

Termiske pålægningsmetoder

- Oversigt og anvendelse



FORCE Technology
Svejseteknisk innovation

Peter Tommy Nielsen
Projektleder

Termiske pålægningsmetoder

- Hvorfor?
- Hvilke muligheder er der?
- Hvordan?
- Anvendelse
- Eksempler

Hvorfor?

Motivation:

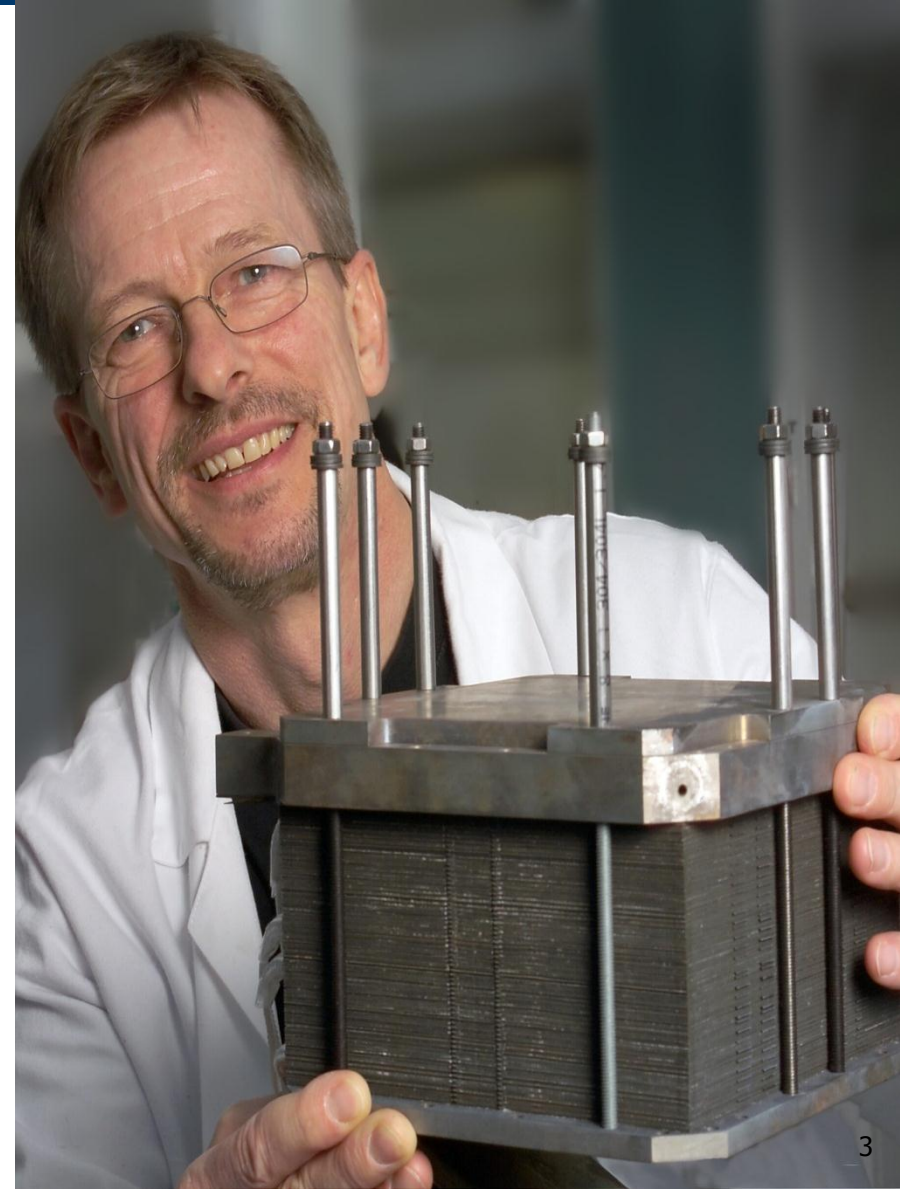
- Forlænget levetid
- Forkortet nedlukningstid
- Billigere løsning
- Det eneste der dur
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 -
 -
- Kroner og ører!



Hvorfor?

Behov:

- Nye teknologier
- Nye tilgange
- Nye produkter
- Udvikling og innovation
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 -
- Kroner og ører!



