

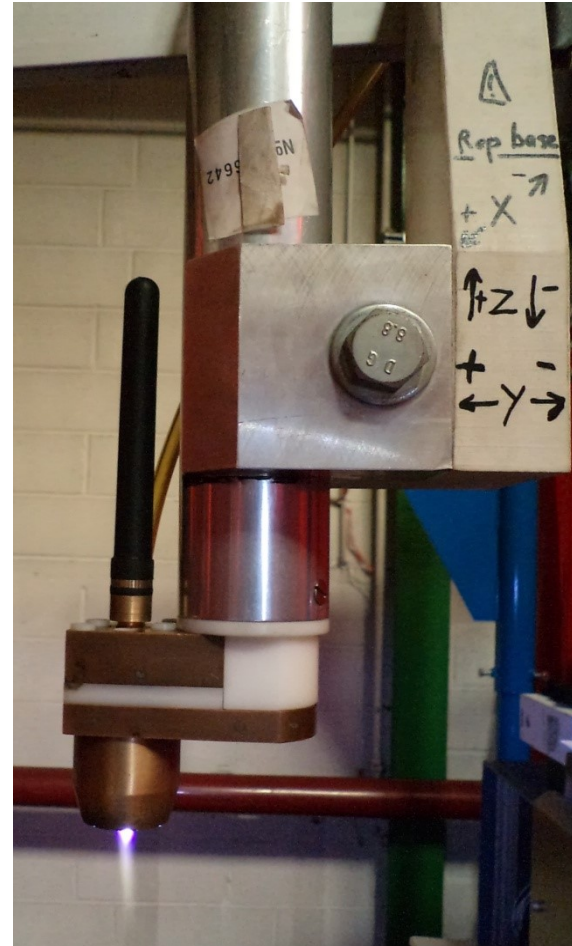
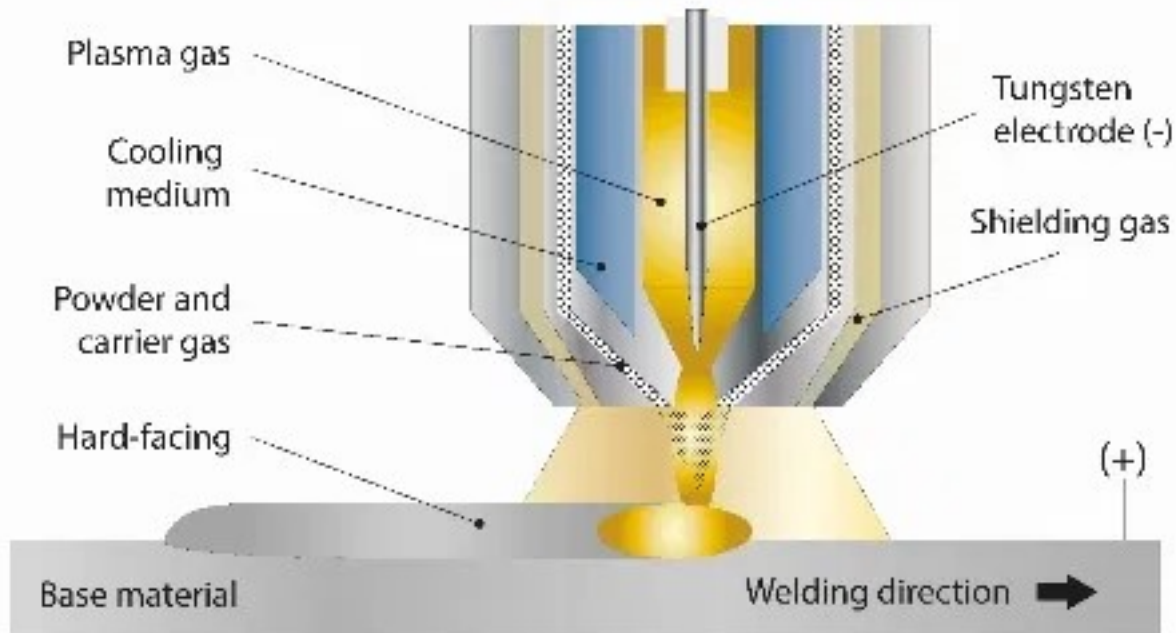
Formation Alt-Ctrl-Trans

