More efficiency

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Micro-layer corrosion protection systems for use in the automobile industry are not only required to be high performing, environmentally compatible and globally available. In a difficult market environment with increasing pressure of costs for all market participants, efficiency and economy are decisive factors.

The automobile industry is currently in a state of upheaval and is undergoing a process of realignment. Where the established European and US volume manufacturers are implementing cost reduction programmes and are often only capable of defending market share with the aid of drastic discounts, on the other side of the world new automobile brands and market leaders are being established. Toyota will shortly assume the position of global number 1. The company can already be seen to be challenging for technological primacy in a number of areas. A global brand is emerging in the low-price segment, in the form of Hyundai. A number of established car manufacturers are also placing their number two brands in the low-price segment. And experts await the next global low-price brand from China.

The global production and global purchasing of the OEMs also requires a common global quality standard for all built-in components. And this is not the end of the

developments: environmental standards are also to be standardised in the medium term. An initial example of this is the European end-of-life vehicles directive. Although only valid within the EU, it has an influence on motor vehicle manufacturing worldwide. After all, cars are not produced solely for the domestic market, but in order to be sold globally. In addition, Japan, Korea, China and a number of US states have similar directives. It is apparent in this that the automobile industry is also undergoing consolidation with regard to environmental protection matters and the markets have already reached a stage where they are impossible to distinguish from one another.

Global alignment on quality and environmental protection

For suppliers such as the manufacturers of coating systems this process of realignment in the automobile industry brings with it consequences - for example with regard to quality assurance. To be capable of guaranteeing the quality standard of its products around the world it is also necessary for them to be represented globally. However, this means more than merely having the products on site at the right time and with the desired level of quality. For example, the high standard of quality is not only derived from the product itself, but also to a significant extent by the coating process. Careful selection of coating companies in the scope of a user licensing system can ensure here that an optimal standard of quality is provided wherever cars and their components are manufactured in the world. In this, the coating processes worldwide will be optimised continuously on site by employees in the form of product and process audits.

Quality assurance also means anticipating the future requirements of the market via active innovation. The growing requirements of zinc flake systems and the increasingly strict environmental conditions set the standards in this. The increasing standardisation of parts - e.g. screws fitted in a car - require coating firms to possess allround qualities: in addition to high corrosion protection, a specific friction co-efficient, high chemical resistance, temperature stability at 200°C and trouble-free installation with a variety of surfaces are also required.

The Chrome(VI) question was yesterday

Environmental protection requirements are also developing continuously. With regard to health-endangering heavy metals, following the transition with Cr(VI) materials previously viewed as alternative are finding increasing use, including Cr(III), Mo(VI), Co(II) and nickel. In the long term, only those systems will persevere that contain little or no hazardous Cr(VI) replacement. Dörken MKS-Systeme GmbH & Co. KG, Herdecke, addressed this situation at an early stage, working continuously towards "anticipatory" problem solutions. For example, a new corrosion protection system for brake discs also meets the requirements of other environmental directives such as surfactant guidelines or the conditions of REACH, with air drying also generating savings in the application process.

Systems in benchmark testing

Complex industries with high quality requirements such as the automobile industry are increasingly turning to zinc flake or galvanic zinc-nickel systems for corrosion protection. In particular, connecting elements - i.e. also safety-relevant components of vehicles - are increasingly utilising zinc flake systems. There are a number of reasons behind this:

The strict selection of appliers of zinc flake systems in the scope of the previously-mentioned licensing system and the frequent practice of naming zinc flake system manufacturers in automobile specifications enables a globally standardised quality standard to be provided - in contrast to other systems. A further argument in favour of the zinc flake system is the avoidance of hydrogen-induced stress cracking corrosion in application. In contrast, the application process with galvanic coats leads to the inclusion of hydrogen. The latest investigations of the Zentralverband Oberflächentechnik (ZVO) show that the formation of brittle fractures cannot consequently be excluded [1]. The toxicological dubiousness of nickel - and nickel dust in particular - means that the medium-term future of high nickel content coatings (zinc-nickel contains 12-16% nickel!) remains questionable. In addition, the problem of contact allergy (zinc-nickel allergy) is being increasingly debated.

Cost pressures make efficiency essential

However, the market does not consist solely of quality and environmental regulations, there is also the general pressure of cost and subsequent decline in margins for the

companies in the market. This creates pressure for common efforts to be made in the development of systems that are increasingly more efficient. This means: corrosion protection systems are required to provide higher and higher quality at lower coat thicknesses or with a reduction in the number of coats required. This often leads to a significant reduction in process costs. As these constitute by far the largest cost factor in the coating process as a whole, at around 75 percent, the savings potential is highest here.

An efficient coating system, for example one that meets the required specifications without sealing, can bring with it a whole range of "savings factors". The lack of an additional coat alone can lead to material savings of up to 50 percent. This is joined by the time saving from the removal of a coating process with often complex change of material. At the same time, the removal of one coating and annealing stage leads to significant savings in energy. If further efficiency increases are to be achieved, then it is necessary to examine the plant equipment utilised in the application of the systems. This must ensure that the valuable materials are employed economically and the number of coatings kept to a minimum. This is often only possible via close co-operation between plant manufacturers, coating materials producers and coaters.

An excellent example

One example of increasingly efficient systems is that of zinc flake basecoats with integrated lubricant. Here the additional topcoat for the creation of the friction factor

required for screw connections is dispensed with. This saves the time and cost-consuming change of material as well as additional handling and process costs. Depending on which system design is compared, this corrosion protection system provides users with a cost reduction of up to 30 percent. For this reason, the DELTA-PROTEKT® KL105 system was awarded the Material Efficiency Prize 2006 by the Federal Ministry of Education and Research.

The success of the high-performance zinc flake micro-layer corrosion protection system is set to continue at a global level. More and more new developments in the increasing efficiency of the systems in conjunction with more efficient application technology are the keys to success here.

Literature:
[1] DGO Work group on hydrogen brittling, meeting of 23/11/06 in Zwingenberg, technical papers