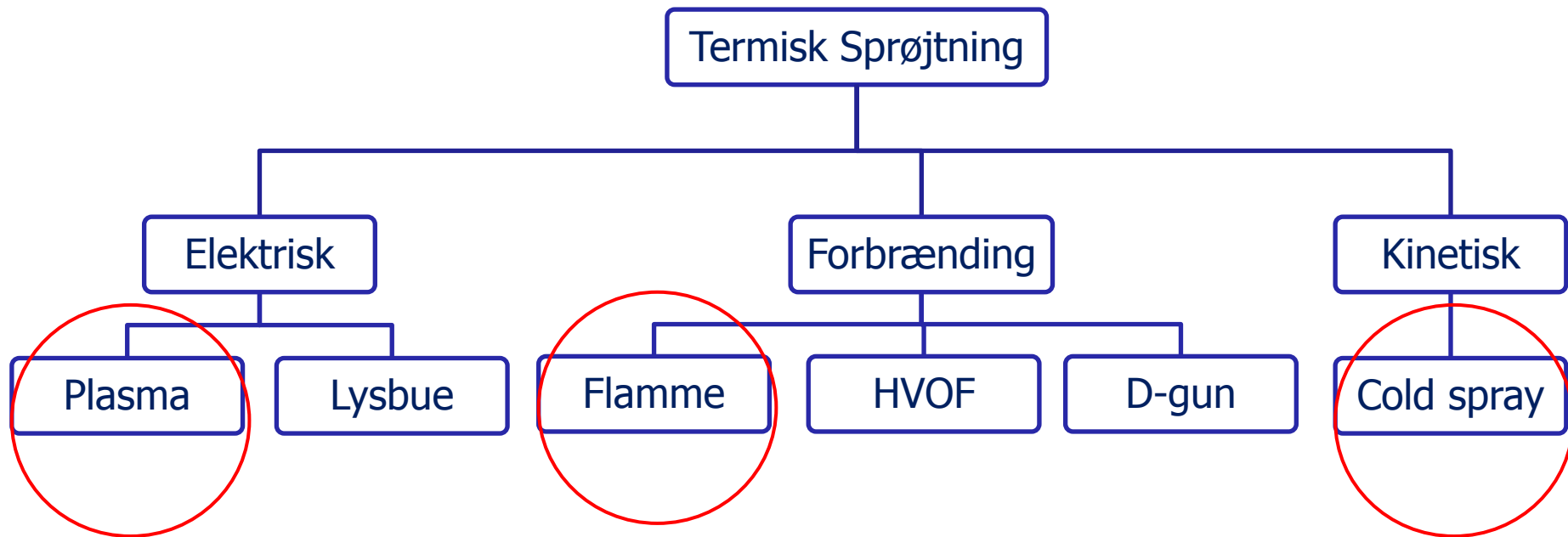
Mulighederne – overordnet set



Tynd -----> Tykkest

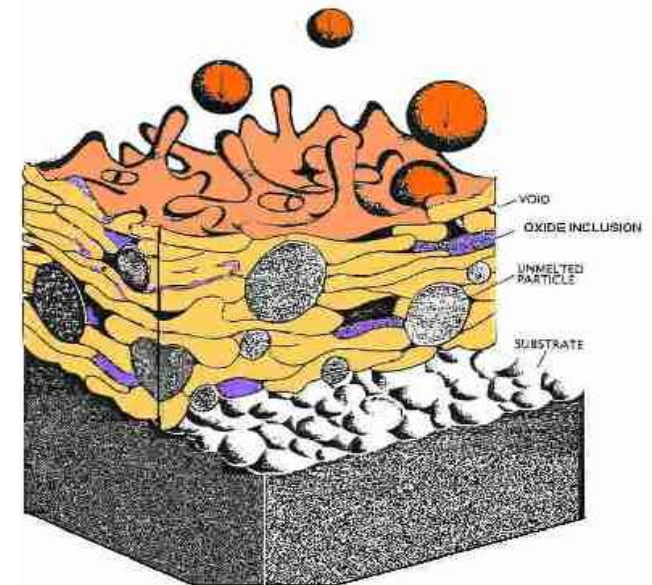
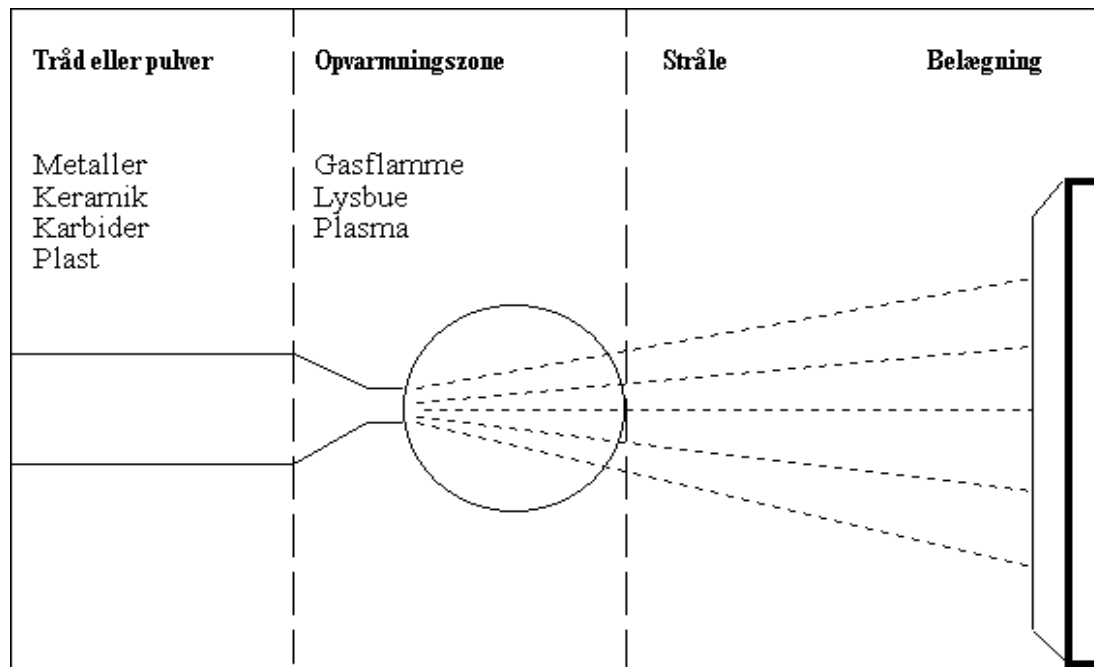
Sværest -----> Nemmest

Materialer, geometri, tilgængelighed...



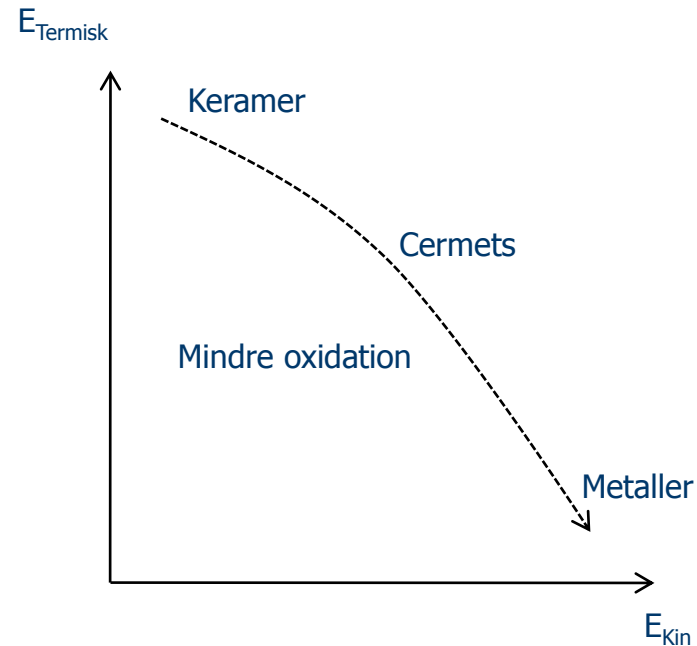
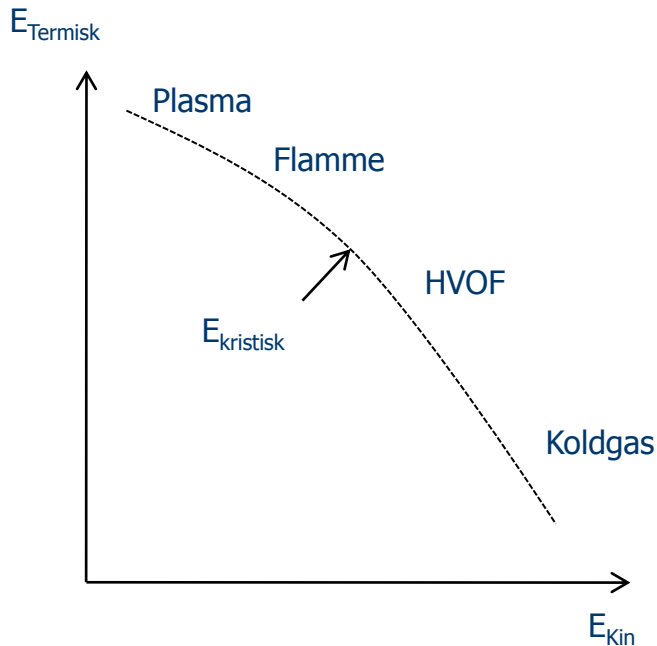
Procesmulighederne er mange!

