Production of coatings for industrial trials

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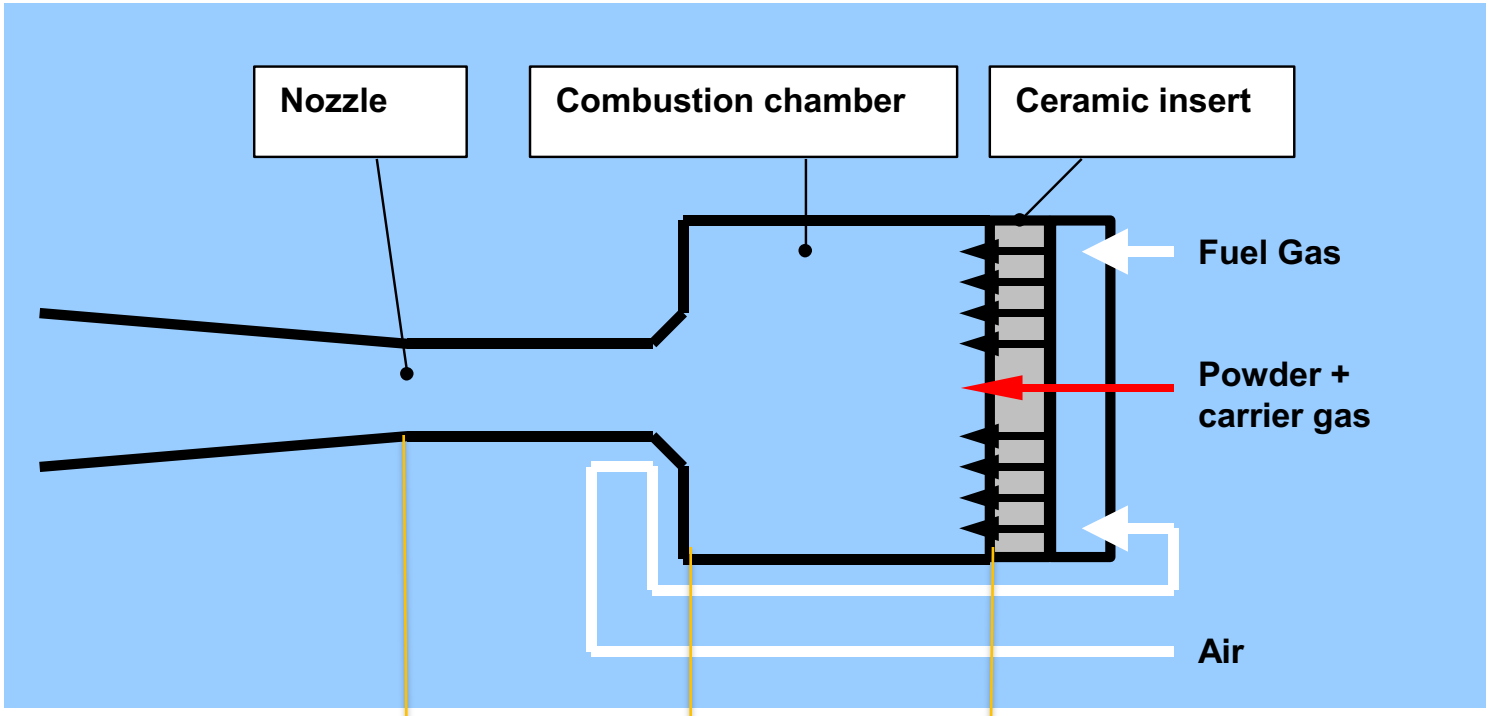
Non Sticking furnace Rolls for steel products to improve service life and product quality in continuous annealing and galvanizing lines

