



Creepservice Sàrl

Sentier du Minsitre 22

2014 Bôle

SWITZERLAND

Creepservice Sàrl

- **Swiss engineering company since 2006**
 - Legal holder of Intellectual Properties Rights
 - European Patent Application **EP06016249.2**
 - Patent applications in Europe, USA, China, Korea, Taiwan, Japan



Breakthrough CS technology

- First high performance and low cost technology enables to improve considerably service life time of micro tools and sewing needles
- Ultra low friction, increased breakage resistance
- Improved anticorrosion, anti-sticking and biocompatibility
- Low temperature (<70°) surface treatment

CS machine « East 01 »



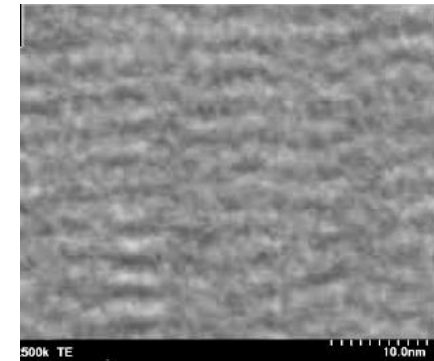
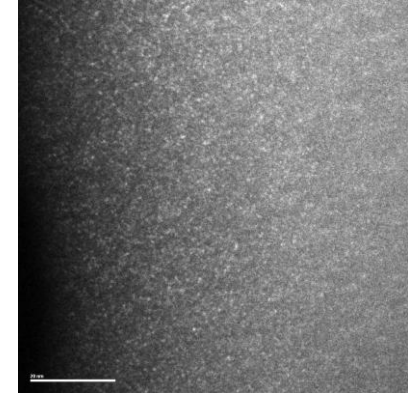
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CS coating equipment

- **Method consists of a combination**
PVD +CVD + low energy ion implantation
- **Filtered arc sources (x2) for metal deposition**
 - + Reactive gases
- **Pulsed arc carbon source**
 - adjustable filtering of macroparticles
- **Low energy ion gun**
 - etching / polishing / implantation

CS nanostructured coatings

- Hardness: $H_v=3000-5000HV$
- High Young modulus $> 600GPa$
- High density $> 2.9 g/cm^3$
- Ultra smooth, $R_a < 10nm$
- Thicknesses: $10nm-10 \mu m$
- Friction coefficient 0.12
- Transparency in InfraRed
- Biocompatible



Transmission Electron Microscopy

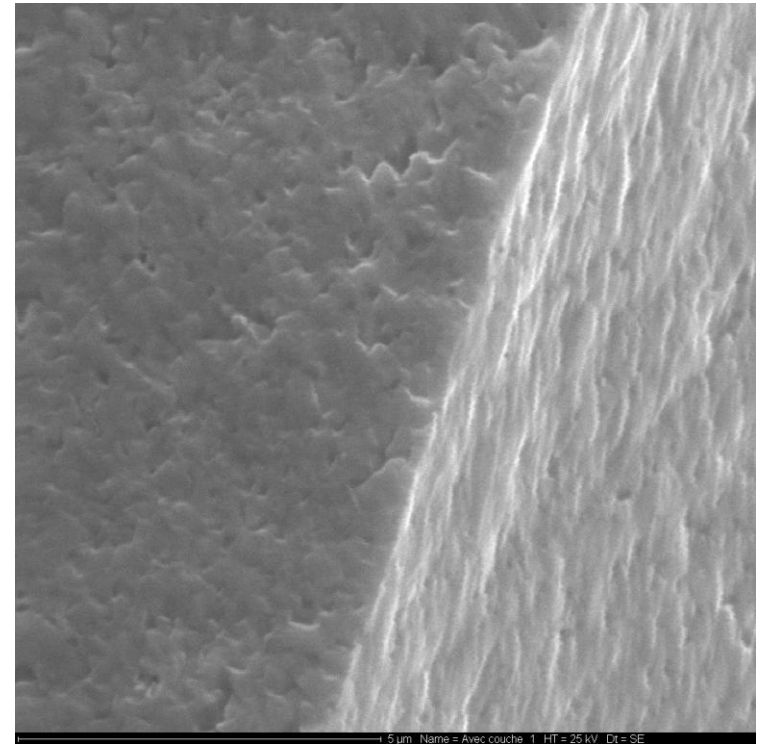
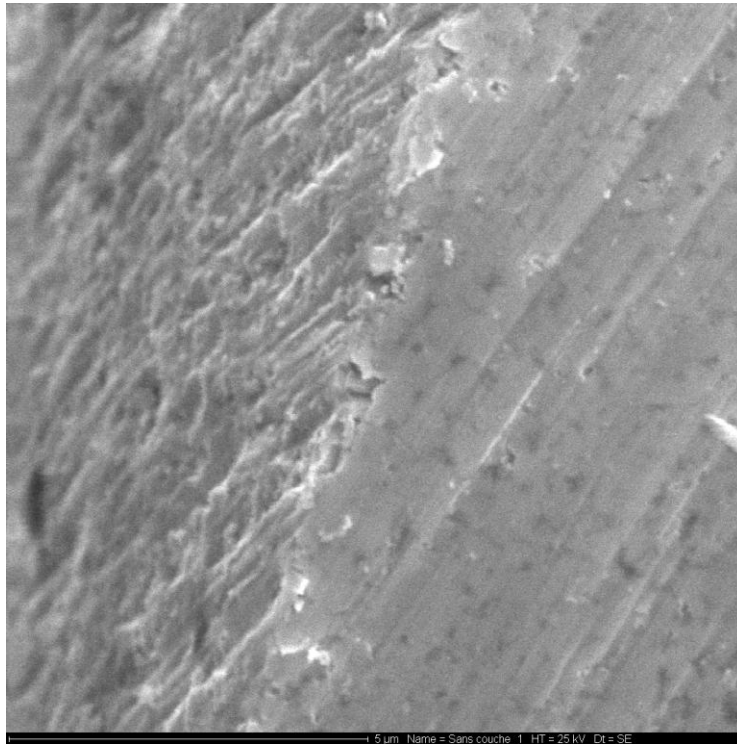
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CS coatings improve surface