Termiske sprøjteprocesser - generelt



Ordnet kaos – det kan kontrolleres

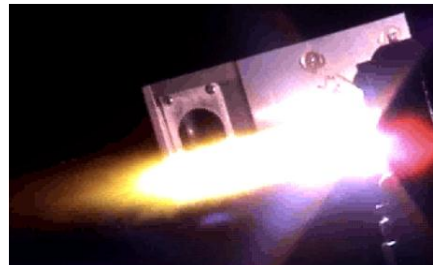
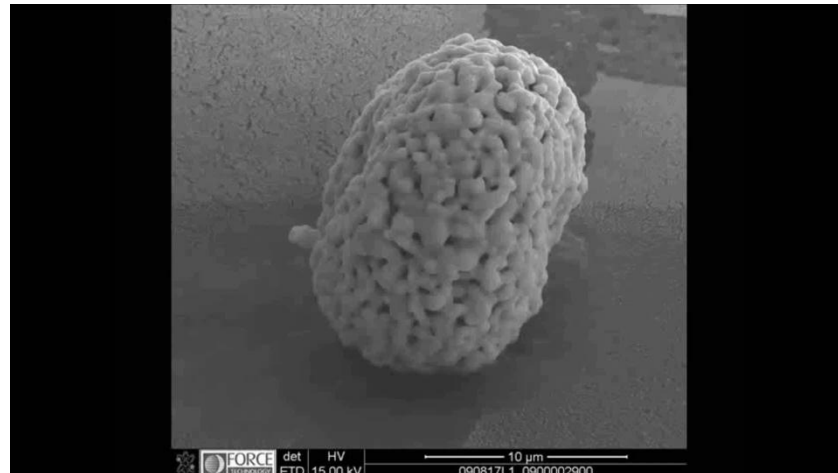
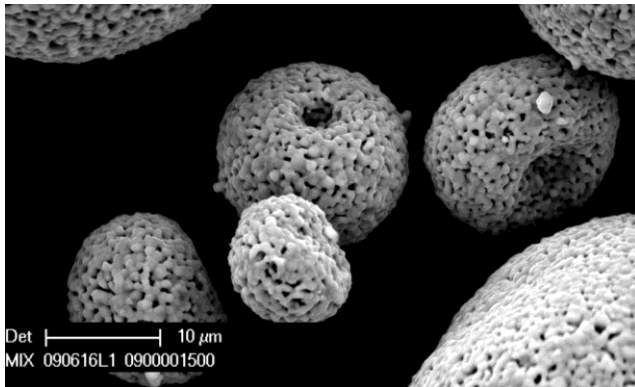
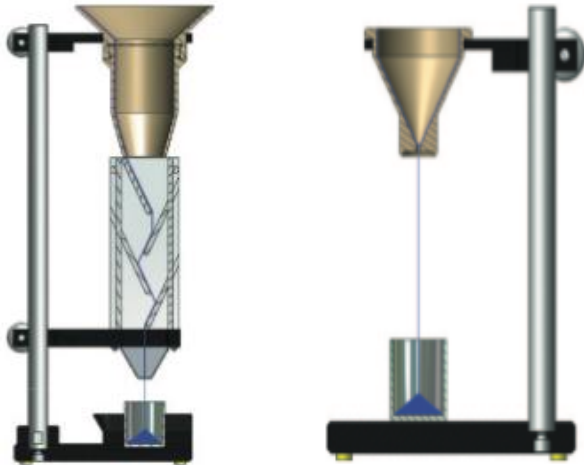
Termiske sprøjteprocesser - generelt



Ordnet kaos – det kan kontrolleres

Termiske sprøjtning - det kan kontrolleres

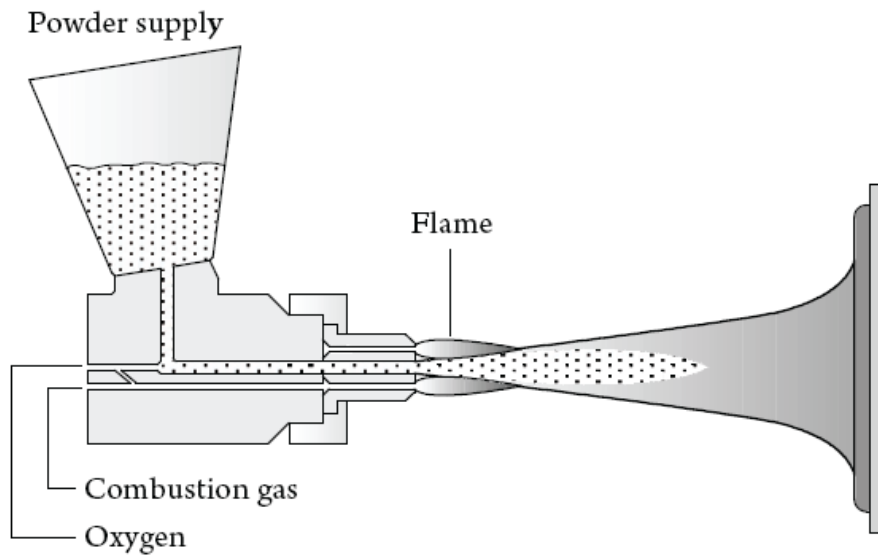
Vejen til succes: procedure specifikation, måling, kalibrering og metallurgiske undersøgelser



Termiske sprøjteprocesser - generelt

Metode	Temperatur [°C]	Hastighed [m/s]	Adhesion [MPa]	Oxid indhold [%]	Porøsitet [%]	Deposition rate [kg/hr]	Typisk lagtykkelse [mm]
Plasma	7000- 15000	100-800	20-70	1-3	5-10	1-5	0,2-2
Lysbue	>3800	100	10-40	10-20	5-20	6-60	0,2-10
Flamme	3200	50-100	7-18	10-15	10-15	1-10	0,2-10
HVOF	3300-5200	600-1000	>70	1-2	1-2	1-5	0,2-2
Koldgas	300-1000	500-1500	30-100	0,2	>0,5	10-30	0,2-?

