AST
ADVANCED SURFACE TREATMENTS

60 SECOND INSIGHT

ACID OR ALKALINE BASED SOLUTIONS?

This refers to the solution electrolyte of a given process. The same coating, for example Zinc electroplating, can usually be deposited from either an acid or an alkaline electrolyte solution. Although the chemical make ups between the two systems are complexly different, a fundamental difference that defines them is the either potassium chloride (acid) or caustic soda (alkaline) base in which they are blended.

Both solutions will result in the deposit of a Zinc metal layer, and as such both layers will share many similar properties. For example both will corrode in a similar pattern and achieve similar corrosion protection per micron. However, despite these similar properties these different electrolytes do produce alternative characteristics that do ultimately have a profound effect on the final aesthetics and functionality of the coating. Both systems have their positives and their negatives depending upon the intended use of the component. This means that due consideration must be given to the type of plating solution used to obtain a coating if potential problems are to be avoided in further manufacture, assembly and/or service.

A common example here is the uniformity of the coating. Acid based coatings deposit much quicker than alkaline ones with a plating efficiency of close to 100% compared to alkalines 50%. However, this accelerated deposition of acid solutions occurs in a much more erratic pattern. This means acid plated layers have a much greater variation in the layer thickness, where it would not be uncommon for even small parts to show a spread of up to 40 microns between lowest and highest readings around a target thickness of 20 microns. This can be of particular detriment to threaded components were this spread can be magnified by a further 400%.

Throw and coverage are another common difference and area of confusion between these two processes where they are reversely proportional. Acid provides greater coverage with reduced throw, whereas alkaline shows an almost exact reverse. Coverage is best described as the ability of the coating to deposit in low current density areas, regardless of thickness achieved (usually minimal). Throw is the ability to deposit the required, uniform thickness as far as possible (usually not reaching as far). This provides a further link with distribution properties as when the acid system continues to cover into the low cd area it continues to deposit in the high cd at almost a rate of 4:1, alkaline solutions distribute evenly at 1:1.

The tables on the right highlight some of the key benefits of each of the acid and alkaline electrolyte systems as a summary, however if you need any further detail or specifics to a certain component then we are here to help.

ACID PROCESSES
BRIGHTER APPEARANCE
QUICKER COATING DEPOSITION
GREATER COVERAGE
ABILITY TO COAT CAST IRON AND HARDENED STEEL SUBSTRATES
REDUCED HYDROGEN EMBRITTLMENT RISK

ALKALINE PROCESSES
UNIFORM DEPOSIT THICKNESS
BETTER THROWING POWER
GREATER COATING LAYER DUCTILITY
LESS TENSILE STRESS
REDUCED THREAD FILL
IMPROVED IMPACT RESISTANCE

bsi
ISO 9001 Quality Management Systems CERTIFIED
ISO 14001 Environmental Management CERTIFIED
IATF 16949 Automotive Quality Management CERTIFIED
ISO 45001 Occupational Health and Safety Management CERTIFIED

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