08-06-2021

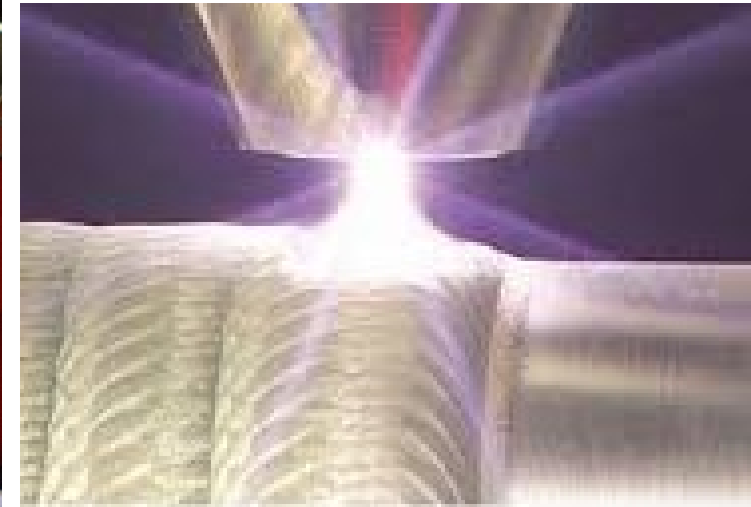
Mohamed Boudifa

CRITT-MDTS

PTA : Plasma Transferred Arc

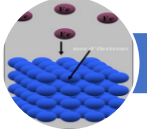


First Arc :
Pilote Arc



Transferred Arc :
Second electric arc

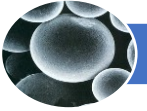
Advantages of PTA



Metallic bond



Homogeneity



Resistant



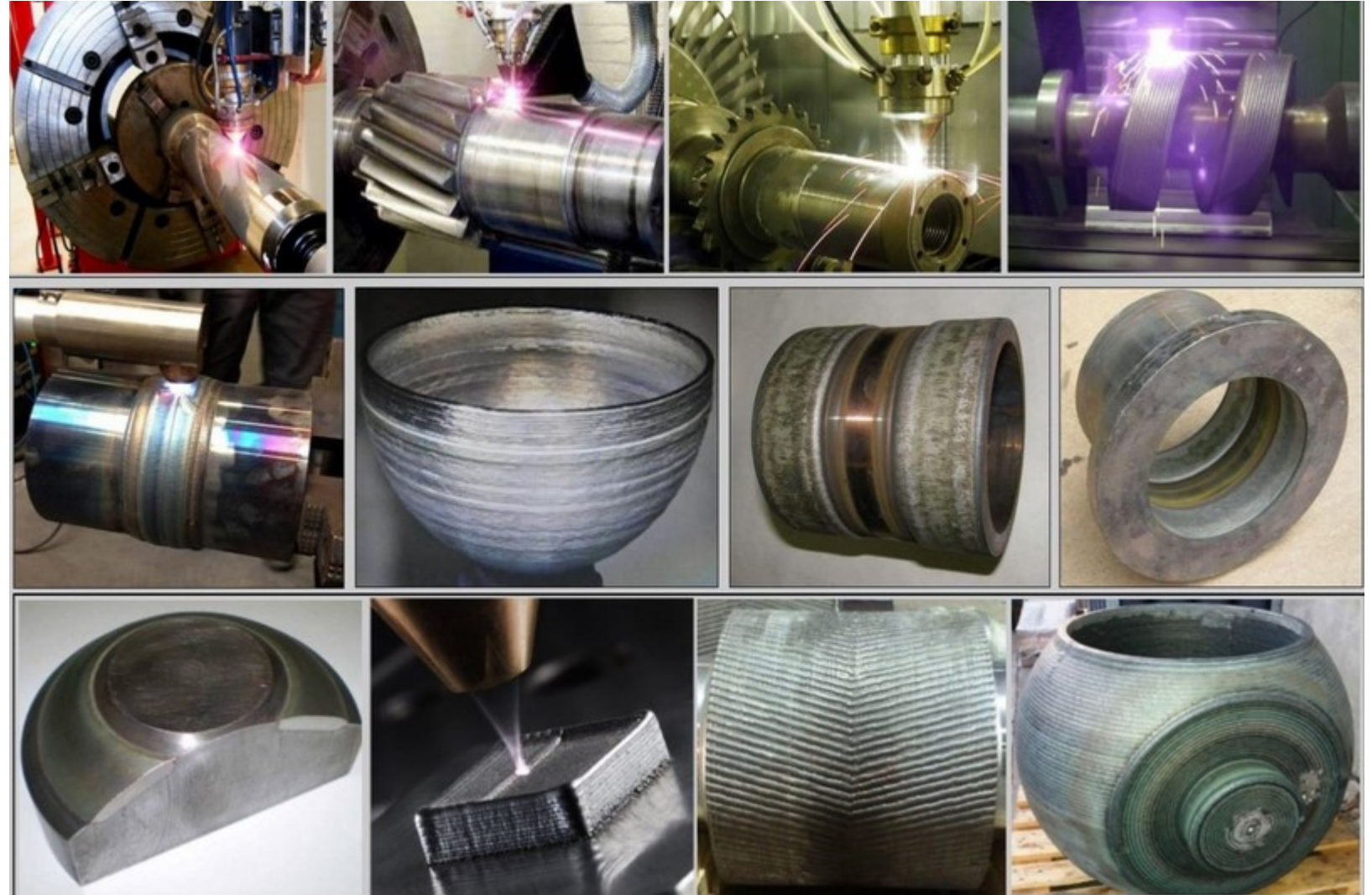
Reproducibility

Advantages of the hardfacing process

- Dilution rate within 3%.
- Coating of 2 to 4 mm parts in one pass without repair
- Hardfacing speed : 2Kg/h to 5 Kg/h depending on the alloy
- Fast, fine and predictable work
- Very good joint quality

