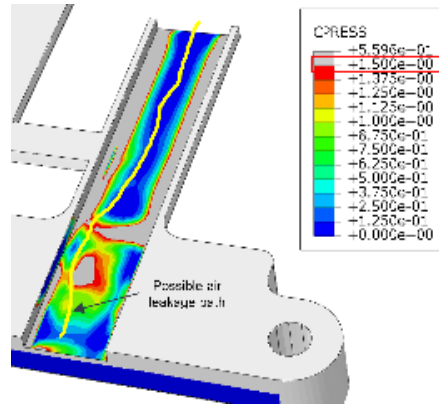


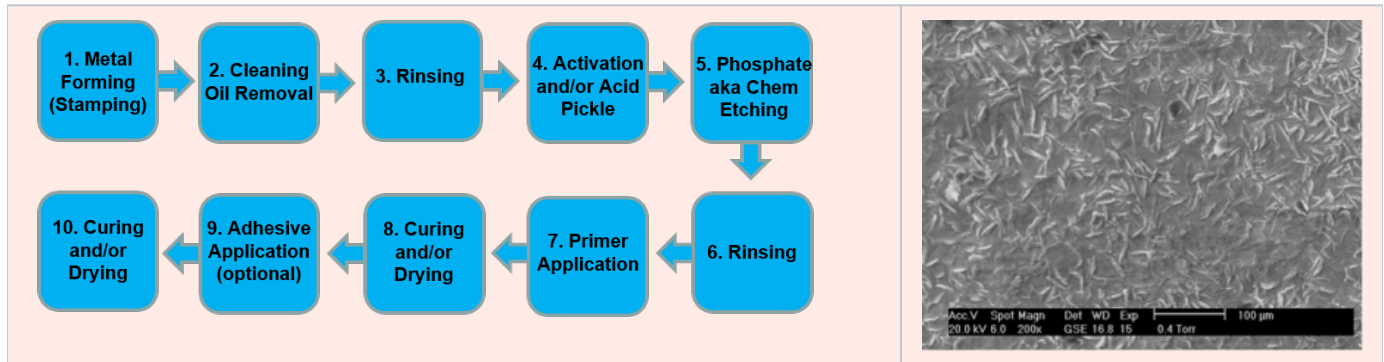
# Adhesion to metal and tightness

The adhesion of the overmolding plastic with the substrate is of course usually a relevant requirement in many applications. The issue is that the adhesion of a molten plastic with metal in structural applications is poor (close to 0 if no treatment) leading to a poor (or inexistent) tightness. This is illustrated [here](#) through the use of Virtual Engineering on some basic designs.

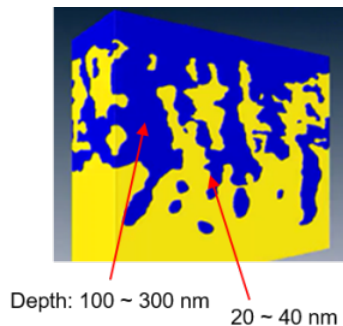


Depending on the nature of the polymer and those of the metal substrate, a specific treatment might be applied to trigger the adhesion.

Some internal studies have shown that a good adhesion between our **Tecnoflon FKM** and metal can be obtained during molding and curing provided a specific metal surface treatment and the use of a primer. This is well documented in this [presentation](#).



For applications in which the adhesion between a **thermoplastic** and a metal is requested, a chemical etching process might be applied on the insert with the objective to get a "nano/micro-mechanical locking". The *Nano Molding Technology* (NMT- [one slide](#), [NMT- thesis](#)) developed and patented by Taisei Plas (Japan) was successfully used these last years by some of our customers for E&E applications. In order to get an overview about the current performances of this treatment, an internal study has been performed using copper, aluminum, stainless steel and magnesium with the "NMT mold" available at Alpharetta. The results are presented [here](#).



There are alternatives (to the NMT) like the AMALPHA process from MEC (<https://www.mec-co.com/product/amalpha/en/about/feature/>) or the TRI SYSTEM from Toadenka in which a nanofilm formed by a surface treatment of the metal enables a very good adhesion when overmolding. A short study was performed to compare these three etching techniques, still with the NMT mold in Alpharetta - [document](#).

Some coatings (torlon, addibond) have been tested as well, on an exploratory basis and without an "extended approach" using both the so-called NMT mold ( [lap shear results](#) ) and the busbar mold in Alpharetta ( [tightness measurements](#) ).

