Effects of surface treatments on adhesion to metals

By Brian Knight

We have performed tens of thousands of adhesion tests over the years and many of these tests were done on metal surfaces. Below is a summary of tests done on a variety of metal surfaces and done with a variety of surface preparations. As you look at the chart, notice the surface preparation that gives the highest number.

All the tests shown below were performed using a PATTI (pneumatic adhesive tensile test instrument) meter. We chose this test method as our default adhesion test method about 14 years ago because it yields consistent results, is relatively easy to perform, and is economical. The results shown below show the tensile strength of a glue-joint. Not all joints are stressed in tension, so consider the data to be comparative, not a specification.

Most of the tests were done with WEST SYSTEM® 105/205 or 105/206. Most were allowed a two-week room temperature cure before the test was performed.

Metal	Cleaning	Preparation	Tensile adhesion (PSI)
Copper	sand 80-grit	860 Etch A&B	1218
	sand 80-grit	860 Etch A only	1014
	sand 80-grit	wet sand	1503
	sand 80-grit		1065
Aluminum 2024 T3	sand 80-grit	860 Etch A&B	1477
	sand 80-grit	wet sand	1330
	sand 80-grit		1126
Steel	sand 80-grit		1320
	sand 80-grit	wet sand	1352
Lead (pure)	sand 80-grit	wet sand	2753
Cast Iron	sand blast		3214
	sand 80-grit	wet sand	3970
	sand 80-grit	860 Etch A&B	2334
Stainless Steel 316	sand 80-grit		957
	sand blast		974

wet sand refers to sanding the fresh epoxy into the surface with 100-grit paper.
860 Etch A&B refers to surface preparation with the two-step WEST SYSTEM 860 Aluminum Etch Kit.