Industries: nuclear, automotive, plastics, naval

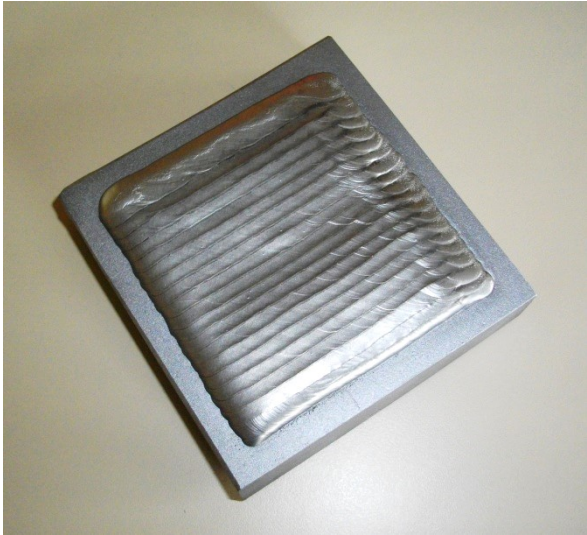
PTA hard-facing examples



PTA at CRITT-MDTS



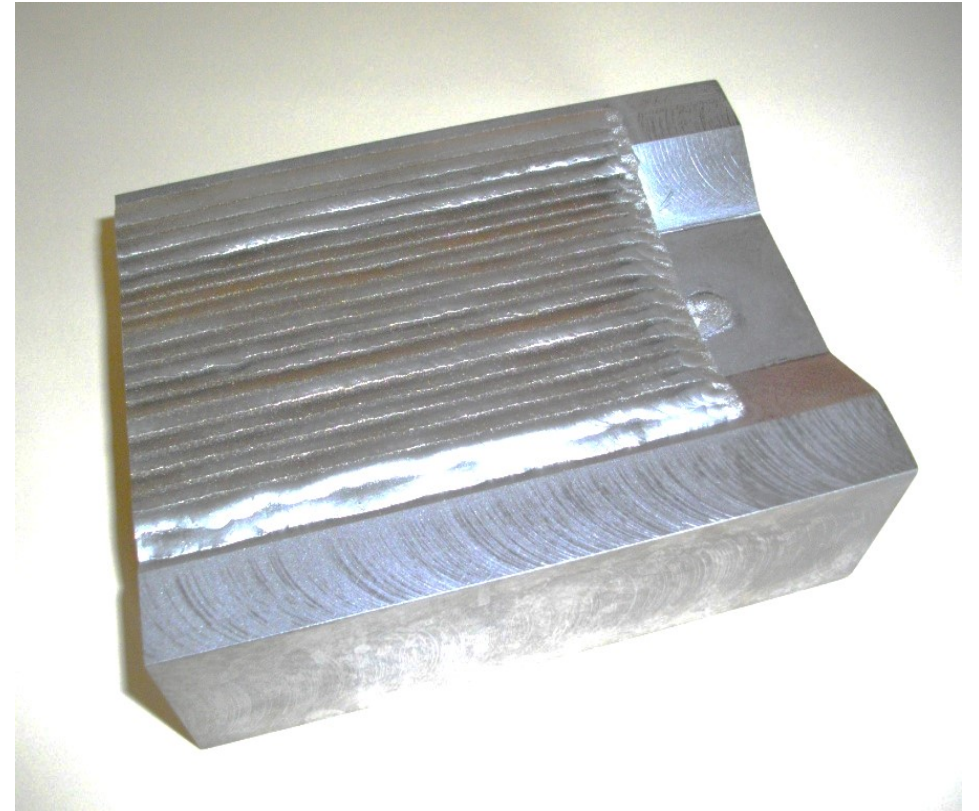
Some examples of achievement



2 Layerse reloading carried out on steel sheet of 20 mm thickness : 5 and 6mm average thickness

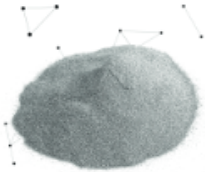


A flat circular spiral coating:
One layer of 3-4 mm



Reloading on complex flat surfaces

Feasibility Study: DCX CHROME Metallic Chrome Deposition



Chrome metal powder

Chrome metal powders are used for production of welding electrodes, flux-cored wires, for thermal spray, aluminium hardeners and powder metallurgy applications. Grain size distribution and chemical analysis are guaranteed through a strict process and quality control.

01 Standard Specifications 100 µm - 250 µm - 300 µm

	Al	Fe	Si	C	S	P	Cr
Max (ppm)	2000	3000	1500	200	150	20	Min (%) 99,2%
Typical (ppm)	1000	2000	1000	150	80	10	

02 Standard Specifications - fine powders 45 µm - 63 µm - 80 µm

	Al	Fe	Si	C	S	P	Cr
Max (ppm)	2000	4000	1500	400	150	20	Min (%) 99,2%
Typical (ppm)	1000	2000	1000	150	80	10	

03 Standard Specifications - low gas high quality powders 80 µm - 100 µm - 160 µm

	Al	Fe	Si	O	N	C	S	P	Cr
Max (ppm)	200	2000	500	800	100	400	40	20	Min (%) 99,75%
Typical (ppm)	40	1400	350	600	50	120	20	10	