Eksempel - Flammesprøjtning

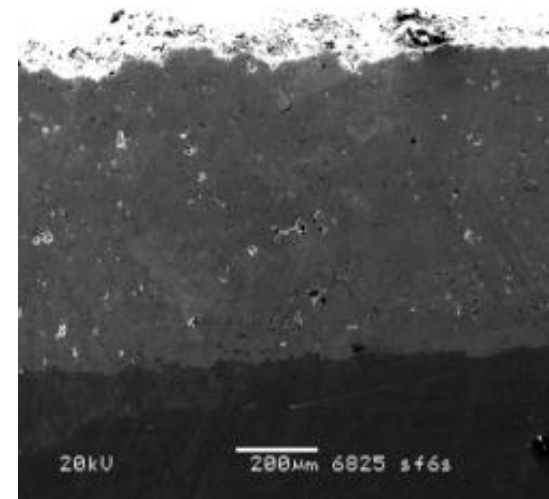
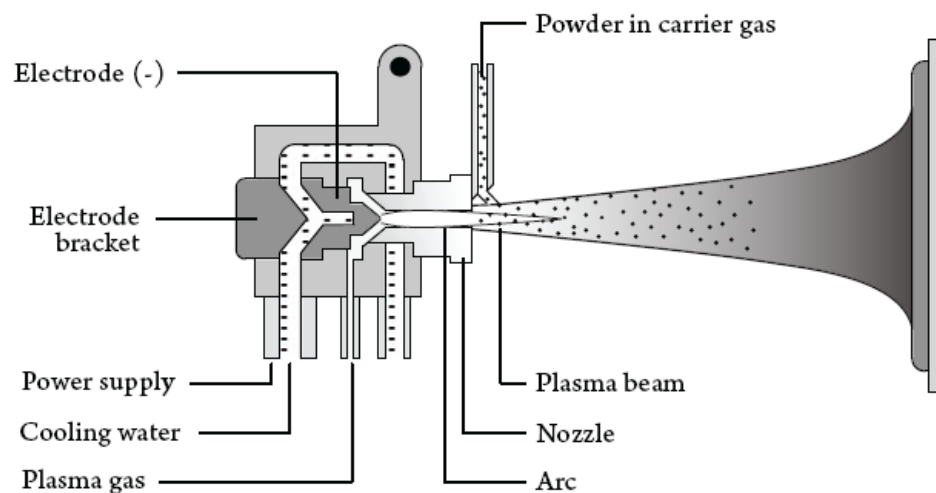


Eksempel - Flammesprøjtning

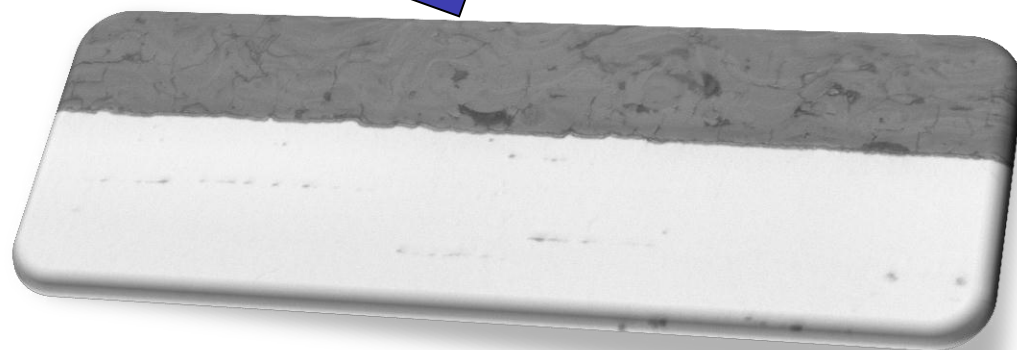
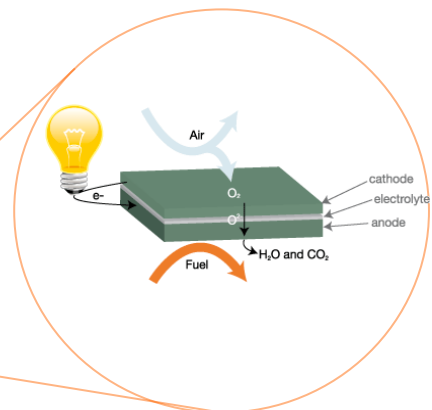
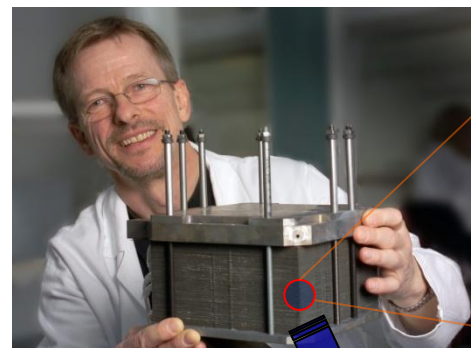


