

PRESS RELEASE

Three-Dimensional, Colored Facade Elements Made of Metal Expand Design Possibilities for Architects

The facade defines the first impression of a building. Is it worth taking a closer look? Are there elements that set it apart from its (built) surroundings? Even small design accents can make the difference between 'attractive' and 'does not appeal to me.' The Fraunhofer IWU now offers a solution for architects and builders who seek equally appealing and cost-effective options: striking facade elements with reliefs that have nearly limitless shape and color possibilities and do not require expensive forming tools.

Whether for private, public, or commercial properties, incrementally formed facade elements are worth considering. The process is suitable for creating larger and smaller metallic elements in the outer shell. At the new forming portal of the Chemnitz Research Institute, currently the largest facility of its kind in Germany, steel and aluminum sheets with dimensions of up to 4 x 2 meters and a 'bulging' depth of up to 75 centimeters can be shaped into almost any form. Fraunhofer IWU teamed up with facade builder Wirth & Co. GmbH and coating specialist WOBEK-Design GmbH to develop example elements in a joint project to demonstrate the technological possibilities. They decided to use the shape of a fish in several color variations.

Color: Enhancing Shape and Providing Weather Protection

The colored coating emphasizes the three-dimensional effect of the form and provides reliable weather protection. The side of the metal sheet opposite the forming tool (punch) first receives a form-stable, white powder coating. The subsequent application of a colored inkjet print is also elastic and is not damaged by the sheet metal forming. The coating process is complete when a UV-resistant clear coat, the only layer applied after the forming process, has been applied. It seals any areas of the painted surface that may have become porous due to the metalworking.

Incremental Sheet Metal Forming: Economically Unbeatable for Custom and Medium-Volume Production

In the forming portal, a 12-millimeter diameter punch gradually presses the desired shape into the sheet metal based on a corresponding 3D model. Complex geometries require a counterform on the back side of the sheet. The counterform's material can be inexpensive plywood. Instead of a counterform, manufacturers may also use another

Contact

Andreas Hemmerle | Fraunhofer IWU | Phone +49 371 5397-1372 |
Reichenhainer Straße 88 | 09126 Chemnitz | Germany | www.iwu.fraunhofer.de | andreas.hemmerle@iwu.fraunhofer.de |

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forming tool or a reusable pin cushion. The gradual forming process takes slightly more time but eliminates the need for the costly tools required in deep drawing processes. Using the example of the approximately 2-meter-long, 1-meter-high, and nearly 20-centimeter-deep fish, the project team calculated that up to a production volume of 185, incremental forming is more economical than the significantly faster deep drawing.

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Perfect System Solutions

The researchers are also considering fastening requirements to avoid unnecessary limits to design possibilities and account for the trend towards closed, energy-efficient facades. A further IWU team has proposed bonding elements made from inexpensive plastic granules, allowing facade elements to be attached to curved surfaces. However, the possibilities do not stop there: this team also manufactures entire facade elements made of plastic. Granulate-based 3D printing is making its way into facade construction (Press Release).

Wide Range of Other Applications

The new portal facility also enables and simplifies the production of parts for which no forming tools are available. This is often the case with historic vehicles, as manufacturers are typically not required to keep expensive pressing tools available beyond ten years after production ends. Artistic creativity can also be cost-effectively 'shaped' with incremental methods: Several inquiries have already reached the Fraunhofer IWU.

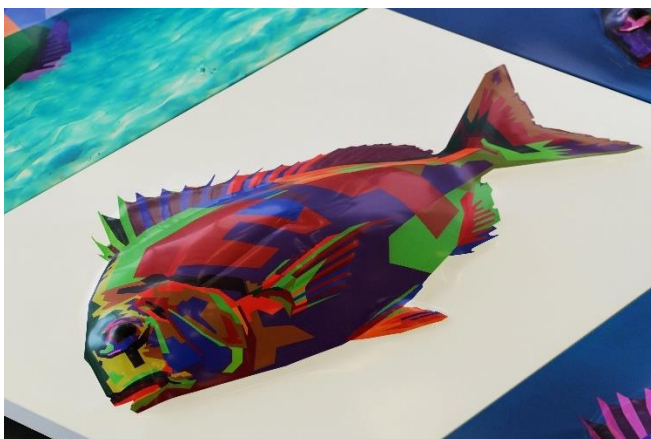


Abb. 1 The three-dimensional effect of the relief depends on several factors: the distance of the viewer, ...

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**Abb. 2 ... the color design
of the main motif and
surroundings, ...**
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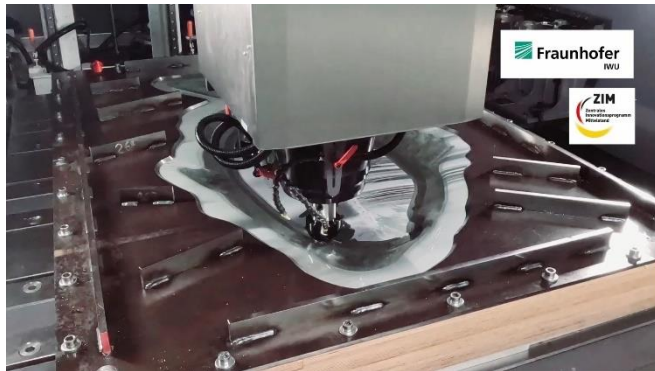


**Abb. 3 ... and, not least,
the viewing angle.**
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**Abb. 4 The new
Incremental Sheet Metal
Forming Portal at Fraunhofer
IWU.**
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**Abb. 5 In time-lapse:
Incremental Sheet Metal
Forming (available online as
a video)**
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