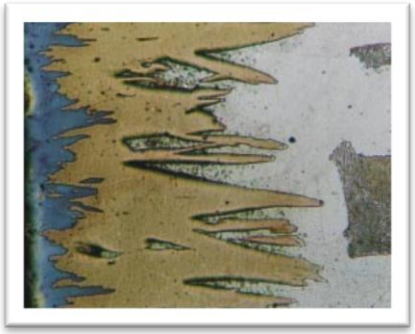
Shanghai Xaing Rong Industrial Equipment Co. Ltd.

Face Improving (FI)

FI refers to a specialist use of depositing metal or ceramics or composite by both onto a mild metal to optimize the superficial wear and high temperature resistance. This is often done for hard-facing excavating tools , digger bucket teeth, stove spare parts ect.

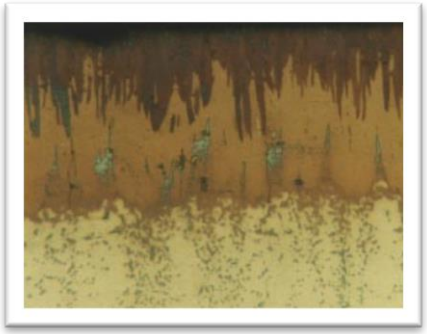
◆ Boron Physical Vapour Deposing (B-PVD)

In the process where boron is deposed on the surface of a ferric substrate, numerous boron atoms form, which react with Fe contained in the substrate and compose stable single- or double phase FeB and Fe_2B. The following pictures show the microscopic photos after boron is deposed on 4 steels including #20, T8, CrWMn and 3Cr2W8V. The superficial layer is FeB, the lower layer is Fe_2B and the lowest layer is boride.



#20 Steel 400X

T8 Steel 400X



CrWMn 400X

3Cr2W8V 400X

The B-PVD surfaces reach HV 1300~2300 or HRC 73~83 varying on different substrates. After deposing, the durability of cold heading and cold drawing dies is fold increased up to tens of times and that of warm-stamping, heading, extruding and forging dies is longered by 3~6 times. Moreover, our B-PVD technique can upgrade the deposed object's capability against chemical erosion by 8~19 times except hydrogen nitrate (NNO_3). The following table shows 1Cr5Mo's weight loss (WL) against several solutions before and after B-PVD:

	HCl (WI-g)	H_2SO_4 (WI-g)	NaOH (WI-g)	HNO_3 (WI-g)
After	0.0015	0.0011	0.0005	0.1329
Before	0.0123	0.0096	0.0096	0.0152
Times	8.2	13.3	19.2	-9

Aside from moulding applications, our B-PVD finds many footings in oil and gas and other processing machinery: valve rod, separator case, crusher hammer , mud pump case , just to name a few.

It's widely acknowledged that numerous Cr, Ni and Mo substances contained in Stainless Steel (SUS) makes chemical or physical thermal treatment like PVD on SUS impossible because of an oxidation film formed on the surface. To depose Boron on SUS as do on carbon steels, we have developed a special B-PVD technique which can achieve a 0.05~0.1mm thick and $HV_{0.3}$ 1320-1560 boron layer on the surface.

B-PVD's Charateristics:

- The deposing medium is simply composed and environment-friendly.
- The deposed surface looks clear and grey, so don't need washing.
- The deposing technique does not require heating the furnace for loading, so is easy to be carried out.
- The deposing medium can be recycled, so saving costs.

B-PVD's Applications:

- ◆ Moulds and dies
- ◆ Valve balls
- ◆ Valve rods
- ◆ Abrasive blast nozzles
- ◆ Other wear and erosion-resistant parts

◆ Metallic Ceramic Coating (MCC)

The coating mainly carried out through flame-spraying ultrasonically is characteristic of high-speed particle, fine and homogenous coverage and excellent adhesion on the coated object. Since it contains ceramic grains bonded by metals, the coating achieved is able to tolerate wearing and flushing by fluids.