Transportabelt og nemt – onsite opgaveløsning mulig

Eksempel - Plasmasprøjtning

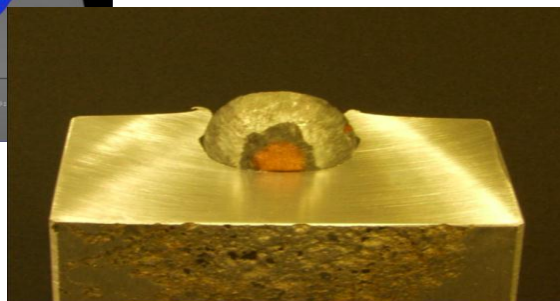
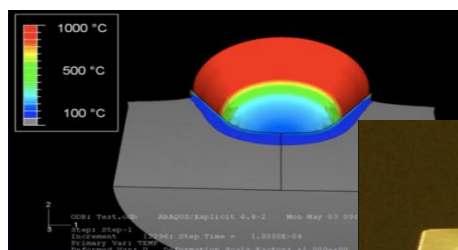
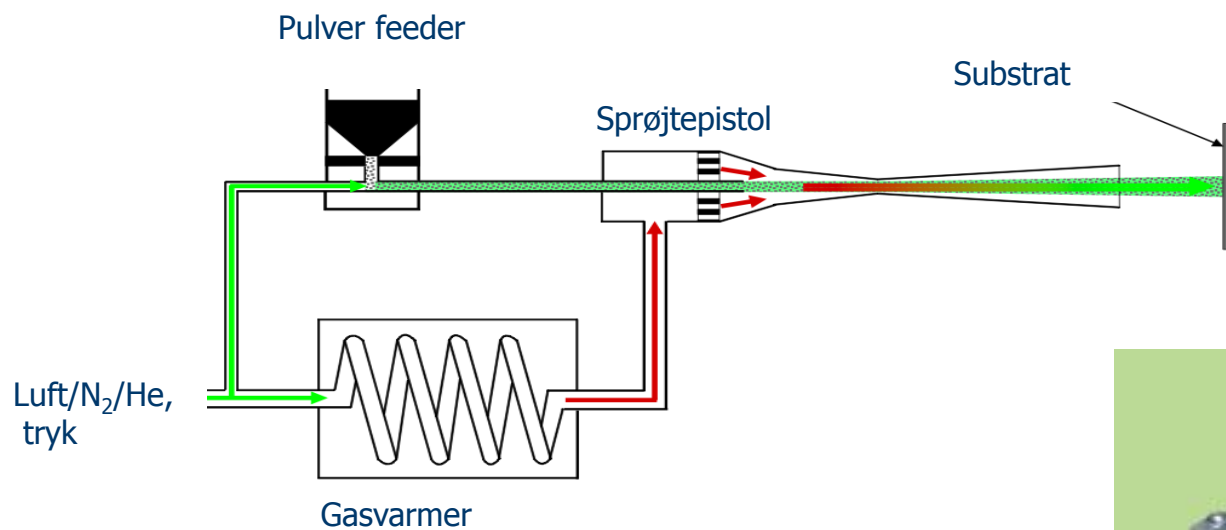


Eksempel - Plasmasprøjtning

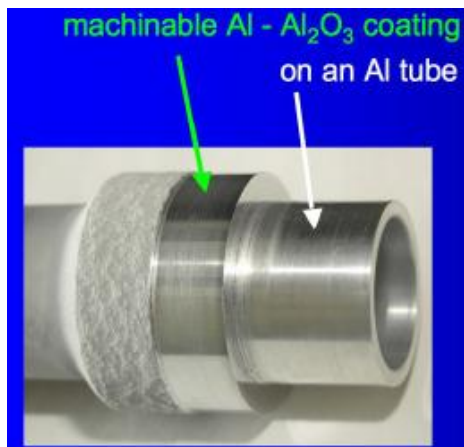


Fleksibelt og alsidig – materialepaletten er stor

Eksempel - Koldgassprøjtning



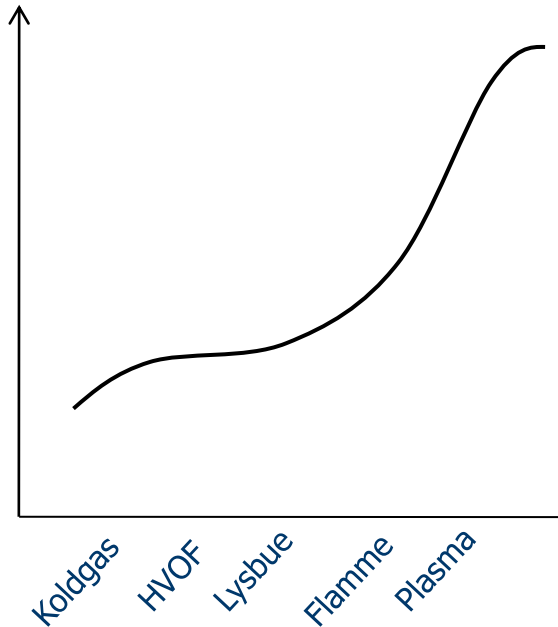
Eksempel - Koldgassprøjtning



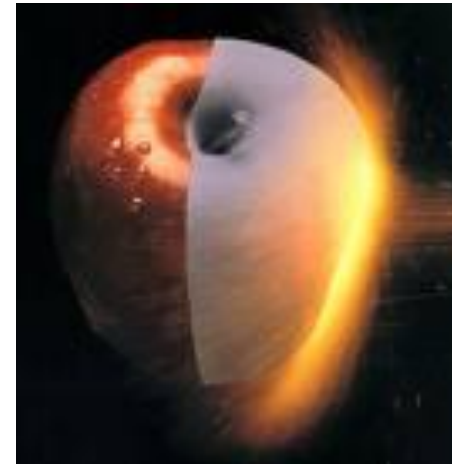
Stort potentiale – forsat under udvikling



Materialevalg



Substrat:
findes der noget der ikke
kan coates?



Samlet set er mulighederne tæt på ubegrænset

Ting der skal overvejes: for- og efterbehandling, line of sight, formål, anvendelse...

