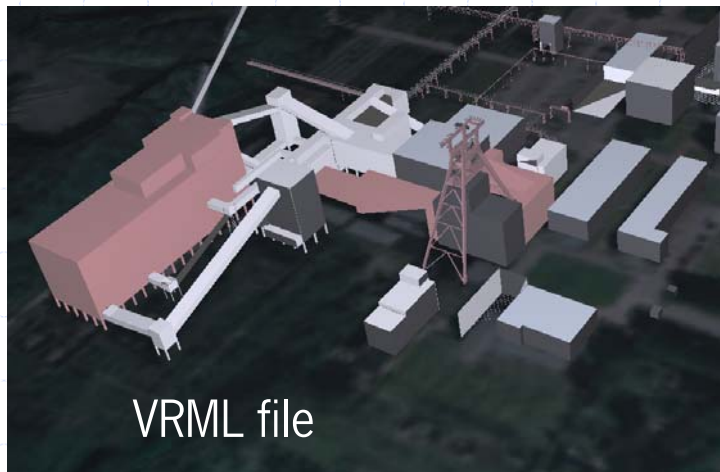
Digital terrain model “Zeche Zollverein”



stereolithography
model



Stadt Essen, Amt 62, Gruppe
Geoinformation



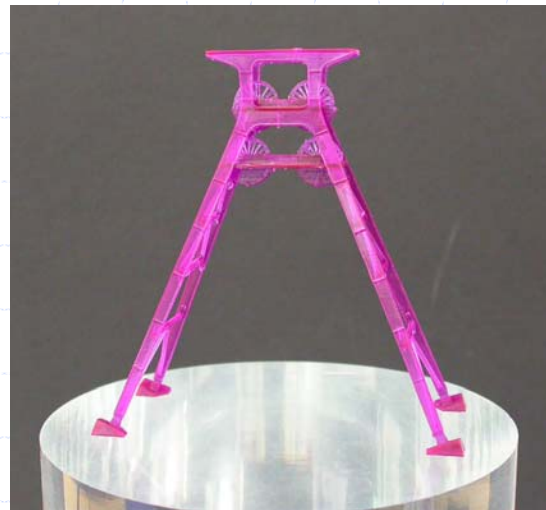
VRML file

3D printing
model

Winding tower „Zeche Zollverein“

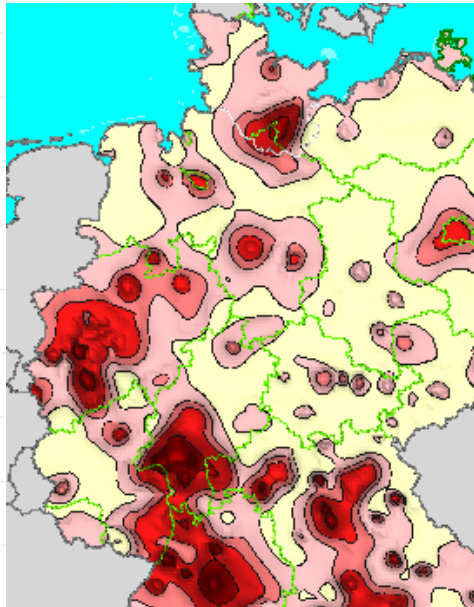


stereolithography
model



Stadt Essen, Amt 62, Gruppe Geoinformation

3D model – German building land prices



VRML file



3D printing
model

Bundesamt für Bauwesen und Raumordnung

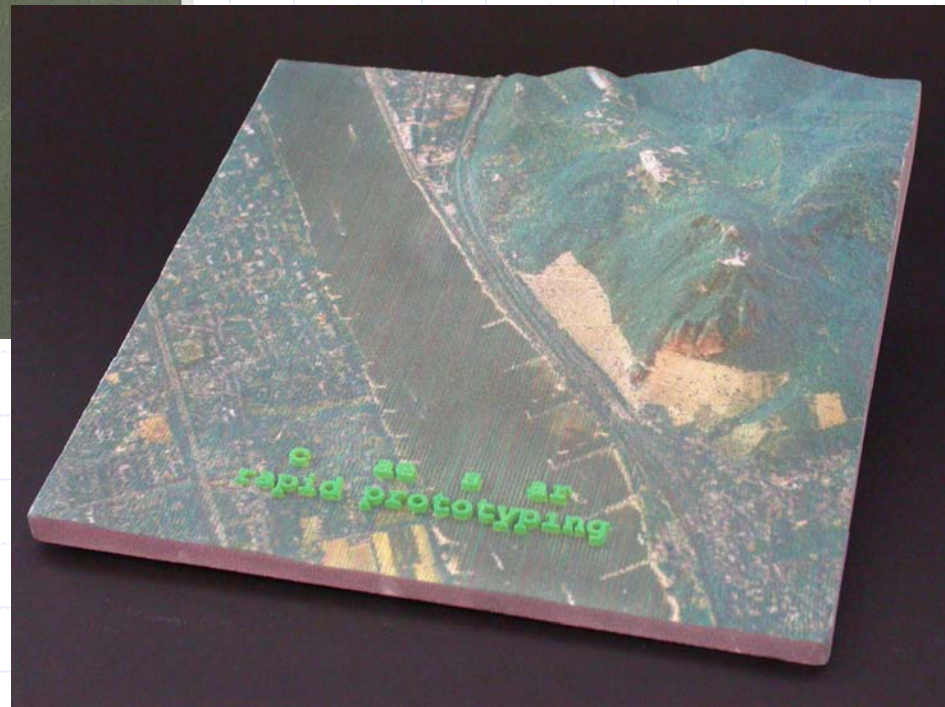
Digital terrain model “Siebengebirge”



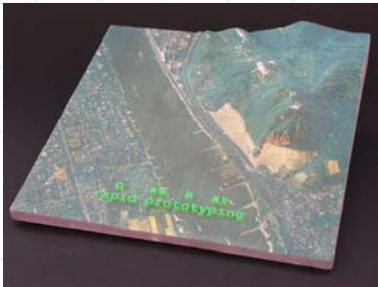
JPG, VRML file

Landesvermessungsamt Nordrhein-
Westfalen

3D printing
model



Rapid Prototyping – Pros and Cons

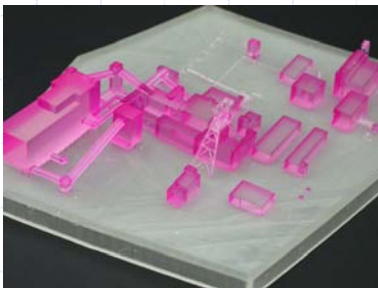


3D printing:

- + Full-color models
- + Fast, cost-effective technology
- Restricted stability

Use 3D printing for:

- Colored models
- Multiple replica



Stereolithography:

- + High precision + mechanical stability
- + Translucent material
- Expensive technology

Use Stereolithography for:

- High quality replica
- Small feature preservation

Advertisement ;-)

Currently we offer commercial services.

- service bureau for prototyping and small series production
- product label – **3mat**



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tille@caesar.de