

# High-performance Corrosion Protection

**With increasing requirements of quality, zinc lamella systems are also enjoying greater significance on the Indian market.**

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**“India is ... the next China!” With these words Dieter Zetsche, CEO of Daimler AG, described the prospects for one of the most interesting future global economic areas in November 2010. The fact that India has moved from being merely a sales market to a production location can be witnessed with a brief glance at two key industries: the automobile industry and the wind energy industry. At first glance, they appear to have little in common. However, for the developer and manufacturer of a micro-layer corrosion protection system, there are positive parallels.**

Fig. 1: Zinc lamella coatings are used on automotive fasteners worldwide

When India is mentioned as an economic location, thoughts still currently turn to motorcycles and affordable cars. This image has been enhanced in recent years in particular by the Tata Nano, which caused a stir a few years back as “cheapest car in the world”. The number of cars produced in India is set to quadruple in the next ten years, according to the estimates of the Society of Indian Automobile Manufacturers. In 2009 the figure stood at 2.2 million, with this expected to reach 8.7 to 9.7 million by 2020. And yet it is not only the production volumes that are rising, quality standards, too, are on the up. More and more Western car manufacturers are setting up their own operations in India and producing high-quality models. The necessary subcontracted parts are still imported at this time, but this can change rapidly, as the example of China shows. Global players such as the automobile industry are accustomed to purchasing locally and just in time - and the subcontracting industry will respond to this pressure.

Local manufacturers such as Tata and Maruti-Suzuki already have local sources; but further Western subcontracting companies will follow and set up operations in the vicinity of the production plants. This also applies to suppliers in the field of fastening and joining and - where these manufacturers do not have their own in-house coating operations - the coaters of these parts. One system for protecting the surface of connecting elements approved by all well-known automobile manufacturers worldwide is zinc lamella technology which, as has been the case in China, will have to be available locally in India in order to supply the OEMs on site.

## Change of Scene

The Indian market for wind energy plants is already booming and has therefore long been an attractive environment for Western companies with the corresponding know-how.

70% of wind energy plant construction in India is dominated by local providers, including Suzlon Energy, which has a market share of 47%. The company exports worldwide and is one of the top 5 wind energy plant manufacturers. Zinc lamella technology has long been used here, particularly in the fastening elements for rotor blade mounting.

## Key Technology for the Highest Demands

Zinc lamella systems, then, have long arrived on the Indian market and are the key technology for increasing requirements of quality in surface technology. As a rule, protective coatings are applied in coat thicknesses of between 6 and 25  $\mu\text{m}$ , enabling very high corrosion durability in salt spray tests. The product portfolio of the company includes both zinc lamella basecoats and organic and inorganic sealing systems. Since 2007, the EU Directive on End-of-life Vehicles has practically forbidden the use of heavy metals like known carcinogenic substances, chrome (VI). Worldwide, there are currently numerous components such as fastening elements, pressed parts, clamps, springs, side-impact protection units, and brake discs that are coated by licensees using MKS systems.



Fig. 2: The complete stud bolt set for the rotor blade connection in the wind turbine

## The Coating Systems

Generally speaking, the coating systems comprise a basecoat and an organic or inorganic topcoat. Depending on requirements, a basecoat may also be applied without a topcoat. Both basecoat and topcoat are annealing systems, chemically combined at temperatures of below 250°C. The DELTA®-TONE 9000 and DELTA-PROTEKT® KL 100 zinc lamella systems are largely inorganic, micro-layer-forming basecoats, on the basis of zinc and aluminium flakes. The metallic nature of these enables cathodic corrosion protection. The scale-like arrangement of the flake layers creates a barrier effect that significantly retards the onslaught of corrosive media (moisture and oxygen). A subsequent organic topcoat with DELTA®-SEAL or the silicate, water-based products of the DELTA-PROTEKT® VH 300 range serve to further enhance corrosion protection considerably. In contrast to the basecoat, the topcoat is not electrically conductive. Corrosion protection can be further enhanced with the aid of the topcoat. Depending on the choice of topcoat, further requirements regarding colour, temperature resistance, chemical resistance and defined glide and friction characteristics can also be fulfilled.

## Coating Technique

The selection of coating technique depends on the respective component. After a specific pretreatment the zinc lamella coating is applied using the standard application procedures of coating technology, followed by annealing in a tunnel furnace after each coating stage. The risk of application-related hydrogen embrittlement of high-strength components does not exist, as no hydrogen is present in the coating process. The focus is upon dip-spin applications for small mass-produced parts and the spraying method for larger components. Free-flowing components are dipped in the coating medium in baskets and then spun to remove excess material. This process takes place in enclosed coating facilities. The necessary coating parameters such as dipping time, spinning time and tilt angle of the unit are controlled with the aid of computers.

Coating and annealing typically occur several times in order to achieve adequate coverage of the material. Heavy, non-pourable parts can be coated using either the spin-coating procedure or via spraying. The spraying procedure involves both hand spraying and automated robot technology. Up to now, the zinc lamella system is showing its high degree of acceptance in the automobile industry. □