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Hard Metal Coating Appliance
2020 electronic

Description

With the aid of this appliance thin, true-to-size coatings of hard metal (tungsten carbide) can be applied to any types of steel. The thickness of the coating is adjustable between 2 and 40 my mm.

Methods

Nowadays very exacting demands are made on the toughness, hardness and surface wear resistance of tools, equipment and machine parts. Through the normal hardening method only toughness or hardness can definitely be achieved; in practice therefore, a middle course is selected.
In the search for a tough material with a more wear-resistant coating the following possibilities presented themselves:

1. Galvanic coating with hard coats.
2. The plasma gun spraying method.
3. Electro-erosive tungsten carbide coating.

The adhesive strength of the coatings in methods 1 and 2 is unsatisfactory in the case of heavy stresses since the coatings are likely to scale off.
With the third method however, it is possible to apply tungsten carbide to a very wear-resistant surface on the heavily stressed points of a workpiece.

Properties of the hard metal coating

The coating applied joins perfectly with the steel and adheres in such a way that it withstands any mechanical stress. No blows, bending, stretching or compressive strains will even partially remove the coating. This can be done only by grinding or special sand blasting; it can however, be relapped with diamond or silicon carbide. The steel beneath is not softened by the coating but increased in hardness in the upper zone. In the case of certain steel alloys the tungsten carbide coating penetrates the base material. The coating produces a hardness of up to 82 Rc (Rockwell), without the workpiece undergoing any change or distortion since the depositing process is practically cold. The coating is highly heat resistant and thanks to the high degree of temper the wear resistance is considerably increased.
The surface is smooth and shows no directional texture; good saturation will ensure a medium roughness of from 2 to 9 my.

Materials and their pretreatment

Suitable as material for coating with tungsten carbide is any soft, heat-treated or hardened steel as well as all types of steel including the highest alloyed ones. The surface must be clean and metallically pure. Scale and oxide coatings must be removed without fail. Ground, polished or brightly tooled parts must be degreased. If the tungsten carbide coating is applied to an unclean surface no satisfactory adhesive strength can be obtained and the coating will become irregular and show inclusions.

Method of operation

The tungsten carbide hard metal coating operates in accordance with the principle of electro-erosion. A tungsten carbide electrode is attached to the positive pole in a D. C. circuit with electric current and voltage regulation to which are connected condensers of varying capacities. The electrode is fitted in a vibrator gun. Through the vibrator oscillations are set up in the electrode and this is brought into contact with the workpiece to be treated. The workpiece is connected to the negative pole. Through the contact of the electrode with the workpiece a ionised field is produced which guarantees an oxide-free smelting of the tungsten carbide with the base material.
With the help of the vibrator this field is continually built up, the constant to and fro movement of the electrode producing a compact hard metal coating. The preselected thickness of the coating cannot be exceeded since when saturation is reached no further absorption of material takes place. The selected coating thickness is so exact that no subsequent treatment is required. In case of need the surface can be polished or relapped.

The hard metal coating process with the appliance `2020 electronic` is so simple that it can be carried out by anyone.

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2020 electronic: successful used by the fabrication of following products:

aeroplanes
amunition and weapons
automobiles and accessories
bottles
chrome steel vessels
clocks and chronological appliances
computers and office machines
cutlery, scissors, knives
electrical household appliances
electro- motors, transformers
film and photographic apparatus, projectors
general metal goods for household and industry
lamps, lighting units
meters and measuring instruments
motorcycles and bicycles
ornaments and toys
packagings
porcelain, glass and ceramics
profiles and tubes
radios, record players, tape recorders and televisions
screws, nuts and ironware
sewing and knitting machines
telephonic and remote signalling apparatus
Washing, drying and dish washing machines
wire and cable fabrication
etc.

Fields of application

manufacturing parts - parts subject to wear - Punching, bending, drawing and pressing tools - plastic and rubber jet molds - die-cast metal molds - cutting tools for metals, plastics and wood, such as reamers, drills, chamfering drills, milling tools, screw taps, broaches, etc.

