Explosives prevent technology theft

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This is researcher Guenter Helferich. Credit: Fraunhofer/Dirk Mahler

Product piracy causes billions worth of damage worldwide. A combination of visible and invisible copy protection is really effective against this. Explosive embossing is an economical procedure and can be used for mass-produced goods.

The holographic structure on the frisbee glistens colorfully. It is unique to this batch and makes the product forgery-proof. Explosives are used to emboss the original pattern into the injection moulding tool. This method can be used to give copy protection to industrial goods, and also mass-produced goods such as DVDs or medical pills and tablets. The patented technology was developed by Günter Helferich of the Fraunhofer Institute for Chemical Technology ICT in Pfinztal.

He will receive one of the 2009 Joseph von Fraunhofer prizes for

developing an explosive embossing method for the holographic nano-structuring of steel surfaces, as a protection against plagiarism. The necessity for this is obvious - forged products account for approximately 10 per cent of total world trade volume. This not only destroys jobs - approximately 70,000 per year in Germany, according to the German Chamber of Industry and Commerce - but is also relevant to the question of product liability.

Explosive embossing makes it possible to imprint structures directly onto metal surfaces. This method can even be used to transfer the structures of soft holographic embossing templates - nickel shims - into mould inserts for injection moulding. Moulds structured in this way enable plastic products to be produced for the mass market with a clearly visible hologram as a copy protection. This can be done during the production process of the original and without an additional production step. All components can be clearly identified by the 'fingerprint' moulded into the plastic. In addition, the use of conventional galvanic baths or etching baths can be reduced.

"The procedure is simple to describe," says Günter Helferich. "For the structuring, the metal surface to be worked on is covered with the object that is to be imprinted, the original structure. A thin film of explosive material is placed on this. When this is detonated the structure of the original is imprinted, accurate in every detail, onto the metal. The shock wave causes an additional increase in the hardness of the embossed metal." Achieving this result was not quite so simple - it depends on the combination of many parameters, the type of explosive material and the type of metal, the detonator position and the plugging of the explosive material - just to name a few. The explosive embossing of holographic structure templates cannot be copied - even if identical templates are used. Forgers of products will never be able to carry out a "complex" procedure such as embossing by means of detonation with complete accuracy of detail, making it the ideal piracy protection.

Source: Fraunhofer-Gesellschaft (news : web)