Other specifications are available upon request

04 Packing

Steel Drums 500lb / 250kg
1 MT big-bags

Customs tariff 81122190
REACH registration no. 01 2119485052 31-0039



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Phone 631-673-0212

DCX CHROME

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Chrome metal



High grade



Vacuum grade - low nitrogen



DDB - High purity grade



Chrome metal powder



Chrome nitride



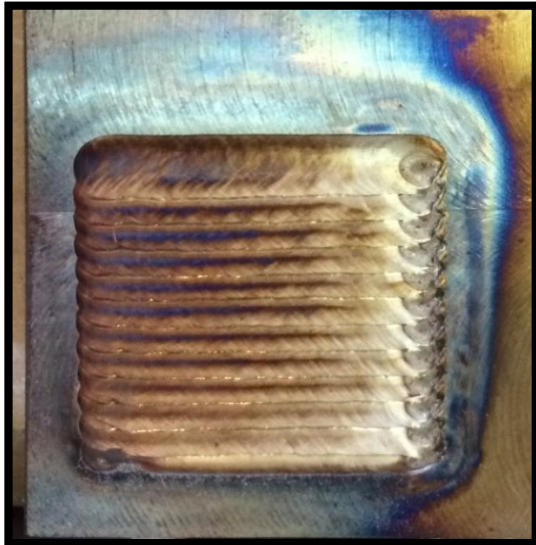
Chrome carbide



