



New cost efficient solution for glass moulds

Barbara Maroli, Sergio Simoes, Höganäs AB

Outline

Introduction

- wear in glass mould parts

Hardfacing of glass mould parts

- coated areas
- mould & coating materials
- deposition methods

New cost efficient hardfacing powder

- main benefits
- properties
- applications

Summary

Introduction

Glass moulds are subjected to different types of wear

- Abrasion wear
 - when the gob enters the mould
 - during the press/blow operation
- Impact wear
 - on the mould edges



Coatings for wear prevention are applied to prolong the life length of the moulds

Coated areas in glass mould parts



Hardfacing of glass mould parts

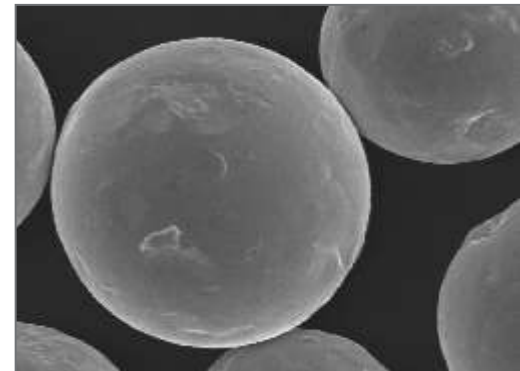
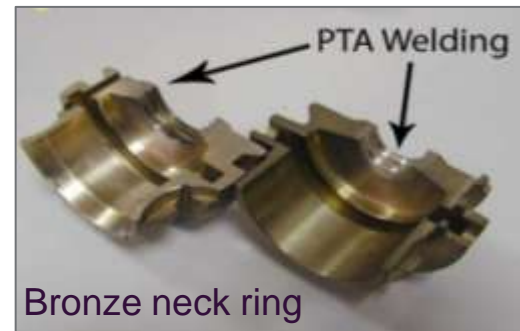
Mould materials

- Lamellar & nodular cast iron
- Aluminum bronze

Lamellar cast iron is by far the most common

Hardfacing materials

- NiCrSiB powder with different amounts of Cr, C, Si, B and >85% Ni, 20-40HRC
- NiCrSiB+WC-Co (plungers)



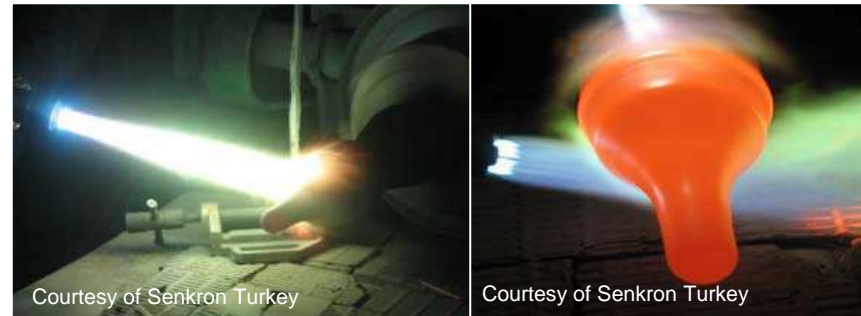
Hardfacing of glass mould parts

Deposition methods

- Powder welding/puddle torch



- Flame spray/HVOF&fuse



- Plasma transferred arc (PTA)



Coated areas in glass mould parts



Mould edges, PTA/PW, Coating
hardness 20-30HRC



Neck ring, PTA/PW
Coating hardness 30-35HRC



Bottom plate, PTA/PW
Coating hardness 30-35



Plungers, FS/HVOF&fuse
Coating hardness 40-60HRC



Guide ring, PTA/PW
Coating hardness 30-35

Challenges when coating cast iron parts

Lamellar cast iron

- Good thermal conductivity, critical for productivity of glass containers
- Sensitive to crack formation during coating

Coating materials for lamellar cast iron

- Choice is limited to NiCrSiB powder grades with >85% Ni to minimize risk for crack formation
- Ni price is high & unstable

New cost effective hardfacing powder

Main benefits of Surfite 1.30-CE powder

Powder chemistry

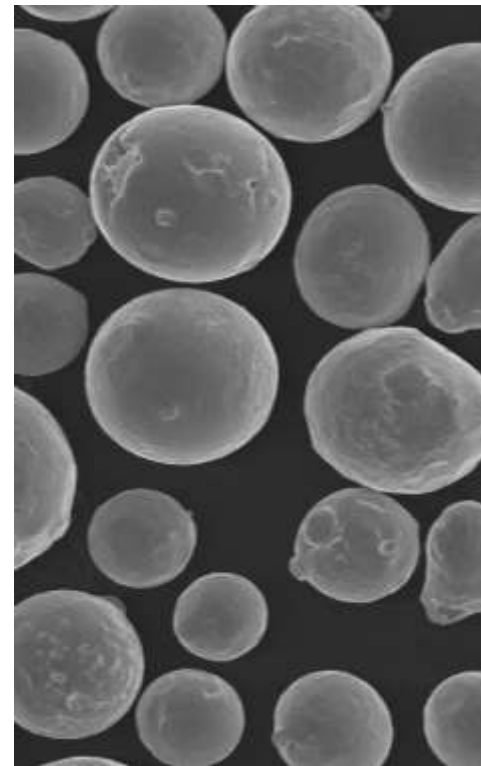
- designed to minimize material costs when PTA coating cast iron parts