Grant Agreement: 754144 NoStickRolls

Steelmaster 2021
November 26, 2021

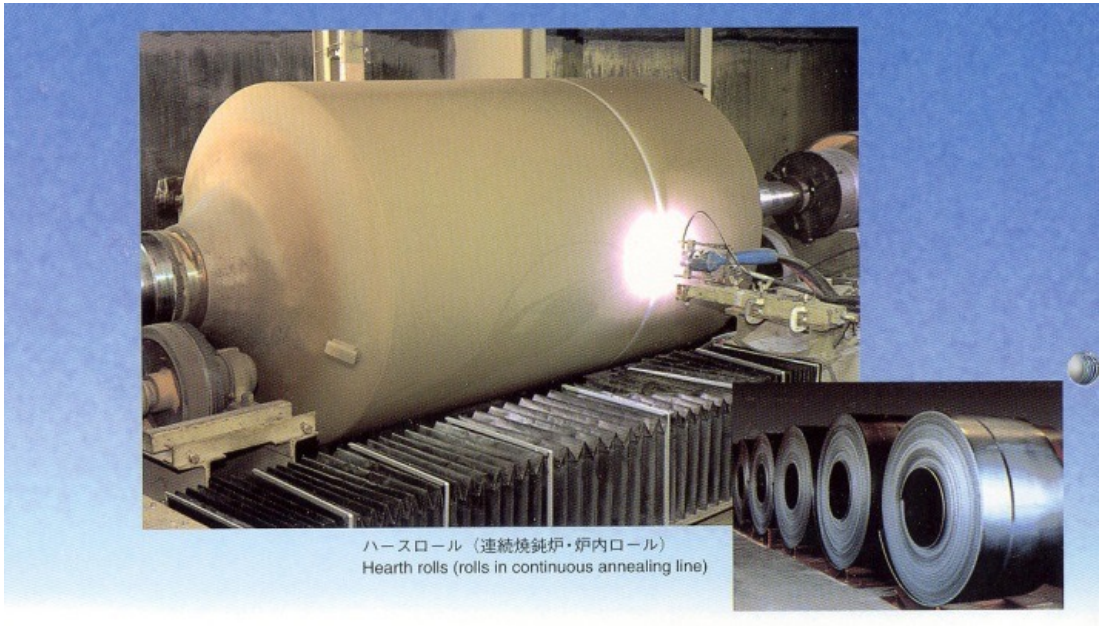
HVAF gun design*



1100-1500 m/s	850 m/s	40-50 m/s	Gas velocity
<1500 °C	~1600°C	1900°C	Gas temperature
Acceleration		Heating	Spray particle

*= courtesy of Kermetico

Furnace Rolls - Continuous annealing line (CAL)/ Continuous Galvanazing Line (CGL)

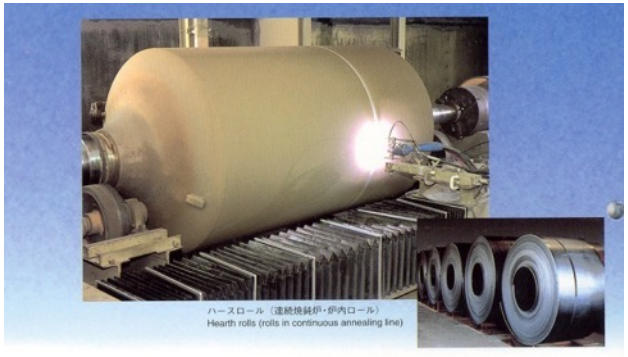


Coating Requirements:

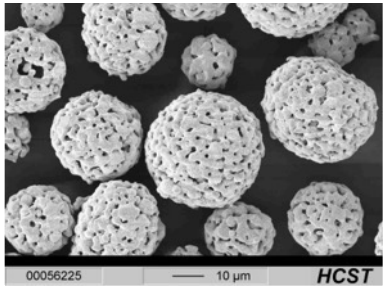
- no adhesion to Fe and Fe oxide particles
- high temperature wear resistance
- excellent bonding
- high HT strength
- chemical stability at operating temperature
- high ductility / toughness

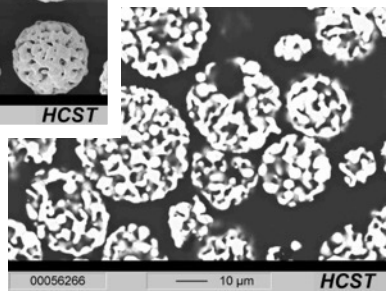
AMPERIT® 551

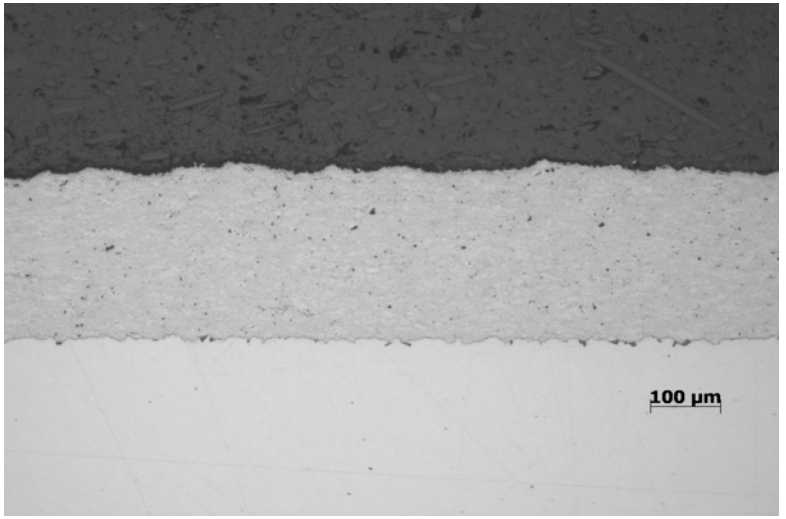
WC-CrC-Ni 73/20/7 agglomerated sintered



- Higher oxidation and corrosion resistance than pure WC-Ni based coatings
- Higher hardness than standard CrC based coatings
- No Cobalt in the metallic Matrix