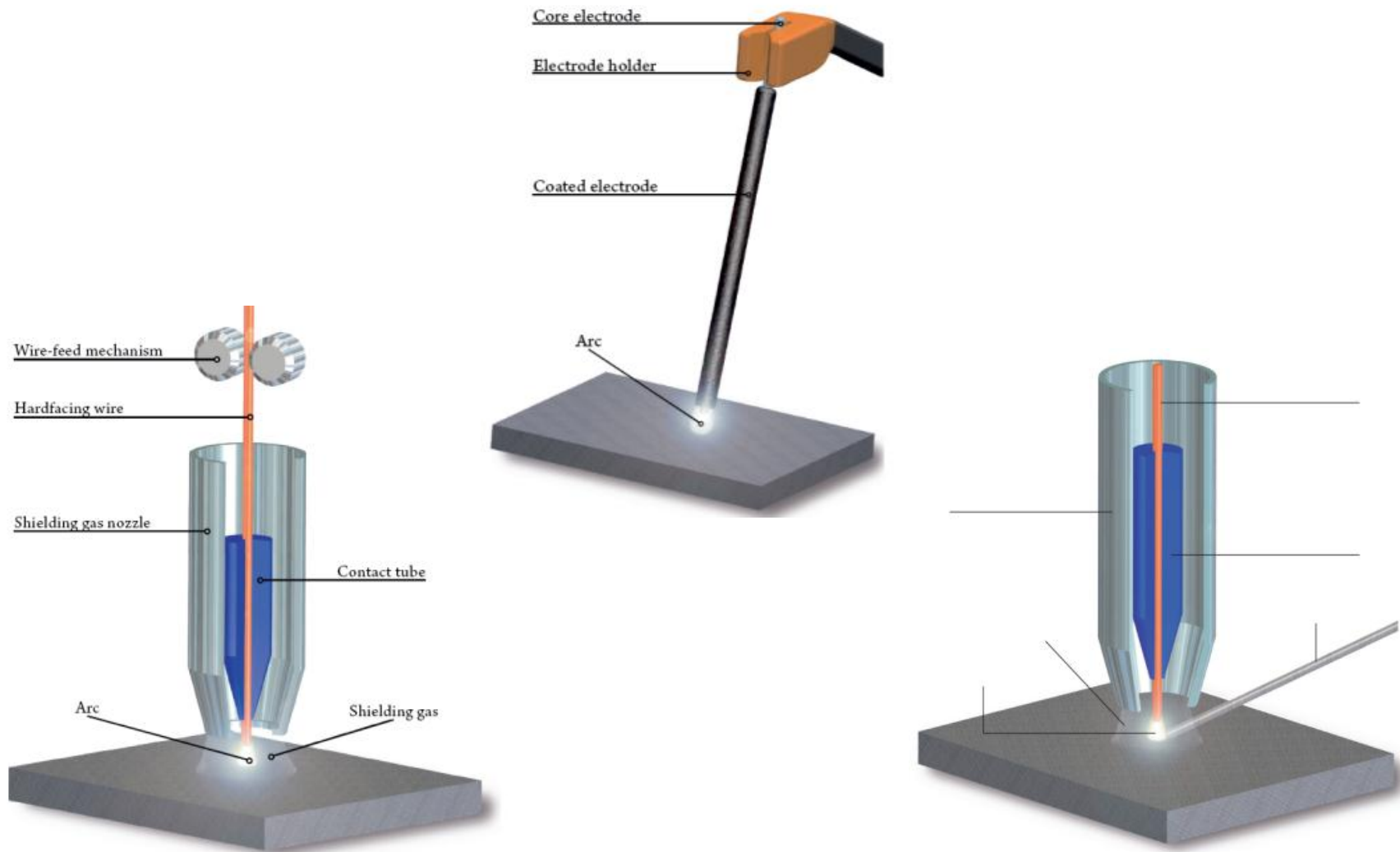
Kold sprøjtning

- Substrat max. 150 °C
- Ingen materialeforandringer
- Coating ikke 100% homogen
- Begrænset vedhæftning
- "Ubegrænset" materialevalg

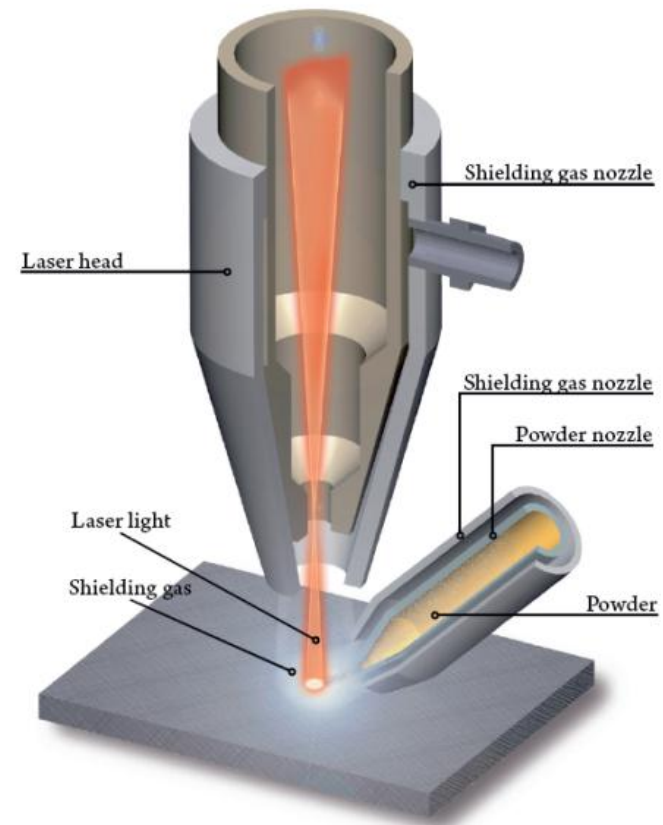
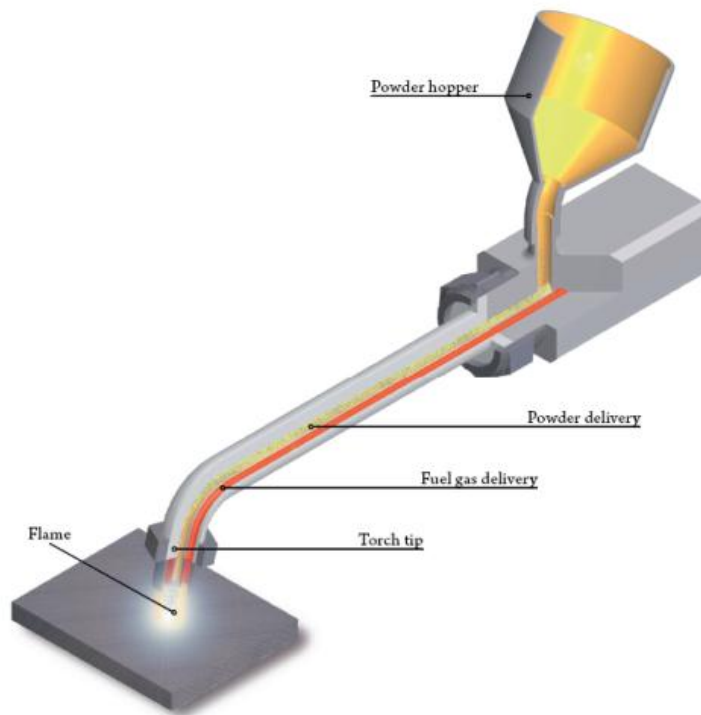
Varm sprøjtning