Cutting edge drill 0.105mm

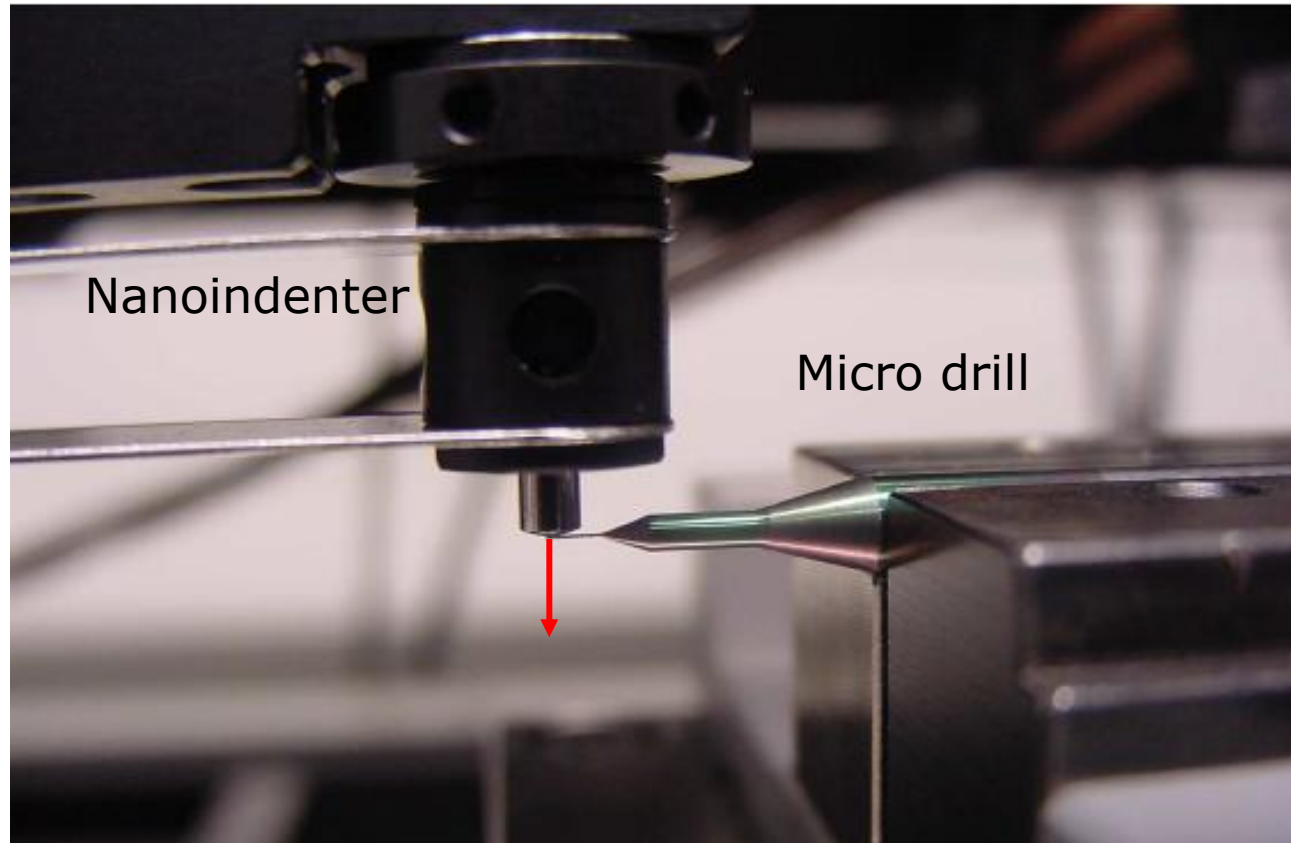
Initial surface

Ion polishing



Scanning Electron Microscopy before and after CS

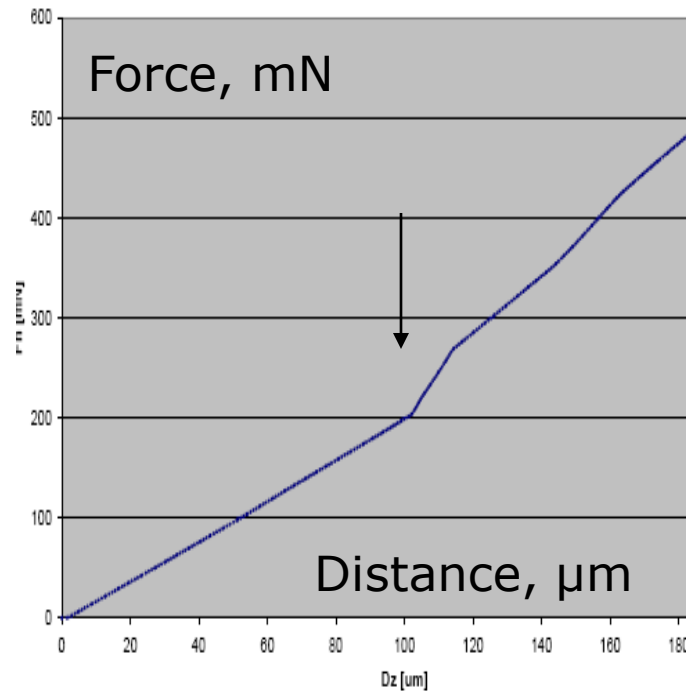
