Jožef Stefan Institute
Center for Technology Transfer and Innovation

TECHNOLOGY OFFER

PHYSICAL VAPOUR DEPOSITION HARD COATINGS FOR PROTECTION OF TOOLS

Fields of use
Machine tools, other metal working equipment, Surface treatment

Current state of technology
Already on the market

Type of cooperation
Commercial agreements with technical assistance

Intellectual property
Granted patent or patent application essential, Secret Know-how

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More information about the invention

Summary

A Slovenian public research organization has developed several types of hard protective coatings to increase the lifetime of tools in machining. The benefit of deposited coatings is in their improved mechanical properties such as hardness, chemical inertness and adhesion. Partners that wish to prolong the lifetime of cutting and forming tolls are sought for commercial agreements with technical assistance.

Description of the invention

A Slovenian public research organization with a 30-year tradition in hard coatings for tools has developed several different coatings to protect cutting and forming tools against wear. The most important materials for hard coatings are transition metal nitrides, but other materials such as diamond-like coatings also used. The emphasis of coatings characterization is in mechanical properties, such as micro- and nano-hardness, adhesion and tribological properties. Some of the techniques can also be applied for surfaces of bulk materials.

Using different coating machines, they offer the deposition of various physical vapour deposition (PVD) coatings based on: Titanium nitride TiN, chromium nitride CrN, titanium aluminium nitride (TiAlN, AlTiN and TiAlSiN), and amorphous carbon (aCN), as well as others upon request. Maximum tool size is limited to 400 mm x 400 mm.

The hard protective coating is distinctively application-oriented, as the main goal is to increase the lifetime of tools in cutting (drilling, milling, reaming), processing of plastics, sheet metal forming, etc. Optimal combination of properties required for hard coatings can only be achieved by understanding the process of coating growth, analysis of the influence of deposition parameters on coating properties, and analysis of coating wear processes. The coated tools and parts have improved properties regarding surface hardness, thermal stability, friction, etc., extending the lifetime several times.

In addition to deposition of coatings, the group also offers advanced analytics of samples related to surfaces and thin films. This may also include failure analysis or consulting for choosing proper surface engineering treatment.

Deposition of coatings is offered to companies under commercial agreements with technical assistance – the company sends / delivers the tools that need to be coated and the researchers apply the coating. Often the characterisation of the base material is done before the most suitable deposition coating is selected.

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Main Advantages

The main advantages of coated surfaces are:

- High hardness
- Thermal stability
- Chemically inert surface
- Self-lubricating, low friction coating

Partner Sought

Partners are sought for commercial agreements with technical assistance. Companies that use or manufacture machining cutting tools (drills, mills, reamers), and forming tools (stamps, punches, inserts), are sought to prolong the lifetime of such tools. The company sends the tools, researchers, if needed make the analysis of the material and suggest the most suitable coating. After the approval of the company the researchers deposit the coating.