- Fusing at 1050 °C
- Risiko for materialeforandringer
- Risiko for deformation
- Coating 100% homogen
- Optimal metallurgisk binding

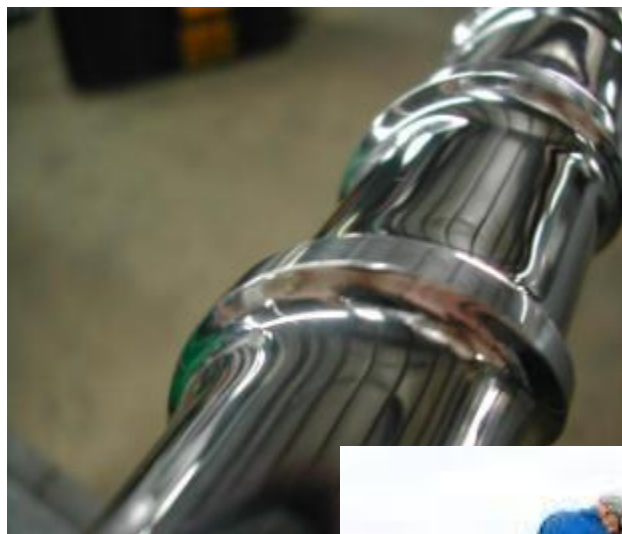
Påsvejsning - metoder



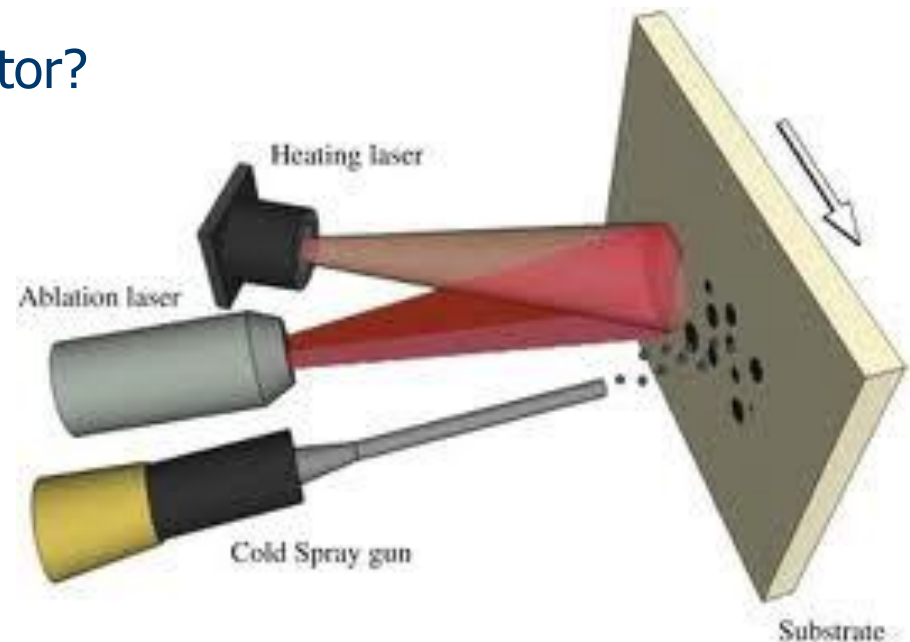
Påsvejsning - metoder



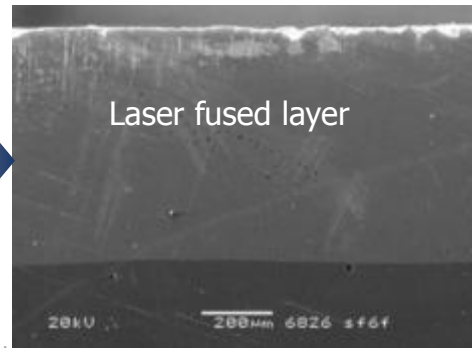
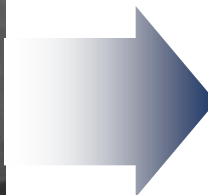
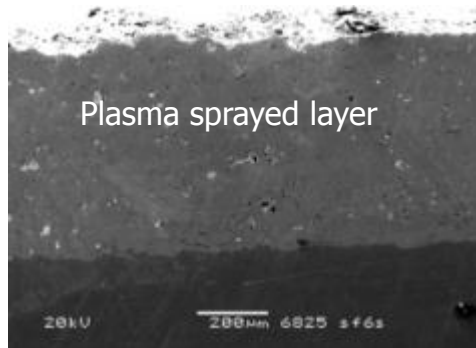
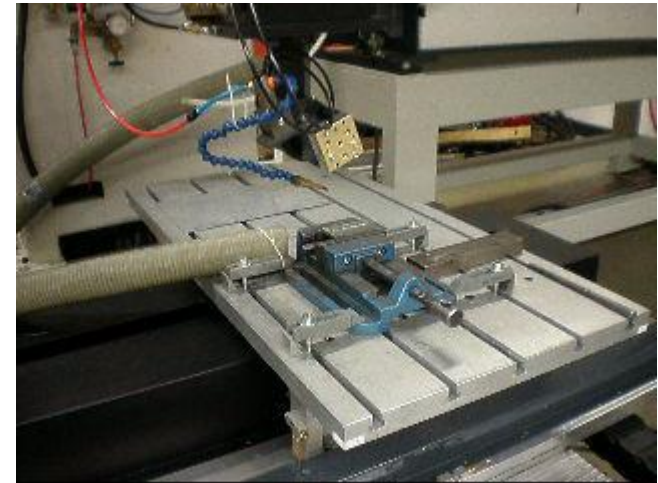
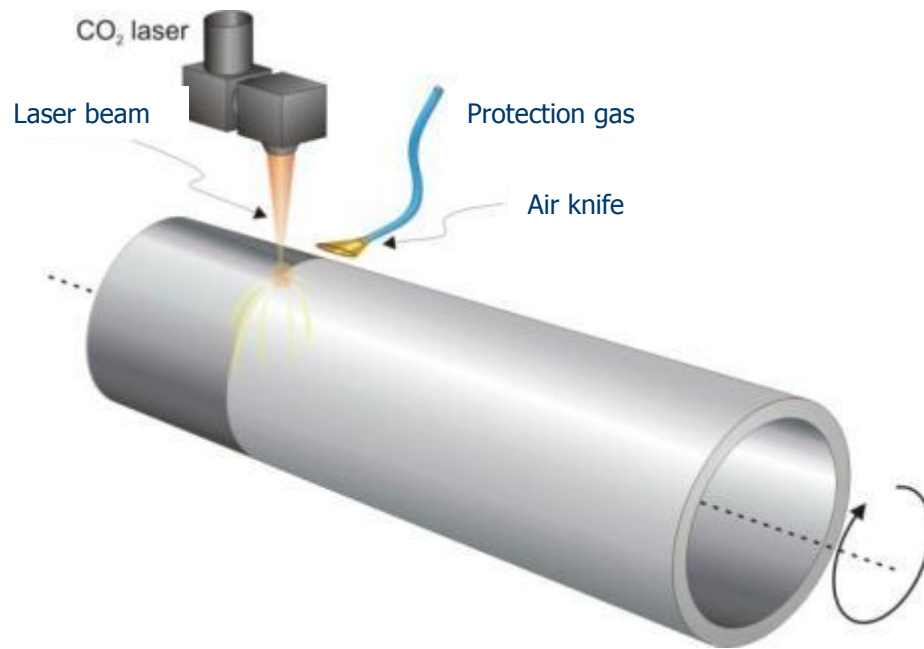
Påsvejsning - eksempler