Coating properties (PTA)

- comparable to currently used NiCrSiB grades with HRC30-35 on cast iron
- medium hardness & wear resistance

Welding & machining

- comparable to currently used NiCrSiB with HRC30-35 on cast iron



Powder properties of Surfit 1.30-CE

Powder chemistry

- Ni based prealloyed with Cr, Si, B, Fe

Spherical particle shape

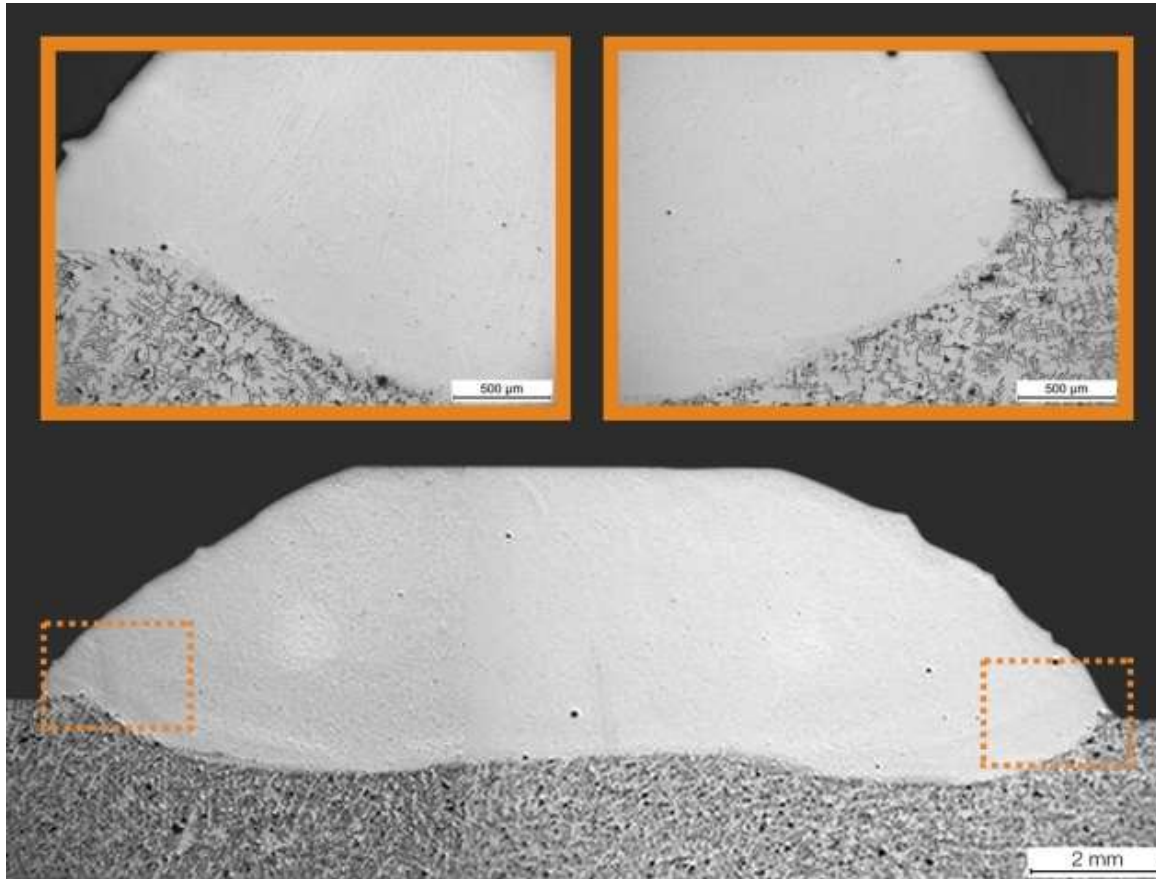
- High deposition rate
- Regular flow

Particle size distribution

- 45-125 μm Surfit 1330-CE
 - 53-150 μm Surfit 1530-CE
 - 63-212 μm Surfit 1730-CE
- for different PTA equipment