Flexion tests, on micro drill of diam.100 microns



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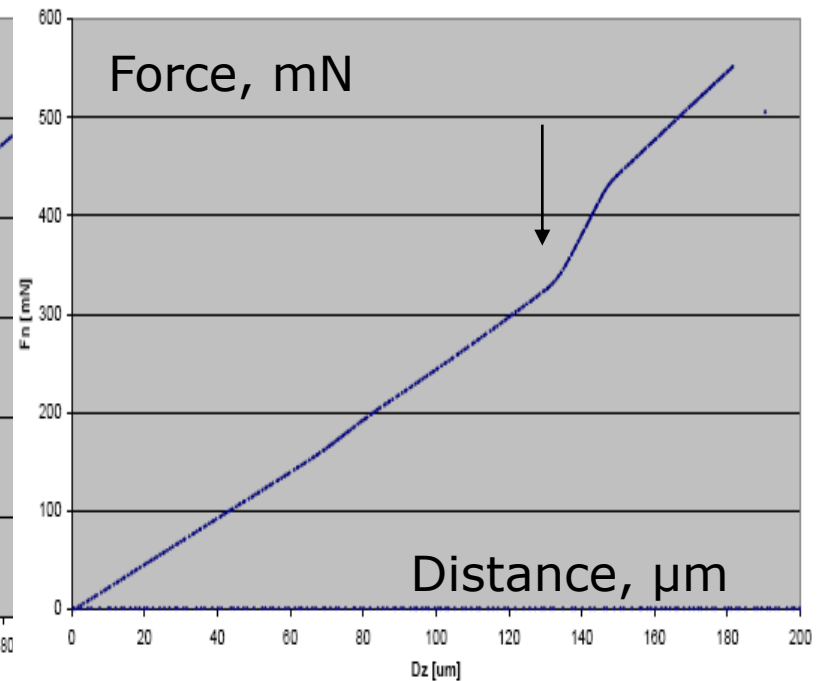
Flexion tests, micro drill of 0.1mm diameter