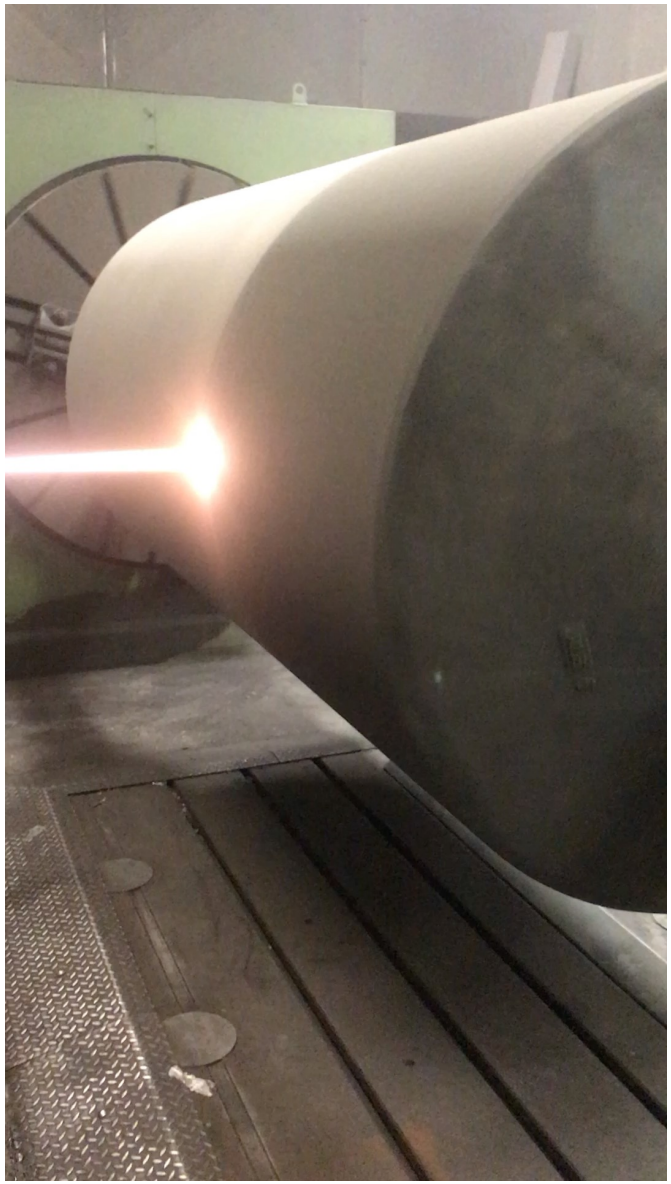
NoStickRolls – Coating of the 1st roll

Coating on AMS roll

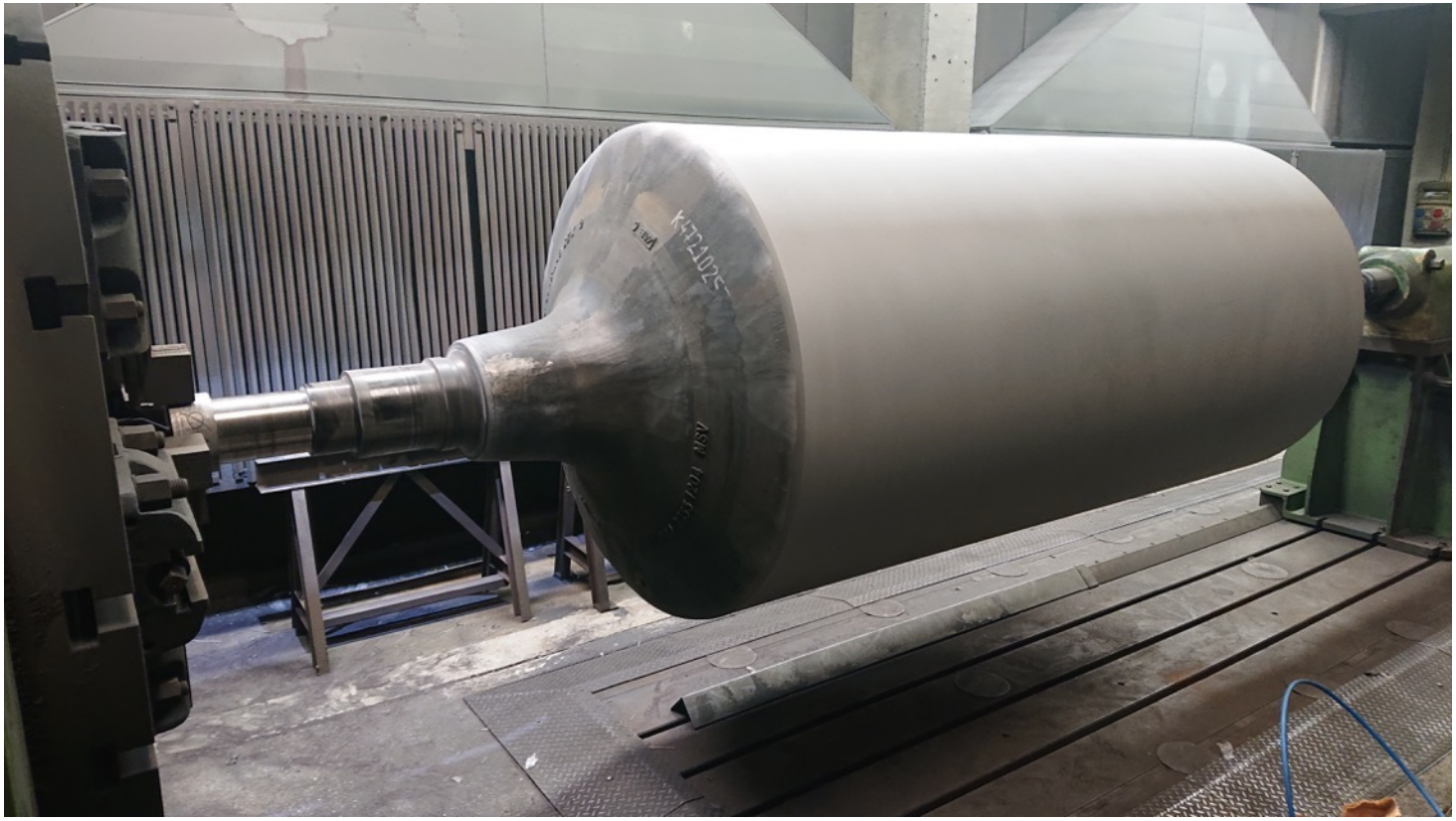
July 25th, 2019

Roll as blasted with corundum 100 mesh at 6 bars in suction type machine