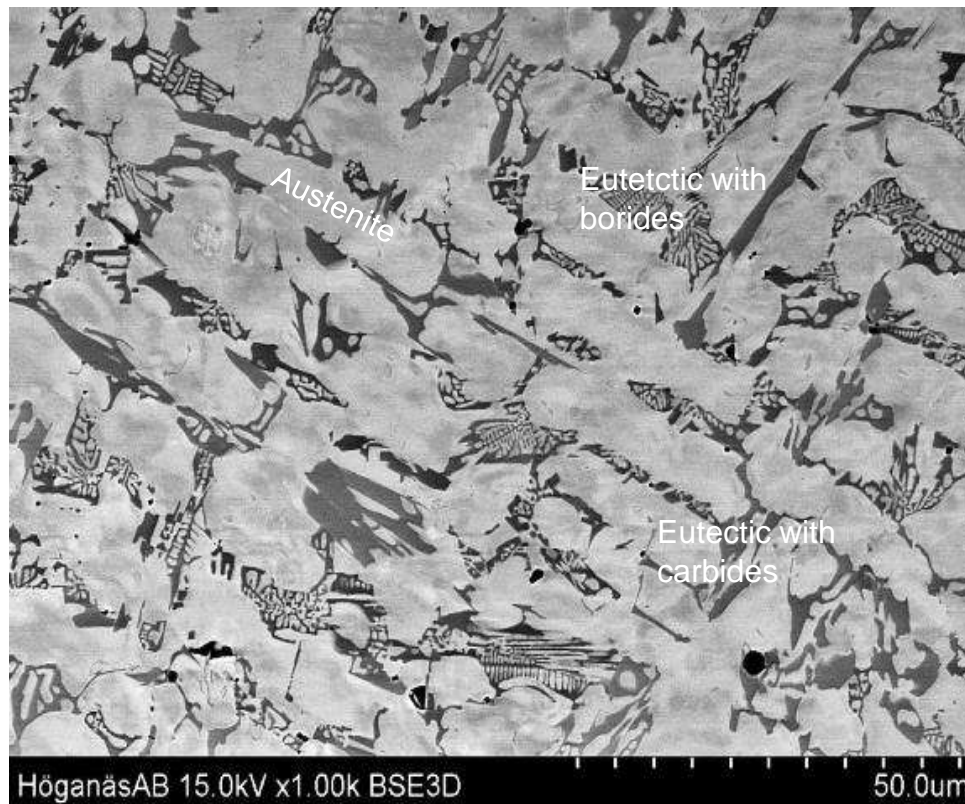
Microstructure of Surfite 1.30-CE

Cross section of Surfite 1.30-CE, PTA deposit on lamellar cast iron, one layer



Microstructure of Surfit 1.30-CE

Cross section of Surfit 1.30-CE, PTA deposit on lamellar cast iron



- Austenitic matrix
- Eutectic with austenite and Cr-rich boride
- Eutectic with austenite and Cr-rich carbides

Hardness of Surfite 1.30-CE

PTA deposit dilution <15% on cast iron parts

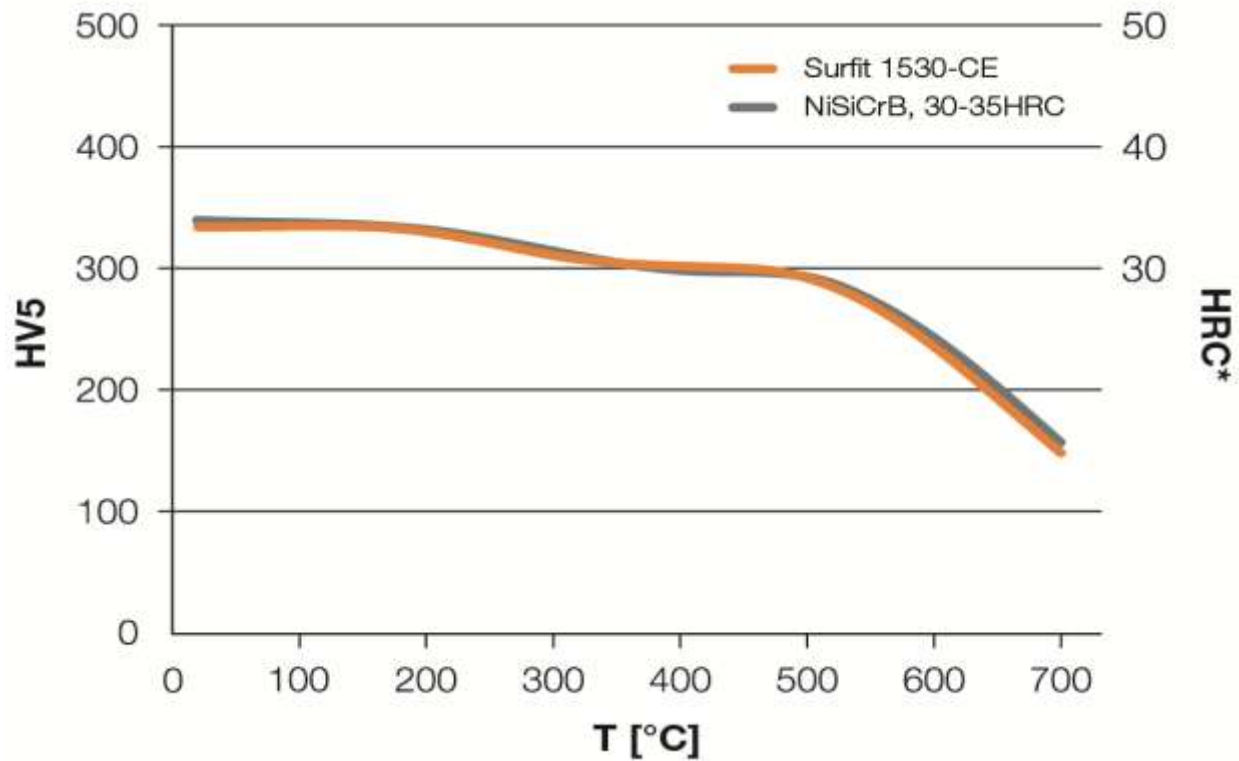
- 30-35HRC
- Comparable with NiCrSiB grades currently used