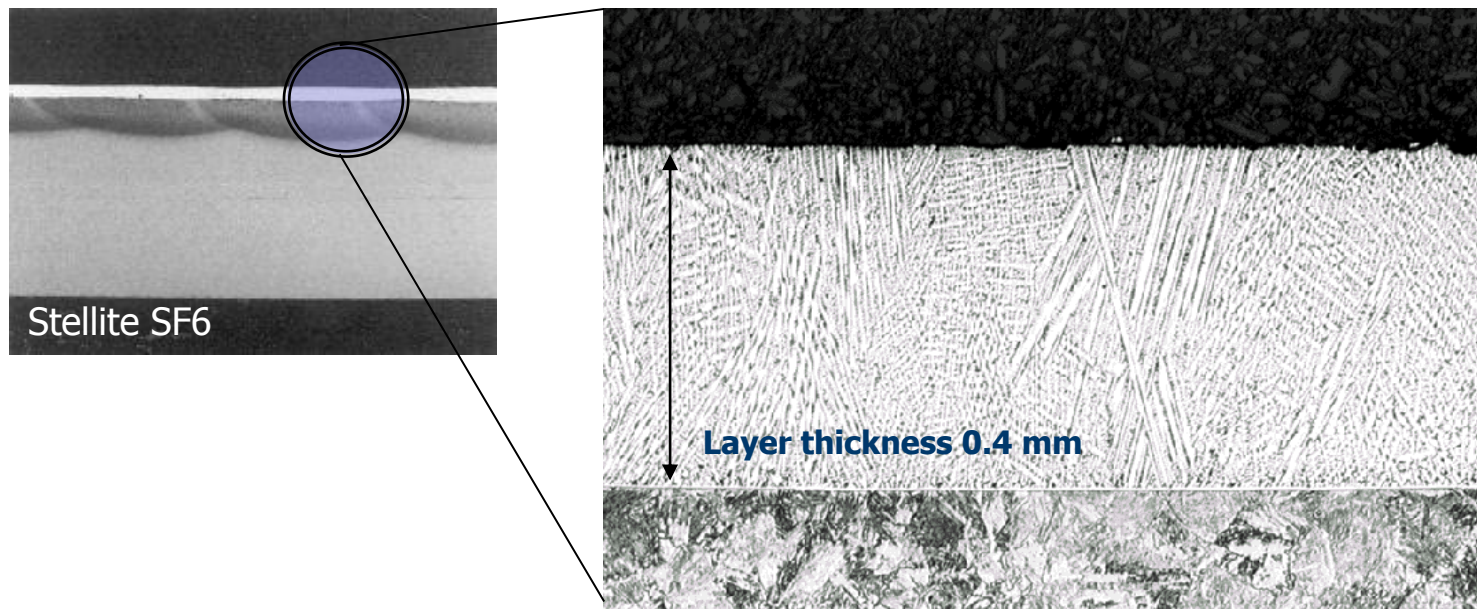
- Laser glasering af termisk sprøjtede belægninger
- Laser fusing af termisk sprøjtede belægninger
- Laser hybridsvejsning
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- Hvad er den begrænsende faktor?



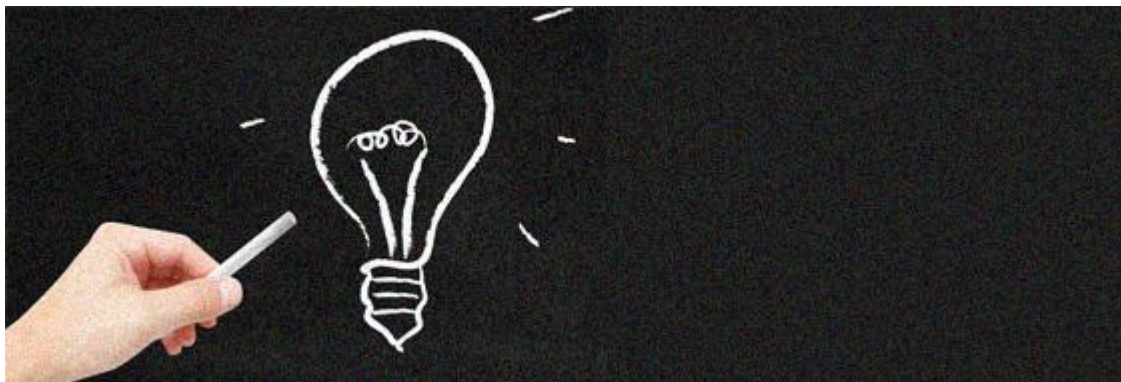
Laser fusing



Laser fusing



- Der er en bred vifte af processer at vælge imellem
- Materialevalget er enormt
- Bruges i forbindelse med reparationer, optimeringer, ny teknologi...
- Overvej formål, brug, miljø...
- Målet er at have et bedre, billigere og holdbart slutprodukt
- Kombination af tilgange *kan* være vejen frem



Tak for opmærksomheden

Peter Tommy Nielsen
Projektleder

FORCE Technology
Svejseteknisk innovation

4326 7401
ptn@force.dk