Roughness around 4.0 Ra

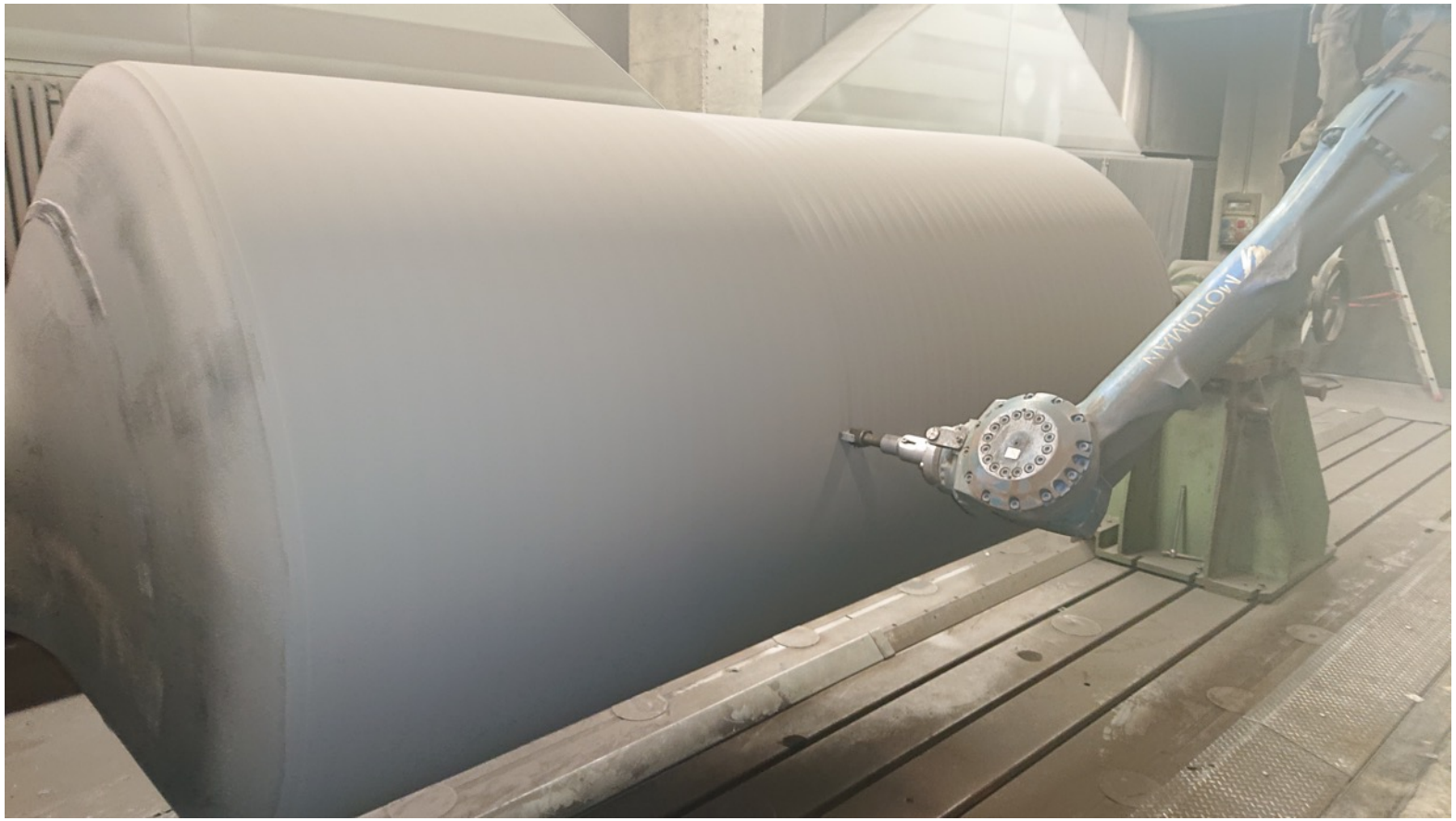


Roll during HVAF coating

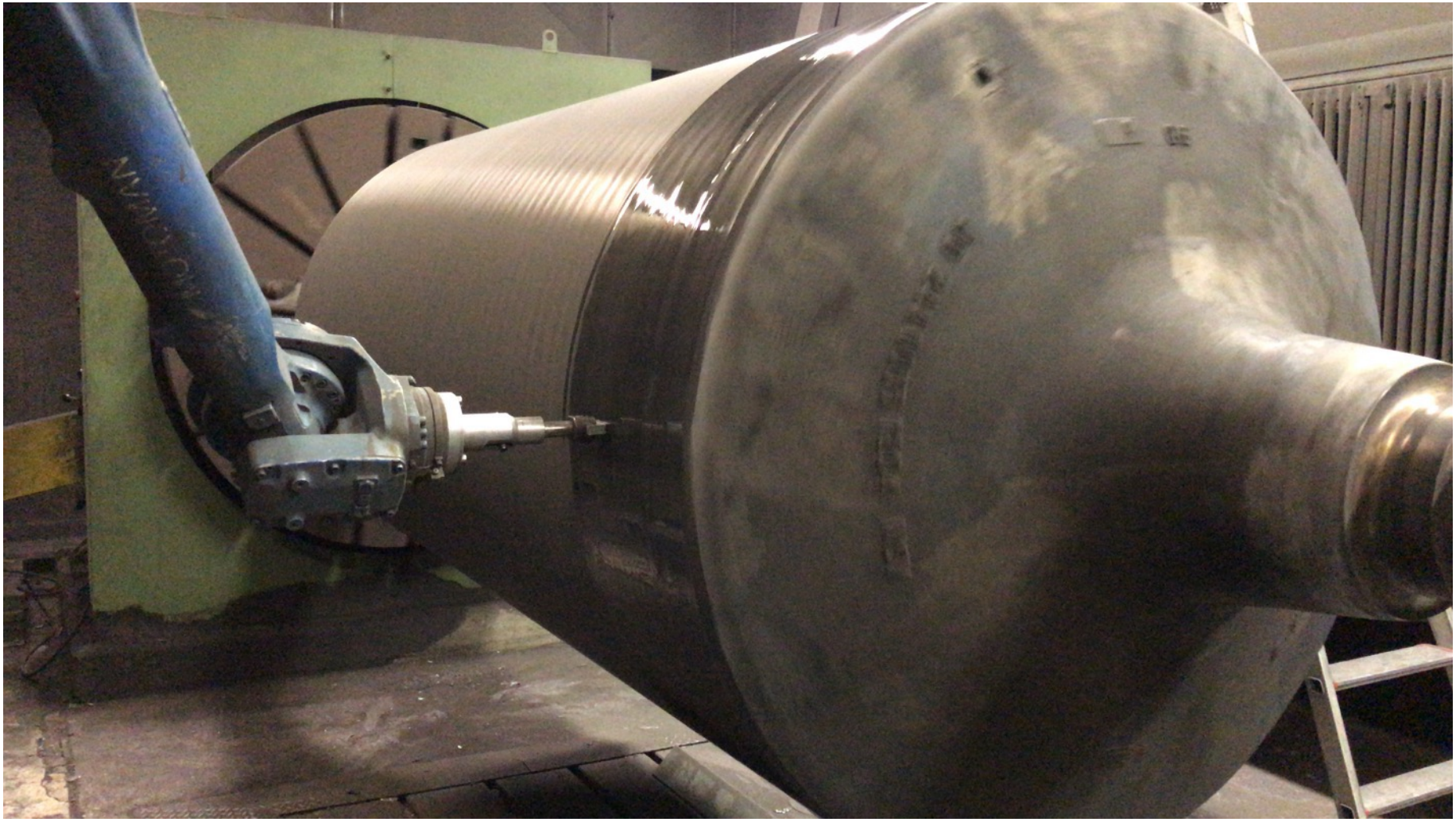


Roll as sprayed

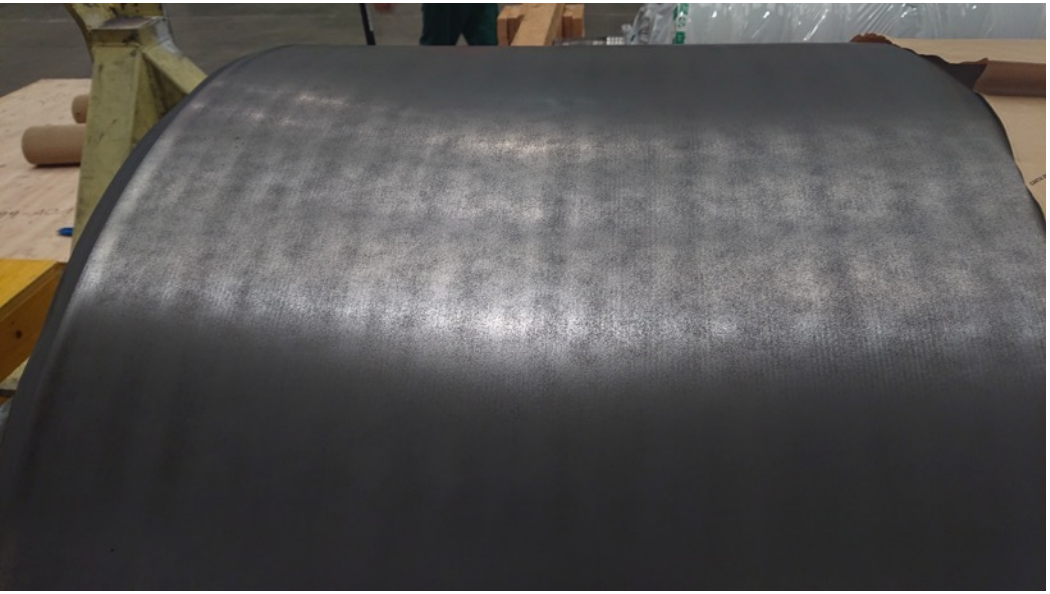
Roughness around 4.3 Ra