Coating	$HV_{0.3}$	Working Temp.	Application
WC12Co	1000~1300	≤540 ℃	The hard and fine coating, with excellent anti-abrasion and -flush capabilities, is applied on corrugating rolls, metallurgical rolls, engine wheels, Inner bushings in oil drilling systems, bearings and so on against wearing and tearing by abrasive particles, hardface, and vibrancy.
WC17Co	1000~1200	≤540 ℃	A little softer than WC12Co, but with more cobalt contained, the coating provides a higher toughness and better resistance against vibrant wearing.
WC25Co	800~1000	≤540 ℃	Higher cobalt proportion toughers the coating thus helping polish and finish and resisting severer vibrant wearing than the former 2 coatings.
WC10Co4Cr	1000~1300	≤540 ℃	More erosion-resistant than the former 3 coatings and as wearable as WC12Co, the coating can be applied on rolls, sluice valves, ball valves and fan wheels, so can replace chrome-hardening.
20NiCr80Cr_3C_2	900~1100	≤850 ℃	Hard and dense, the coating serves as the best solution against wearing, oxidizing, and eroding under middle and high temperatures. Therefore, it is widely applied on furnace pipes and rolls and petrochemical bearings which mostly work under middle and high temperatures paired by flushing eroding and wearing by particle, vibrant and hard face.
25NiCr75Cr_3C_2	800~1000	≤850 ℃	The coating is softer but tougher than 20NiCr80Cr_3C_2 thanks to the NiCr contained.
30NiCr70Cr_3C_2	800~1000	≤850 ℃	A higher NiCr proportion makes the coating tougher than the former ones.

Physical Properties:

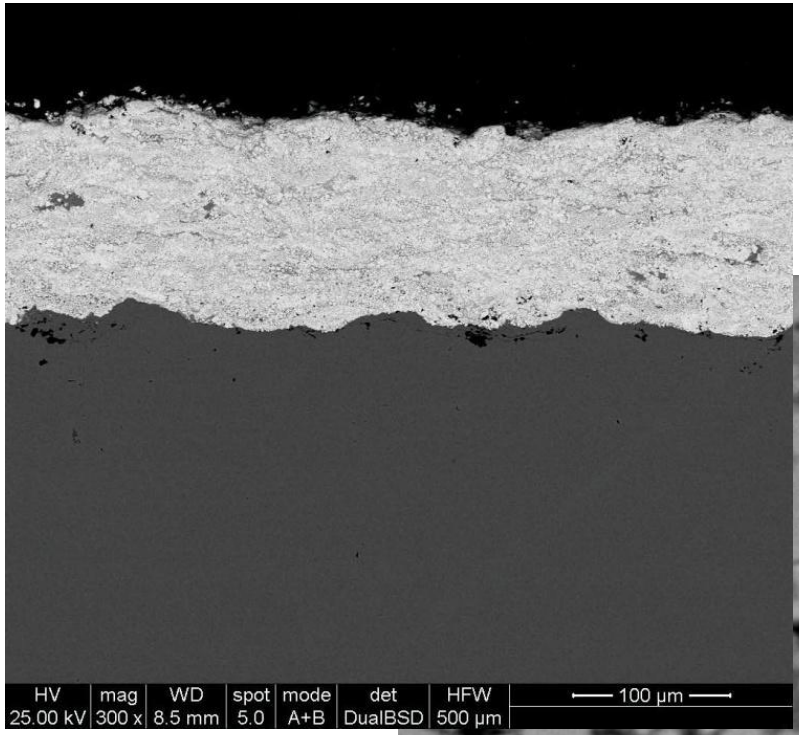
Index	Value
Thickness	0.1~0.3mm
Hardness	$HV_{0.3}$~1200 or HRC~75 for WC12Co and WC10Co4Cr
Adhesion	60~80 MPa
Porosity	<1%

