Selective GST anodising in the first ring groove (left) and partial GST anodising of the piston crown (right)

Selective iron plating on aluminium – to give improved wear characteristics and longer lifetime

Selective surface treatment, by now a technology of proven efficiency, combined with our GAMMAT® concept, has pushed back engineering horizons, especially for surface treatment of mass-produced parts such as automotive pistons. Instead of moving a large number of work pieces from one large open process tank through a series of tanks for surface preparation, activation, rinsing, plating, rinsing and finally drying, the GAMMAT® concept of surface treatment involves transportation of small volumes of process chemicals to each individual work piece, within a closed chamber. The delivery of a variety of process chemicals to a single closed processing unit is made possible by a unique, patented distributor system.

In addition, Gramm Selective Technology (GST) makes selective surface treatment of high quality possible at high processing speed and low costs. The GAMMAT® concept can be integrated into existing manufacturing process lines, and the result will be increased productivity and lower production costs, thanks to the small footprint of the GAMMAT® units, their low emission of chemical fumes and high efficiency (they are easy to integrate into a fully automated handling system). The GAMMAT® concept has been designed for surface treatment by industries using aluminium and its alloys as base material.

Example: GAMMAT® vario HA 10.2.1
Selective anodizing of the first ring groove of pistons, with automated transportation and handling. Capacity: 20 pistons at once, each processed individually.
GAMMAT® vario HA10 is a fully automated hard anodising (HA) system with a capacity of 360 to 600 pistons per hour, involving hard anodising of the first ring groove and taking up no more than 24 to 36 m² of production space. Cells are adapted to the type of piston to be coated. All necessary chemicals are delivered to the cell from reservoirs in a closed system. Piston transfer into and out of the cell is fully automated. No chemical fumes are emitted into the environment because each piston is immediately clamped and an electrical contact established. Between 5 and 8 stages are typical of the GST surface treatment process. Naturally, pistons requiring so many processing stages could be expected to take a long time to go through the system. However, GST uses a high speed electrolyte (ECOLYT) that makes it possible to reach a coating thickness of 15 µm in 60 seconds, compared to 45 – 60 minutes in conventional anodising technology. When pistons are anodised using conventional technology, there is always variation in the coating quality (film thickness and surface roughness) because the processing parameters vary considerably. In contrast, GST ensures an identical processing environment (temperature, flow rate and hydrodynamics) each time a piston is being anodised, and so there is no variation in thickness and surface roughness from piston to piston.

**First ring groove of a piston, anodised**

Electrolyte ECOLYT HA 98.9
Thickness > 15µm
Hardness > 350 HV 0.01
Roughness Ra < 1µm

Roughness Ra 2µm
Roughness Ra < 0.5 µm

**The Gramm service**

Design and manufacture of plant and equipment for closed galvanic systems
- GAMMAT® vario for fully-automated selective coating
- GAMMAT® CBS – Chemical treatment points

Development of customer specific
- Surfaces
- Coating systems
- Electrolytes

Types of contract
- Job-shop plating
- Operator models

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