

# Cold bonding of metals - better than welding?

## METALANGELO offers the solution!



The METALANGELO-system is a modular, **two-step joining-system** designed for mobile application in ship- and car manufacturing, aerospace as well as in equipment engineering in order to replace or to complement welding.

A mutual development from:



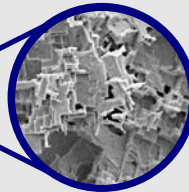
### 1 Surface structuring

The base of the METALANGELO-system is given by the **'Nanoscale Sculpturing'** process which is registered for patent approval.

Here, an etching process causes billions of barb-structures in the micrometer range on the aluminum-surface to be joined.

### 2 Bonding of the components

The second step contains the actual **bonding process** where the initially structured aluminum-surface is glued to the component to be joined. The special developed holder system allows an exact joining on the initially structured surface which causes ideal and reproducible gluing conditions.



#### METALANGELO

Adhesive connection  
with superb quality

#### JUNCTION

Mechanical interlocking of barb-  
elements with hardened glue

#### RESULT

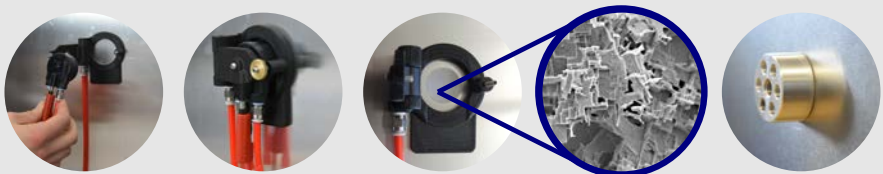
Heavy duty and durable  
adhesive connection

# Cold bonding of metals with METALANGELO

## The **ADVANTAGES** in overview

- 1 Area of application**  
curable and workhardened Al-alloys, also for non-weldable alloys like AA7175
- 2 High strength and calculable bonding**  
~ 500 kg shear-strength with 3.5 times safety (for an area of 6 cm<sup>2</sup>)
- 3 Perfect Bonding**  
Spot-fidelity between structured surface and bonding, defined gap etc.
- 4 Optically attractive bonding**  
no weldseam, no postprocessing necessary
- 5 Easy to handle**  
due to partial automatisisation, no professional knowledge necessary
- 6 Modular system**  
compact and light-weight (size around 0.9 m x 0.5 m x 0.3 m, 30 kg)
- 7 No thermal load of components**  
no heat affected zone, no component distortion etc.
- 8 No welding related problems**  
no hot cracking, no pore-formation in the weldseam etc.
- 9 Usable at hard to access areas**  
like edges or over head-positions
- 10 Already lacquered or coated areas**  
can be processed by METALANGELO

The METALANGELO-system, which is registered for patent approval, is a collaborative development from scientists of the working group Functional Nanomaterials from Kiel University and the scientific team of the Phi-Stone AG.



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