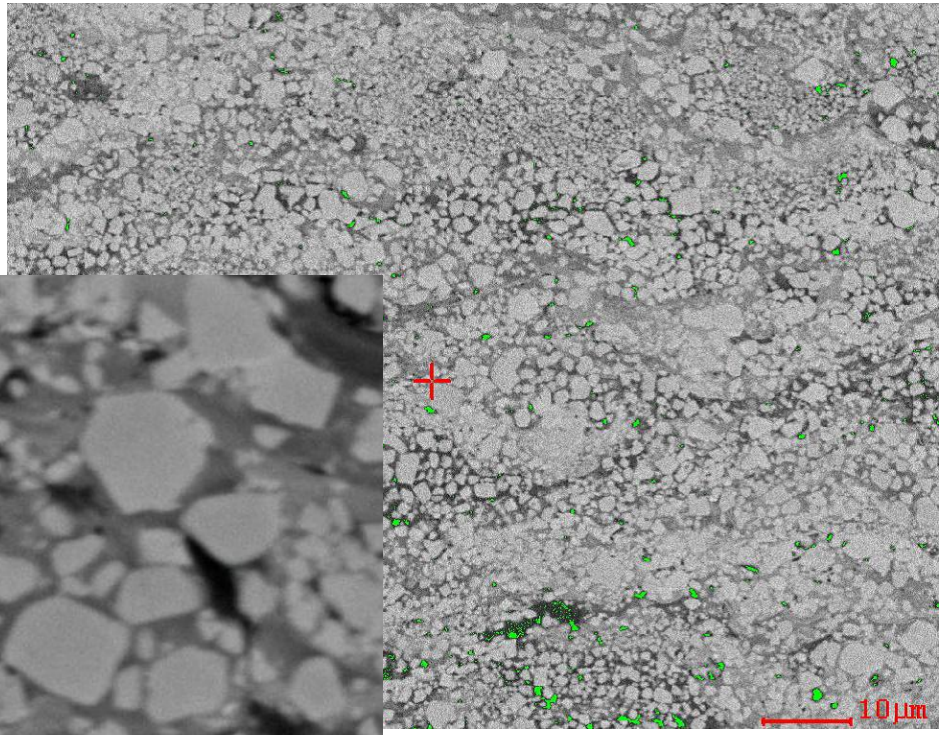
Coated Appearance

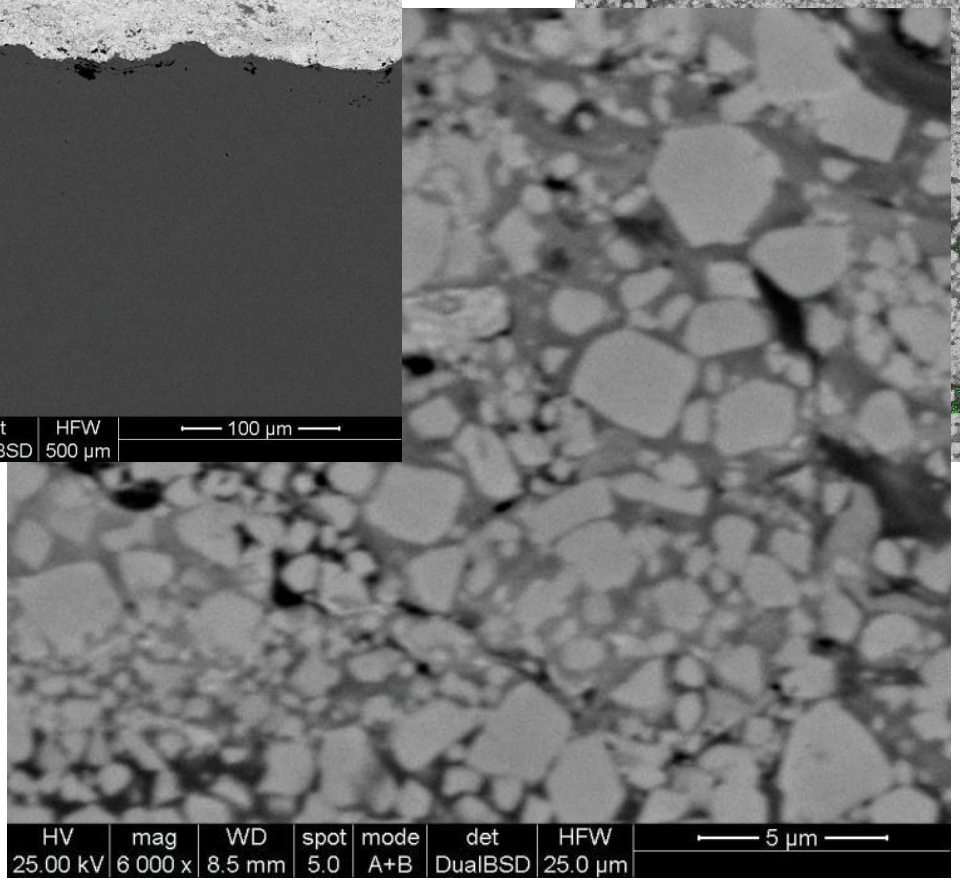
Roller

Valve ball

Microscopic Picture of WC17Co







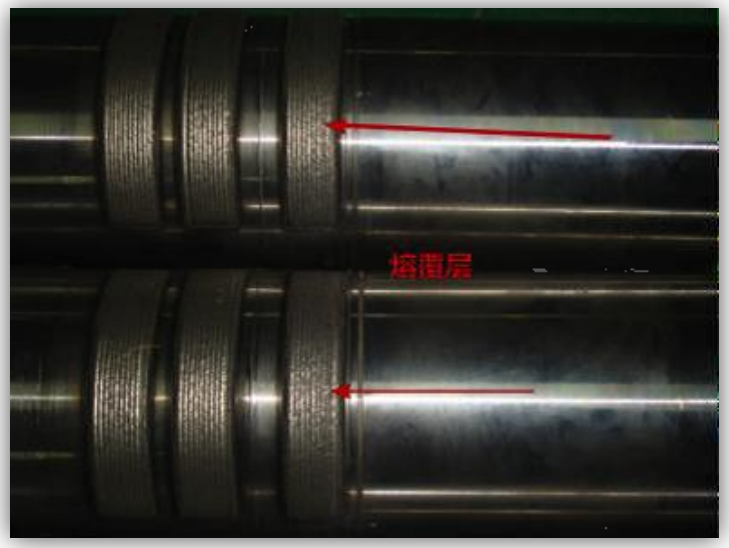
◆ Laser-cladding Coating (LCC)

The technique, which provides well adhesive and thicker coatings is mainly used in dimension offsetting and carrying out wearable coatings like magnet-free coating under such sever condition as down hole.

Coating	HRC	Working Temp.	Advantages
Nickel alloy	20~60	≤650 ℃	The coating is shock-, wear- and erosion-resistant.
Magnet-free nickel	40~55	≤600 ℃	The coating which contains wearable particles is magnet-free and wear- and shock-resistant
Cobalt alloy	30~55	≤840 ℃	Erosion- and high- temperature- resistant

Index	Value
Thickness	0.5~3mm
Hardness	HRC 20~60 ; 3-5 times more wearable than normal alloys
Adhesion	300 MPa
Porosity	Porosity-free

Laser-cladding Parts:



It is proven at an oil well in North China that the service life of a drill collar with a laser-cladding coating is 3-5 times longer than a drill collar without the same coating. Moreover, the drill collar can be renovated after the coating drops off to save costs.

◆ Ceramic Insulating Coating (CIC)

The technique is mainly used in insulating exploration and production (EP) systems. The ceramic insulator coated on both sides of the port well live with big torque.

Index	Value
Thickness	0.1~0.3mm
Adhesion	30~40 MPa
Porosity	3-5%

HEADQUARTER:
Shanghai Xiang Rong Industrial Equipment Co. Ltd.
Phone:+86 21 3616 1907
Fax:+86 21 3616 0055
E-mail: info@xr-ind.cn
http://www.xr-ind.cn
Add: #1-155th Lane Songbao Rd. Suite 613 Shanghai 200940 PRC

FACTORY
Jiecheng Cramics Co. Ltd.-Xiang Rong Ceramics Co. Ltd.
Phone:+86 731 8708 2129
Fax:+86 731 2810 9323
Add: North Xieyuan Rd. Ningxiang Economical & Development Park
Changsha 410600 Hunan Province PRC

EUROPE BRANCH:
H.M.T. (Hard Materials Technologies) GmbH
Serge WEYDERT
Managing Director
Phone:+352 691 96 86 31
E-mail: weydert.s@hmt-cera.com
http://www.hmt-cera.com
Add: 7 Rue Du Marche L-9260 Diekirch Luxembourg