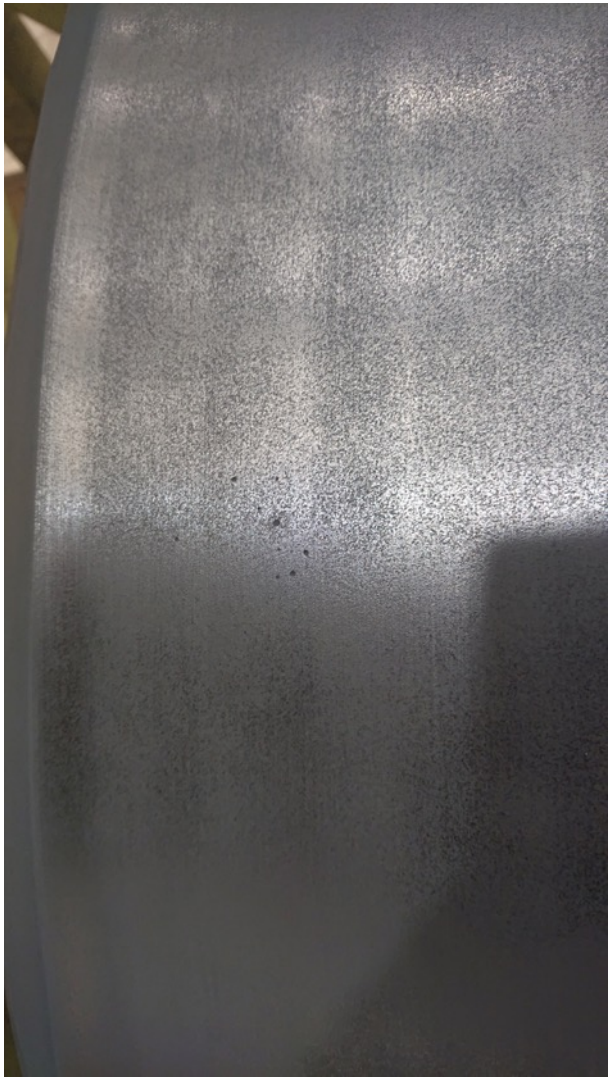


Roll during finishing with stones



Roll during finishing with stones- 4 hours of finishing





Roll finished. Average roughness around 3 Ra

Conclusions

- Roll has been sprayed by HVAF without problems
- To have a smoother surface, the use of a finer powder would be an advantage
- The finishing operation by stone is leaving the surface an uneven texture, even if is reducing significantly the average roughness

