Pretreatment of surfaces to be bonded

Generally, metals have good adhesion properties thanks to their high surface energy, with the exception of aluminium, chrome, magnesium and nickel as well as divers alloys. On these surfaces, high adhesion strength, as well as aging resistant bonded compounds can only be obtained after a preliminary treatment of the surfaces. Examinations referring to the long-term stability of bonded aluminium compounds have shown that a uniform adhesion of adhesives with aluminium alloy (initial state: rolled, drawn, founded or forged) was not aging resistant without a preliminary treatment procedure, particularly with PUR-/epoxy-adhesive systems. On aluminium alloys, MS/STP-adhesives have a good strength after a pre-cleaning with COSMOFEN 60. The main causes for the lack of adhesion strength of the adhesives are thin oxide films, release agents and lubricants, cutting oil, etc. due to the production process. In order to obtain optimal adhesion properties on these surfaces, such remainders must be removed before you start to bond.

- Mechanical methods of surface preliminary treatment (grinding, brushing, compressed air streams) first cause abrasion and therefore a fresh and chemically more active surface. But analytical evaluations show that this activation is not sufficient for permanent aging resistant bonding. Furthermore, due to the mechanical method of pre-treatment on the complete surface, there is a risk that in some places impurities are spread on the surface and this would altogether worsen the adhesion properties.

- Degreasing/de-oiling of the metal surfaces with the usual solvent cleaners is not sufficient, too.

- As we have decades of experience, supported by different investigations, e.g. of universities, we consider that the best possible preliminary treatment of aluminium alloys before bonding is chromate- or phosphate coating or anodic treatment (attention: without oil/wax). The diversity, the age, eventually the additional treatments like oiling/ waxing of Eloxid aluminium surfaces do not permit a general statement concerning the wettability/ gluability of these adherends. Furthermore, with chemical pre-treatment methods, such as corroding in chromosulfuric acid or caustic soda solution, you can also obtain optimal results.

- Another method is permanently successful as well: The use of „wash primers“ for the surface pre-treatment can also be recommended (2-part primers, self-corroding). But we would like to point out that here especially the „chemistry of primers and adhesives“ should be taken in account, as priming can have a lasting influence on the characteristics of the adhesives.

- As alternative to these „wash primers“, you can also sound out the technical application possibilities and carry out tests with the primer system COSMOPLAST 1618 to be used for the pre-treatment of bright aluminium surfaces.

- As a further reliable method of preliminary treatment for the bonding of aluminium surfaces, different powder coatings have proven successful for years (Basis: polyester lacquer, epoxy lacquer, PUR- lacquer); but here, we would like to point out the subject matter e.g. of paraffin-/wax parts or also polytetrafluoroethylene (PTFE) parts which can be contained as additive, and therefore can perturb the wettability of the surfaces to be bonded. In principle, these surfaces should be cleaned with COSMOFEN 60 before bonding. Powder-coatings with PTFE-parts cannot be bonded reliably without a preliminary treatment (e.g. plasma process).

Stainless steel – advice: For the production and processing of stainless steel, such additives like wax, oil, etc. are frequently used. Usually, you cannot just wipe clean these additives. In this case, it has arose that you can clearly improve the bonding results, if you first clean with a solvent cleaner, then grind or better sandblast the surface, and after this clean again with a solvent cleaner.

In any event, directly before starting with priming, the surfaces to be pre-treated should be cleaned from impurities, dust, grease, etc. e.g. with COSMOFEN 60.

As it is difficult to distinguish aluminium surfaces and qualities (bright or pre-treated), we recommend you to principally first ask your supplier to furnish you with sufficient information, so that you can then decide for the best suitable and optimal preliminary treatment. At all events, sufficient qualifying examinations are meaningful/necessary.
Metal bonding under the influence of humidity

Depending on the material consistence of the surface, metals are not protected against corrosion (due to the influence of humidity). A lot of adhesive systems, e.g. 1-part- and 2-part- COSMOPUR adhesive systems, are themselves non-corrosive after the hardening up. These adhesives are resistant against the „normal“ influence of humidity and they hardly lose their compound strength. But they partly absorb moisture and can retain this (if aeration is not sufficient), so that the retained humidity („stagnant humidity“) in the adhesive has a long influence on the bonded surfaces, and this can cause the metal corrosion.

- For the bonding of metal/metal, the surfaces to be bonded have to be sealed/protected against the influence of humidity, therefore use a suitable sealing compound!
- When bonding metals with absorbent materials (e.g. wood, building materials, etc.), humidity may be slowly transported to the metal surface through the absorbent material and through the glued joint. This may cause metal corrosion → in that case the metal surfaces should have a corresponding protection against corrosion, e.g. a lacquer layer or a powder coating!
- Galvanized sheets have principally to be protected against long-lasting influence of humidity, in order to avoid the formation of „white rust“ → here you must take care that no humidity reaches the corresponding surface during the bonding!
  (Also look at: www.rheinzink.de, www.otto-wolff.de)

For questions or wishes or advices concerning this important matter, our application technique is pleased to be at your disposal (direct dialling: (+49) 2773 / 815 – 274).

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