

# ANALYSIS FOR THE BEHAVIOURS OF THE COMPOSITE STRUCTURE “CORE METAL ALLOY”

L. Müller<sup>1</sup>, J. Wellnitz<sup>2</sup>

<sup>1</sup>*Private Institute for Technique and Artistic Design, e.V. Marie-Curie-Straße 6, 85055 Ingolstadt, Germany*

<sup>2</sup>*University of Applied Sciences, Esplanade 10, 85049 Ingolstadt, Germany*

Lightweight design is a philosophy of gaining maximum weight reduction. Especially in times of raising ecological damage, R&D are on their way to find lighter constructions.

The way on the one hand leads through constructive weight optimisation on the other hand through developing totally new materials. Variable sandwich- and laminate-structures combine different materials for creating optimised material behaviour.

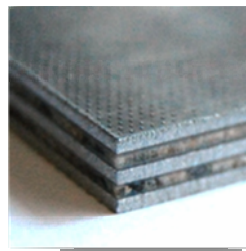
Earth is a terrestrial planet, meaning that it is a rocky body. It is the largest of the four solar terrestrial planets, both in terms of size and total mass. Therefore stone as a new “material” is very close.

Natural stone itself is quite brittle and guaranteeing high compression strength. Including it into a flexible and tensile strength guaranteeing material, such as metal, leads to the creation of a new laminate, “Core Metal Alloy”, a concept that combines thin layers of natural stone and metal.

The “ITD” and the University of Applied Sciences Ingolstadt in a while are intensively working on developing this brand new composite.

The main advantages are:

- high energy consumption,
- hot environment,
- fire Resistance,
- camouflage and design effects,
- noise insulation.



The current research is mainly working on running several tests. After the already graduated certification of resistance against class 4 shelling, optimizations concerning shelling and impact are scheduled. Among investigations of the influence of different types of natural stone also using different numbers and thicknesses of layers will allow for the shear stress content.

Therefore the ITD has built up a slow speed impact testing system for penetrating materials with different projectiles like ice, stone, chips and so on and a maximum of velocity of  $v=250\text{m/s}$ .

First tests on the Natural Stone Laminate can show the great energy consumption of that composite, that is on a higher level than most of the current composites.