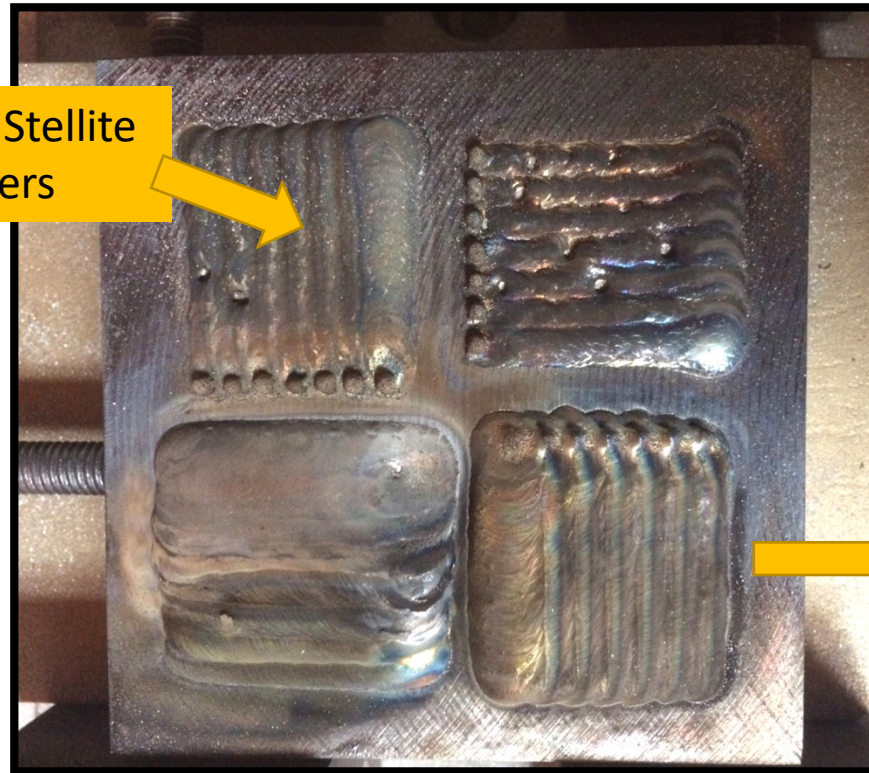
Chrome alumina

Comparative study with a reference

Stellite



Same as Stellite parameters



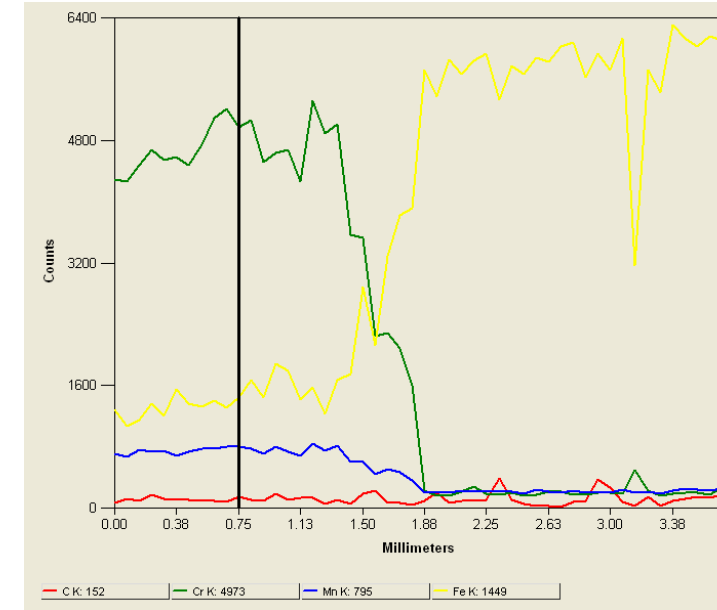
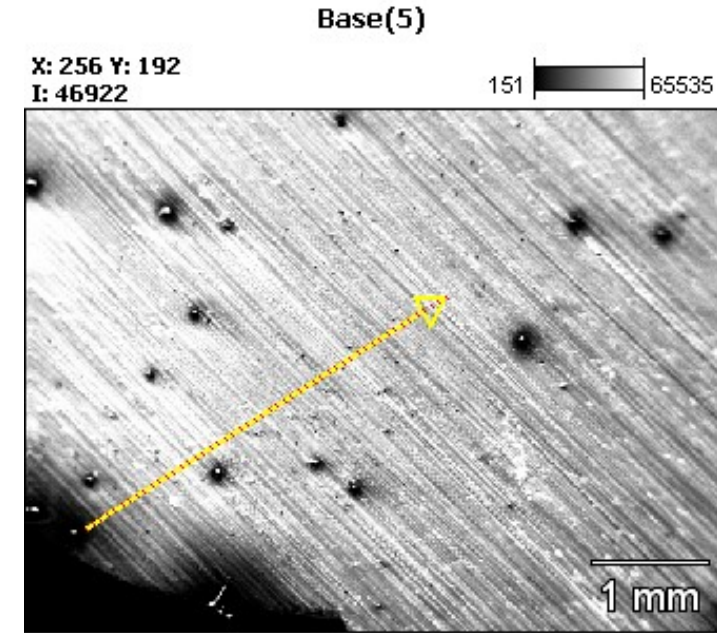
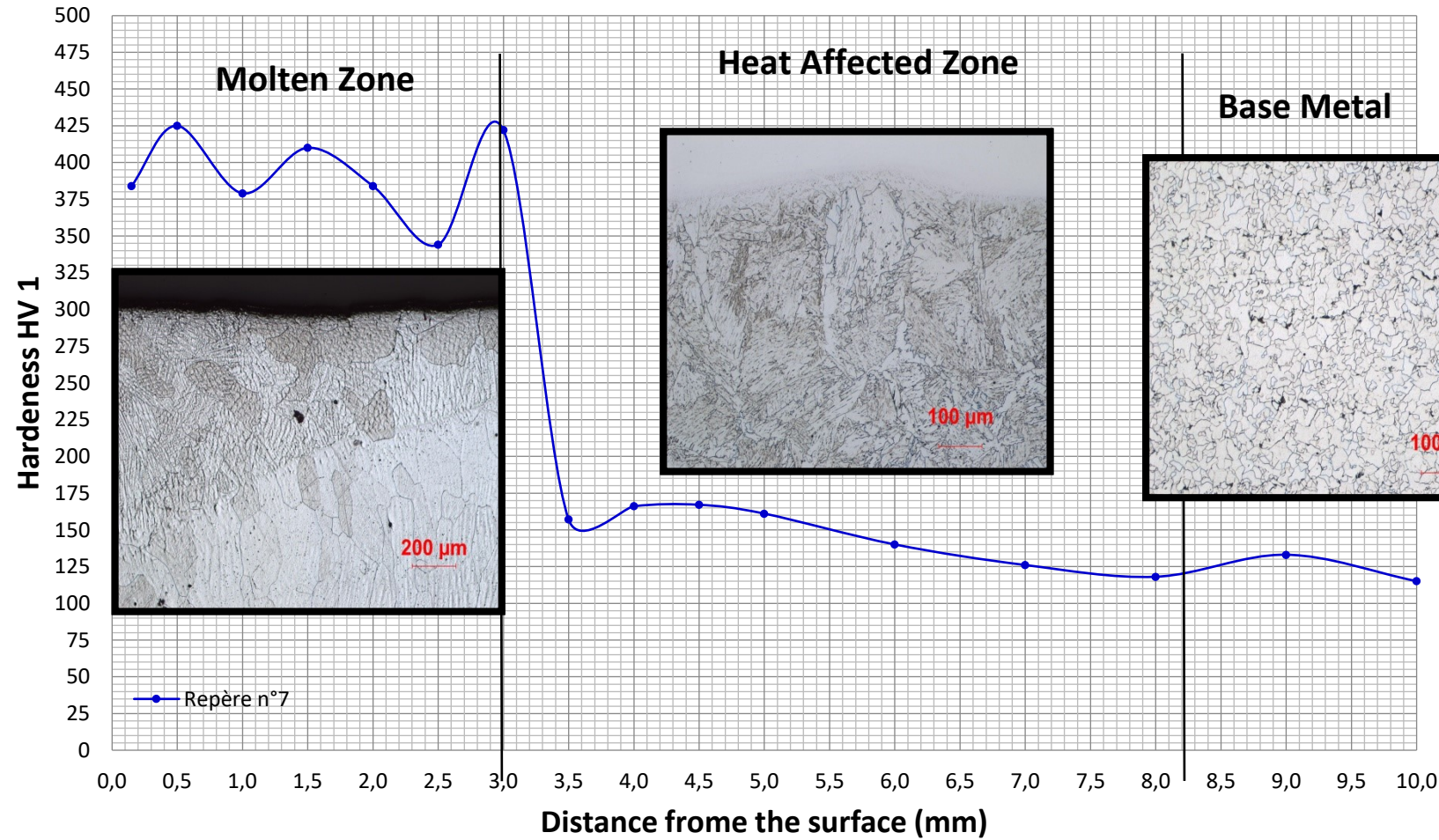
Optimized parameters



Grade	C	Si	Cr	Ni	Mo	Fe	Co
21	0.25	<2.0	28	2.6	5.4	<2.0	Bal.

Tests	Speed (mm/s)	Thickness (mm)	Porosities max	Fe (Wt.%)	Rate porosities (%)	Hardness HV1
			(μm)			
Cr	*	3.6	100	24,4	0,48	398
Stellite	2	2.2	32	29,4	0,2	320

Metallographic analysis of the metallic Chormium coating



Conclusion and Perspectives

- DCX powder is well suited for the PTA deposition process
- Optimization can be made to improve the quality of the deposit: powder quality, PTA process parameters and the introduction of post-processing (heat treatments)
- Tests for other powder projection processes: cold spray for example
- Many characterizations have been performed like XRD, Nano-indentation or planed, like wear tests (at room and high temperature)

Questions

Thank you for your
attention

