PRESS RELEASE

Small parts make the difference

Call for partners: high coating-rate vacuum deposition for small parts in big volumes

Bulk goods? – yes, numerous small parts in industrial manufacturing are produced and processed in such large quantities that we speak of them as bulk goods. Metallic fasteners like screws, bolts, and rivets fall into this category. Their use frequently remains unseen, and yet they play an enormous role in the manufacturing of industrial goods. The quality of a product can be measured by the quality of the fasteners used as well. Coatings for these kinds of fasteners improve their wear characteristics during processing as well as their operating life when they join parts together to form a whole.

The Component Coating Working Group of Fraunhofer FEP has long been dedicated to developing coating processes for these small parts based on physical vapor deposition (PVD). This development work has focused on fasteners for the car industry that are coated to inhibit corrosion. We have reached a point today when it is possible to produce 10 µm aluminum-based anti-corrosion coatings on small batches of fasteners in a roughly one-hour coating procedure. The technology has awakened the interest of industrial coating service firms that are involved with scaling up to actual industrial requirements. It has also been nominated for the 2015 Steel Innovation Award of the German Steel Association (Wirtschaftsvereinigung Stahl). The spectrum of research topics in this competition reflects the importance of light-weight construction techniques in industrial manufacturing and has reinforced the conviction of the developers that their process will become a component in producing new competitive products that allow dissimilar materials to be joined together using corrosion-resistant fasteners. In the transportation sector, especially in automotive manufacturing, the efforts to save weight and conserve natural resources have been unabated. This continuous evolution of components together with the use of new construction materials places new demands on fasteners and their surfaces. Besides corrosion protection, additional functionality is being demanded of coatings, especially for composite and dissimilar materials. For example, equalization of electrical voltages between various component groups is taking place via microcurrents across multiple component interfaces. This equalization benefits from minimum electrical contact resistances. PVD layers have proven themselves superior to other anti-corrosion coa-

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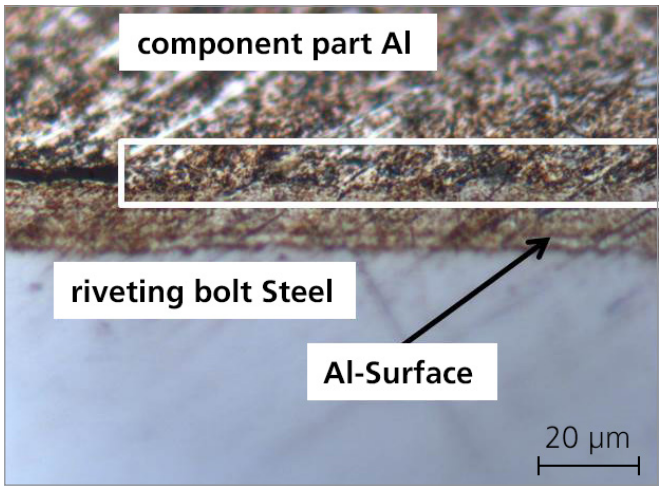
tings in this application. The PVD engineering facility at Fraunhofer FEP offers many options with respect to coating materials and coating buildup through a combination of various vacuum coating processes.

Together with the Work Group for Mechanical Joining under the Chair of Joining Technology and Assembly at TU Dresden, the Fraunhofer team intends to dedicate themselves in the future to further improving the electrical, mechanical, and anti-corrosion properties of coatings. Coating architectures with intermediate layers of a second metal can be realized for this purpose and their mechanical and electrical properties will be investigated in-situ. The Work Group at TU Dresden can produce joins using coated riveting components and subject the bonded joins to detailed characterization that includes electrical testing.

Both these research groups are now seeking industrial partners in order to merge both scientific and practical experience in applications-oriented projects and work in a goal-oriented manner on these complex problems jointly.

PVD-coated bolts and nuts



Quasi-metallic microcontact surface between a PVD-coated steel bolt and an aluminum component
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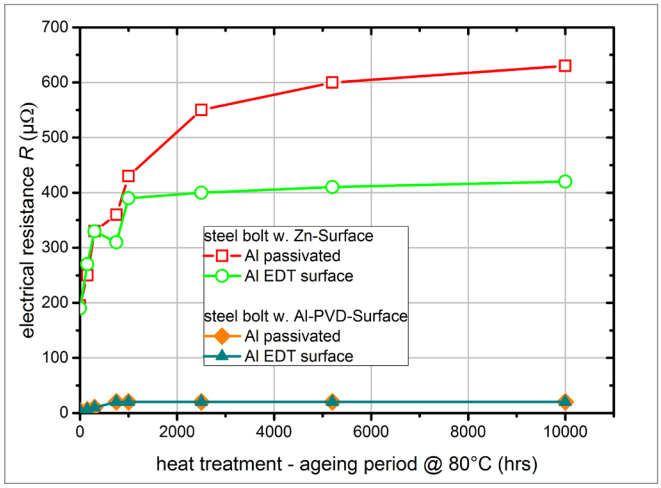

Electrical resistance after aging in heat treatment facility at 80°C
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The **Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP** works on innovative solutions in the fields of vacuum coating, surface treatment as well as organic semiconductors. The core competences electron beam technology, sputtering and plasma-activated deposition, high-rate PECVD as well as technologies for the organic electronics and IC/system design provide a basis for these activities. Thus, Fraunhofer FEP offers a wide range of possibilities for research, development and pilot production, especially for the processing, sterilization, structuring and refining of surfaces as well as OLED microdisplays, organic and inorganic sensors, optical filters and flexible OLED lighting. Our aim is to seize the innovation potential of the electron beam, plasma technology and organic electronics for new production processes and devices and to make it available for our customers. COMEDD (Center for Organics, Materials and Electronic Devices Dresden) with all known activities in organic electronics is now acting as a new business unit at Fraunhofer FEP, Dresden, Germany.