Factors affecting coating hardness

- Dilution When dilution increases hardness increases
For currently used NiCrSiB grades coating
hardness decreases when dilution increases
- Cooling rate, component size and geometry

Coating hardness vs. temperature

PTA deposit, cast iron substrate, dilution <15%



Applications: guide ring

Verified by full scale production tests both at one mould shop and end user

Mould shop

40 guide rings were PTA coated and machined to final components at one mould shop

End user

The guide rings were run parallel to standard guide rings at a manufacturer of glass containers



Compliments of Novamoules S.A., France

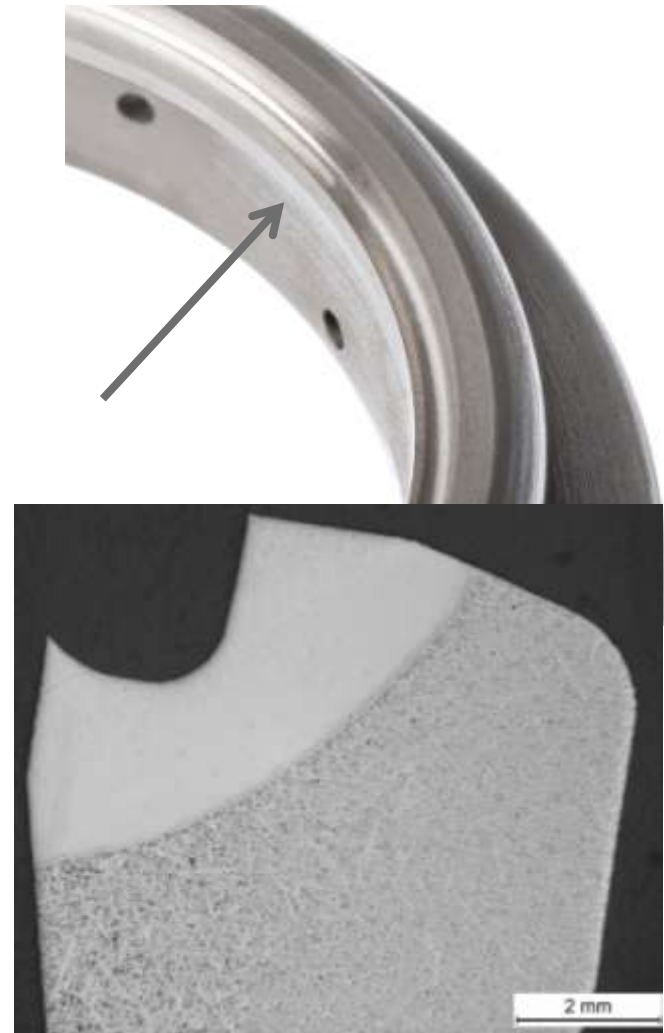
Applications: guide ring

Mould shop

Welding behaviour & coating properties comparable with standard guide rings coated with NiCrSiB 30-35HRC

End user

Performance comparable with standard guide rings coated with NiCrSiB 30-35HRC



Cross section of guide ring, PTA coated on lamellar cast iron

Potential applications within the glass industry

Cast iron

- Mould edges
- Bottom plates/moulds
- Neck ring



Summary

Key aspects of Surfit 1.30-CE

- Cost effective powder grade
- Suitable for overlay welding of cast iron parts
- Coating properties, welding and machining behaviour comparable to currently used NiCrSiB grades with hardness in the range of 30-35 HRC
- Properties verified by tests at mould shop and end user



Thank you for your attention!