Standard



apture à $F_n = 481\text{mN}$ et $D_z = 182\mu\text{m}$

CS Coated



apture à $F_n = 551\text{mN}$ et $D_z = 181\mu\text{m}$

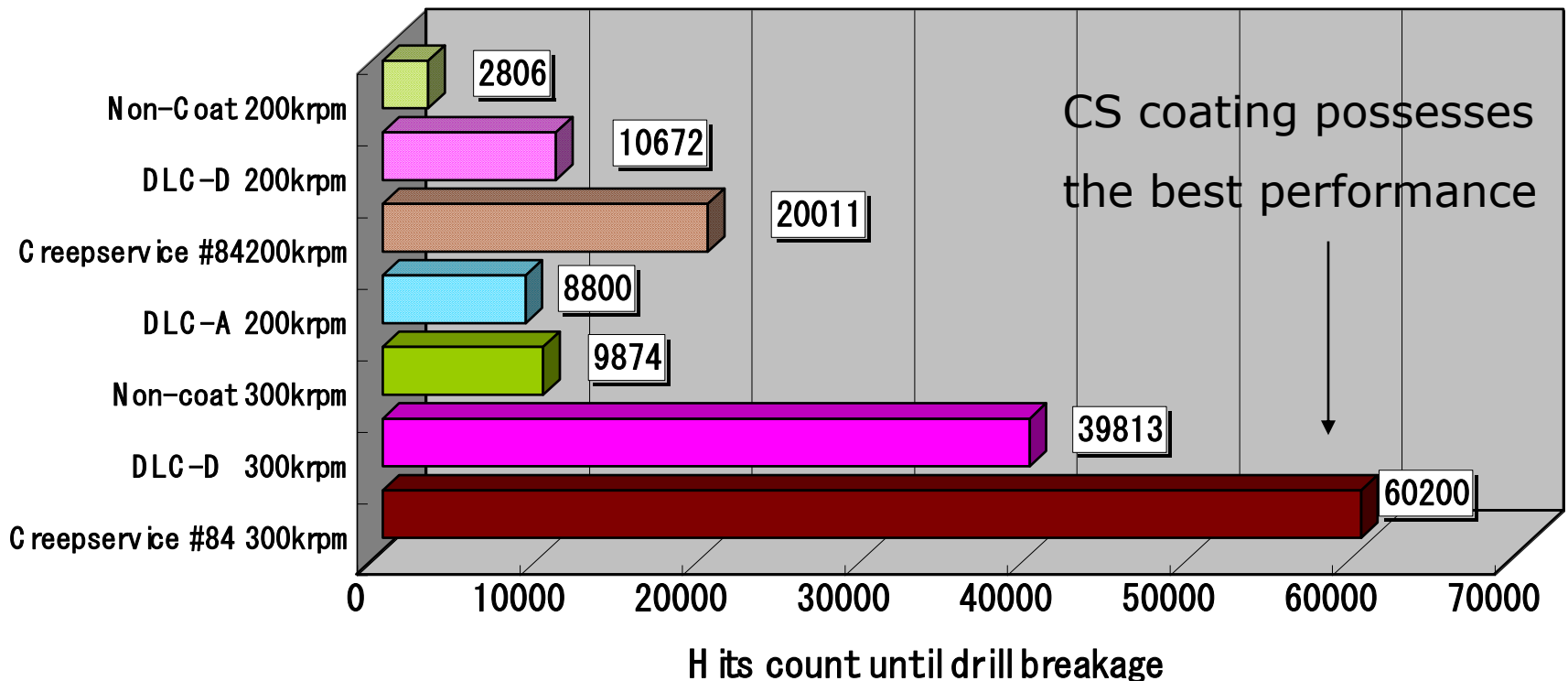
CS coating improves >40% breakage resistance

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Service life time: drilling tests (Japan) on micro drills : comparison of CS against world leader coating in Japan

	drill life
Non-Coat 200krpm	2806
DLC-D 200krpm	10672
Creepservice #84200krpm	20011
DLC-A 200krpm	8800
Non-coat 300krpm	9874
DLC-D 300krpm	39813
Creepservice #84 300krpm	60200

Spindle speed :200krpm/300krpm,
 Infeed rate :1.4m/min, Work board:BT
 HL832HS t0.1x4stacks (double side 12μm
 Cu)
 Entry board :LE800、Backup board :SPB-CM



CS coating first industrial applications

- PCB micro tools
 - Mass production in Japan since 2009
 - The license was sold to the Japanese world leader company
- Sewing needles
- Watch industry
 - Luxury Swiss watch industry will produce in 2010
- IR optical coating
 - Military applications
- Dental and other medical tools
- Automotive industry
 - Car engine moving parts under testing