Examples of use

1. Multiple press tools - punching tools (engine cover)

Defects:	Punching burrs, punching off - cuts rise up
Coating:	All die apertures
Refinishing:	None
Result:	Punching burrs removed, off - cuts remain in die
Service life:	Increased to 220 %

2. Combined punching and bending tool (door striking plate)

Defects:	Cold welding on bending jaws, cut - offs rise up
Coating:	Bending jaws radii and die apertures
Refinishing:	Light repolishing of bending jaws
Result:	Clean bending parts, cold welding and rising up of cut - offs avoided
Service life:	Increased to 280 %

3. Punching - bending - embossing tool (retaining clamp)

Defects:	Cold welding and cracking of the material
Coating:	Bending radii and embossing contours
Refinishing:	Repolishing of radii and contours
Result:	Material flows better, no more cracking and cold welding
Service life:	Increased to 650 %

4. Punching - deep drawing tool (bearing cover)

Defects:	Corrosion on drawing die, poor flow
Coating:	Radius on drawing ring
Refinishing:	Fine polishing of radius
Result:	Corrosion eliminated, material flows better, cleaner surface
Service life:	Increased to 530 %

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5. Extrusion press - die (aluminium curtain rod profile)

Defects:	Sticking and cracking open of material
Coating:	Die aperture
Refinishing:	Light refiling with diamond file
Result:	Even flow of material, less pressure, no alteration in size when cleaning
Service life:	Increased to 750 %

6. Cold extrusion molding tool (protective sleeve)

Defects:	Corroded stamping radius, material sticking
Coating:	Stamping radius and drawing edge
Refinishing:	Fine lap coating
Result:	Corrosion and sticking avoided, better flow of material
Service life:	Increased to 600 %

7. Die cast mold (instrument casing)

Defects:	Abrasion of the edges and extrusion points
Coating:	Extrusion channels and mold edges
Refinishing:	Smooth edges with diamond file
Result:	Good injection, edge strength
Service life:	Increased to 250 %

8. Injection mold (bolt of a lock)

Defects:	Erosion of injection channel and surface
Coating:	Injection channel and surface
Refinishing:	Light polishing
Result:	Erosion avoided, as also spraying - on point
Service life:	Increased to 300 %

9. Trimming die (hexagonal machine screw)

Defects:	Wearing of edges and breaking of the die
Coating:	head and aperture
Refinishing:	None
Result:	Better ejection, less wearing of the edges and consequently no breaking
Service life:	Increased to 480 %

10. Cutting tool (shell reamer)

Defects:	Intense wearing leading to undersize
Coating:	Plain grinding - bevel
Refinishing:	lap in drilling or grind to size
Result:	True - to - size again, abrasion - proof
Service life:	Increased to 650 %

Appliance-Unit, consisting of:

Two-switch-system control device with tool box in sturdy steel case, approved SEV, 100-240 volts interchangeable, 220 watts, mains cable, pedal switch, contact magnet, coating gun with built-in light, hexagon screwdriver, Spare part box with 4 bulbs, 1 tubular fitting tool, 2 clamping plates with screws and 21 assorted HM-electrodes, operating instructions, packed in a special packing-box
weights: net 13,2 KOs, gross 14,7 KOs

Technical data

Current connection:	Single phase - A. C.
Voltage:	100-130 / 200-250 Volts interchangeable
Charging rate:	220 Watts, 50/60 Hz.
Measurement:	width 210 mm, height 220 mm, depth 320 mm

Weights: appliance 11,7 kg - accessories 1,5 kg - packing 1,2 kg

Accessories
Mains cable
Foot switch
Contact magnet
Coating gun
hexagon screw-driver
spare part box for coating gun
Operating instructions
Packing box

HM Special-Tungsten-Carbide-Electrodes
Set of 24 electrodes assorted, 3 pieces of each:
round Ø 1,2 + 1,5 + 2,3 x 50mm, square 1 + 1,5 + 2 x 50 mm, triangular 2 x 50 mm

Electrodes:	round Ø 1,0 x 50 mm	square	1,1 x 50 mm
	1,3 x 50 mm		1,6 x 50 mm
	1,8 x 50 mm		2,1 x 50 mm
	2,3 x 50 mm	triangular	2,1 x 50 mm