Title:

Cannulated bar technology for the orthopaedics: application and processing

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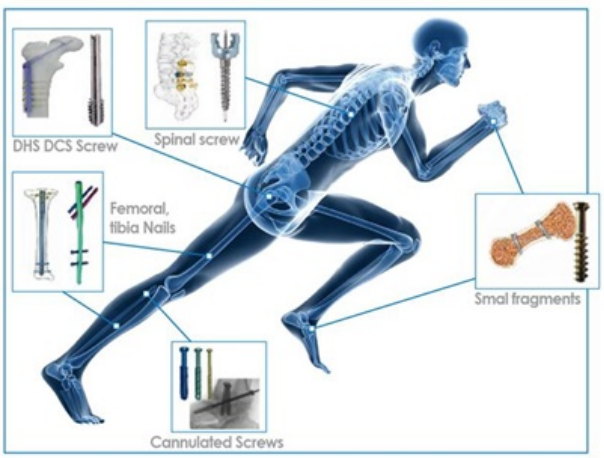
Proprietary approach to producing cannulated bars for screws and nails for trauma

- Surgeons' demand
- Cannulated instruments and implants
- Manufacturing cannulated
- Summary

Surgeons' demand

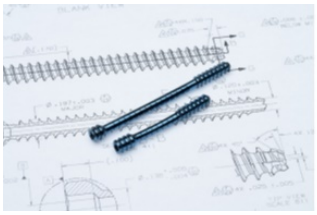
- MIS (Minimally Invasive Surgery) K-wire
- Long bar / small hole technology
- Spec. parameters



Cannulated instruments and implants

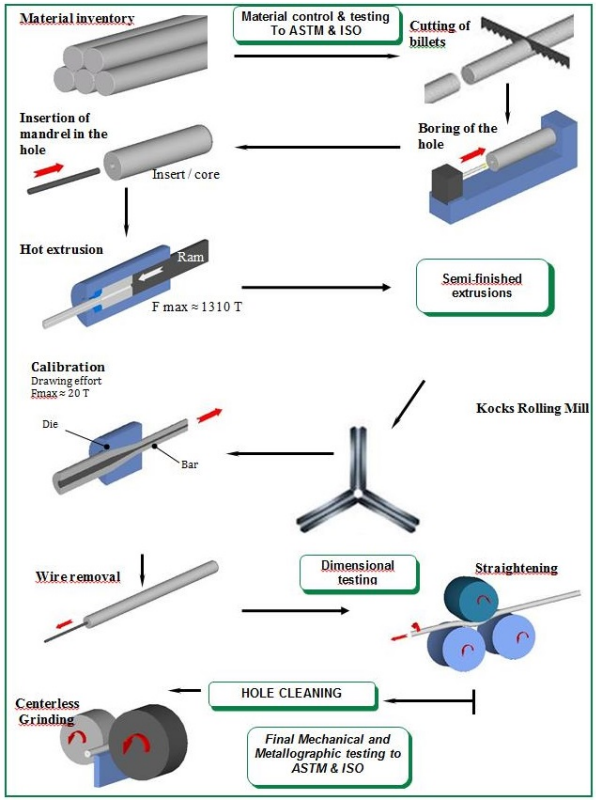
- Instruments: sonotrodes

- Implants: screws, nails

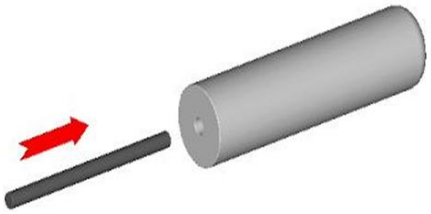


Manufacturing cannulated

Billet and Extrusion

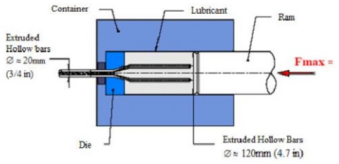


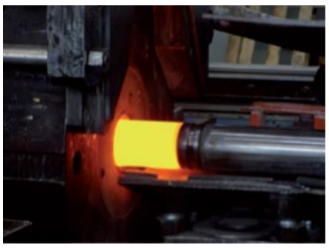
Core material: Same strength at extrusion temperature, highly ductile self-reducing lost core.



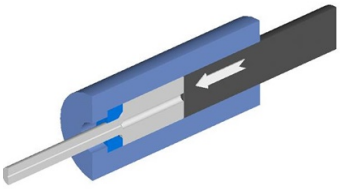
Coating films: Inert material, stop-off membrane, anti-welding prevention, removable, biocompatible.

Hot extrusion press in operation




Extrusion: Glass lubricant



Cold or hot drawing / Heat Treatment / Straightening

KOCKS Rolling:


- Existing technologies

- Selected rolling



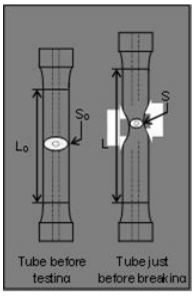

Wire extraction

Cleaning and dimensional controls

Metallurgy testing



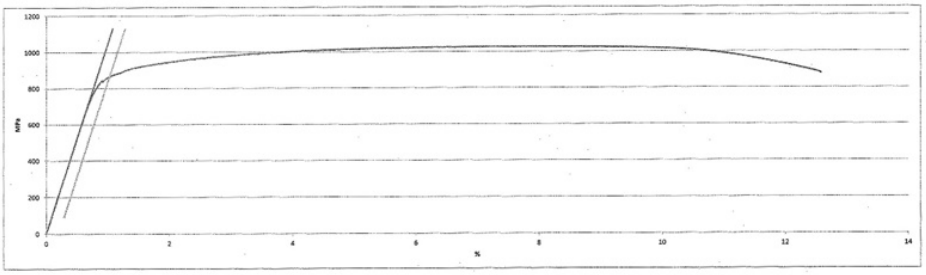
Tensile test



N° du Lot : 1OFP17050044
N° de Série : TA6VELI-12.40-5.00 1T
Opérateur : E. ALLIGIER
Norme d'essai : ASTM E8/E8M - Method A

Date de l'essai : 07/07/2017
Heure de l'essai : 08:23

Essai de traction
N° de série de la machine : 904081
N° de série de l'extensomètre : 8843
Vitesse dans la zone élastique : 0.005 %/s
Vitesse dans la zone plastique avant Rp : 0.01 %/s
Vitesse dans la zone plastique après Rp : 0.1 %/s



N° de l'éprouvette	Epaisseur	Diamètre	Section	Fm	Rm	Module	Rp0,2	A 4D	A 5D	2%	Pos cassure	Comment.
	mm	mm	mm²	kN	MPa	GPa	MPa	%	%	%		
2	2,490	9,960	58,43	59,98	1026,5	104,73	865,0		11,6	31,6	Entre repères	

Summary

Surgeons' demand for fracture fixation call for the use of cannulated bars. The mastering of the entire process requests metallurgical expertise as the composite metallic from billet to final bar permanently uses diverse features of alloy properties. Several forging techniques are being used: thanks to glass lubrication, extrusion with axial and hydrostatic compression can take place, then by a triangular axial hot rolling, finally followed by an axial traction with drawing.