NoStickRolls- Coating of the 2nd roll

Coating on TKse roll

September 30th, 2019

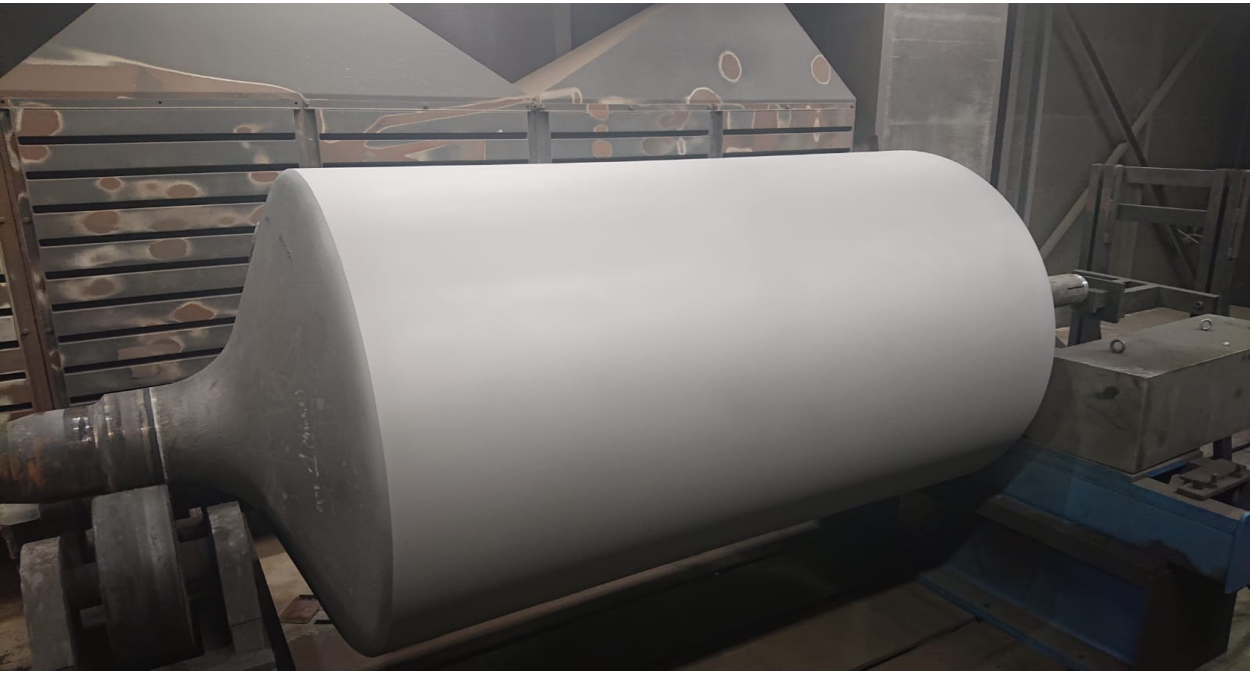
Roll as received

Roughness around 0,8 Ra

Surface very smooth

Some small defects have been found close to the end of the coating area

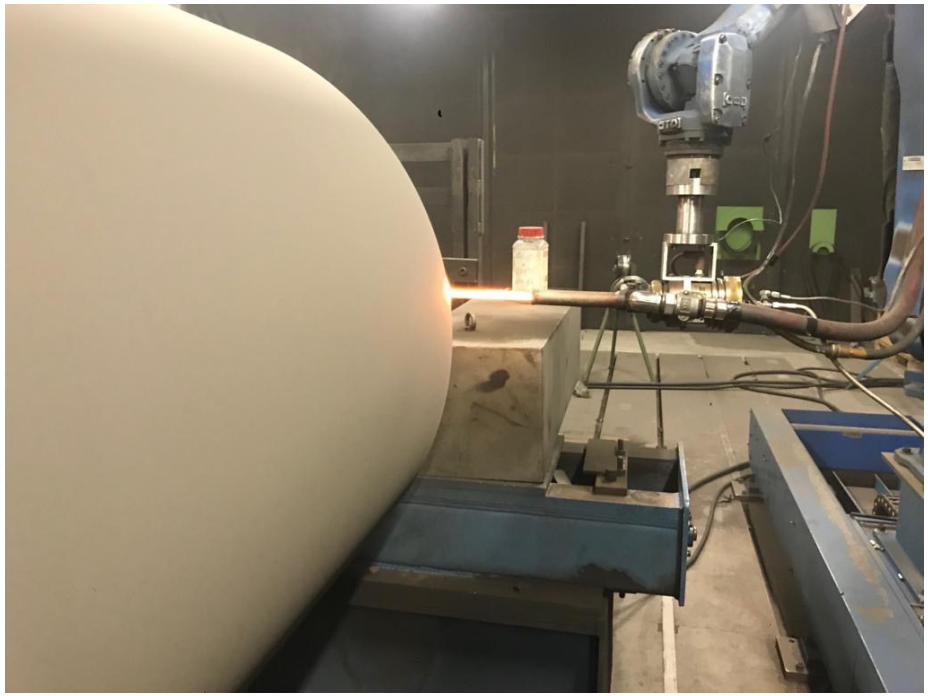
To reduce the roughness after spraying, has been decided to use a finer grainsize of powder (Amperit 551.059 -30+5)



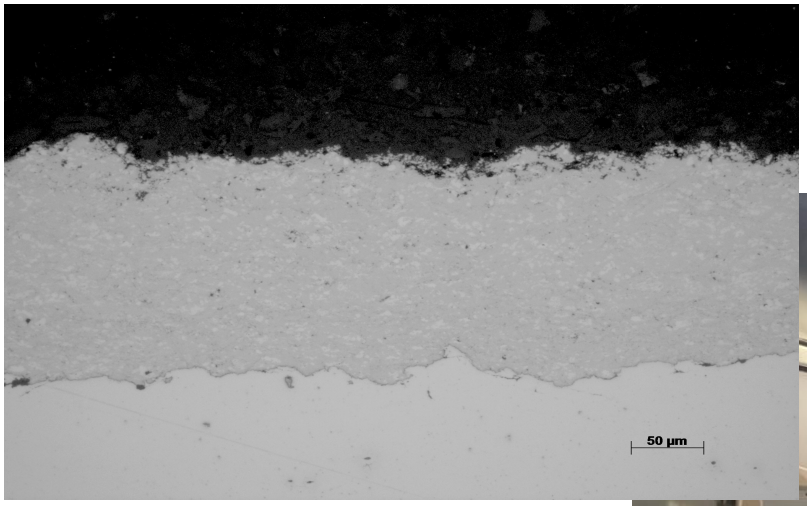
Roll as blasted with corundum 100 mesh at 6 bars in suction type machine

Roughness around 3.3 Ra

Roll during HVAF coating



- Roll after 2 passes
- Roughness around 3.3 Ra, but few spits of coating found of the surface due to partial clogging of the barrel for the small grainsize of the powder
- We’ve been force to switch to the standard grain size (Amperit 551.074 -45+15



Roll as sprayed

Roughness around 4.3 Ra

Conclusions

- To reduce the final surface roughness, the use of finer grainsize is fundamental (more than initial roughness)
- Roll has been sprayed by HVAF with some problems with the finer grainsize, that force to switch to the standard one
- To spray finer grainsize on large surfaces, other tests have to be performed
- The finishing operation by stone has not been performed to avoid an uneven texture

Economic considerations

- The new coating has a price compatible with the market standards, for as sprayed roughness of 3,5– 4,5 Ra
- If the roughness should be decreased in the order of 1,0-1,5 Ra, an extra price of 20% per square dm should be considered
- Roughness could be decreased, economically, only by polishing; grinding is complicated by the not perfect geometry of the parts that should force to add an additional grinding before the coating and an extra thickness of coating in order to have at least 0,15 mm of thickness after machining

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