



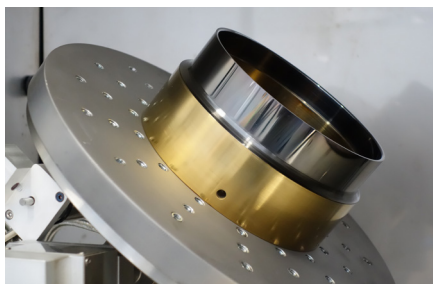
The new industrial-scale high-current ion implanter from DanFysik A/S

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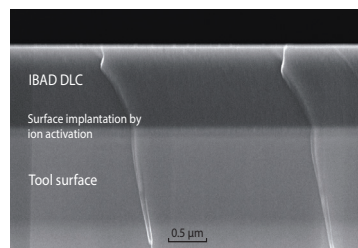
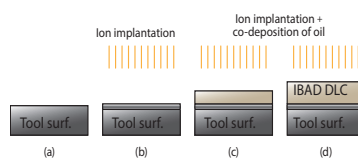
Novel Diamond Like Carbon coating for thin sheet metal forming

The Tribology Centre at Danish Technological Institute has developed a unique technique for Ion Beam Assisted Deposition of a Diamond Like Carbon coating, a so-called IBAD-DLC for thin sheet metal forming. The coating is especially used in the packaging industry for forming metal cans of various sizes and geometries. Due to the high smoothness of the IBAD-DLC coating and its low friction and self-lubricating properties, it is possible to produce e.g. food cans without destroying the metal or the protective polymer film preventing direct contact between the metal foil and the corrosive food content.



A sheet metal forming tool which is first coated with titaniumnitrid (PVD-TiN) subsequently coated with the IBAD-DLC coating. The tool is used for stamping blankets for production of bottoms and lids for large tin cans.

The coating has also revealed superior performance in connection with stamping and forming of e.g. heat exchanger plates for small plate heat exchangers. One of the major advantages of the IBAD-DLC is that it is often possible to run a production line without the use of lubricant. Hence it is not necessary to wash the finished products. The IBAD-DLC coating is deposited on metal forming tools by combining high-energy ion implantation while condensing a special oil on the tool surface. The tool surface is initially acti-



Ion Beam Assisted Deposition of DLC, the so-called IBAD-DLC. The coating process is shown schematically in (a) to (d). The lower image shows a SEM cross-section of the resulting coating with superimposed text indicating the different layers.

vated by ion implantation prior to running the combined oil deposition and ion implantation thereby growing the IBAD-DLC coating. The coating is formed when the high-energy ions are cracking the oil and synthesizing the Diamond Like Carbon coating, which is mixed in the tool surface. Recently, the demand for the IBAD-DLC coating has increased significantly - especially from European food can producers. As a consequence, the Tribology Centre at Danish Technological Institute has acquired a second industrial-scale high-current ion implanter from DanFysik A/S. Below, an example of a metal forming tool coated with the IBAD-DLC coating. The tool is used for the production of the "ring" on food cans, which is used for opening the can. Due to the IBAD-DLC coating, the tool can produce these opening devices for months without using lubricants. Lubricants are totally eliminated.



IBAD-DLC coated tool for forming the opening device on standard metal food cans. Due to the coating, the forming process can be performed without the use of lubricants for several months.

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