



MANOIR INDUSTRIES



Explosive depth hardening

ON CAST MANGANESE STEEL

Outreau Technologies Solution: meeting railway company requirements



Cast manganese steel crossings, pre-hardened by explosion, are already used in North America and should soon be introduced in Europe where rail operators are strongly interested in this technology.

The Swiss Federal Office of Transport has approved the cast manganese steel crossing, pre-hardened by explosion to implement the Swiss railway network.

Outreau Technologies, Manoir Industries monitor subsidiary, specialized in crossings since 1954, has conducted a research program in collaboration with the Swiss Railways, to monitor on track the evolution of the wear profile on cast manganese steel crossings, pre-hardened by explosion.

The cross-border corridors used by all the railway companies will face a significant increase in rail traffic. It will generate additional constraints on the crossings with the rise of:

- axle load
- speed limit
- frequency
- diversity of rolling stock material

At the same time, maintenance optimization will indeed be necessary to reduce the additional costs due to the traffic growth.

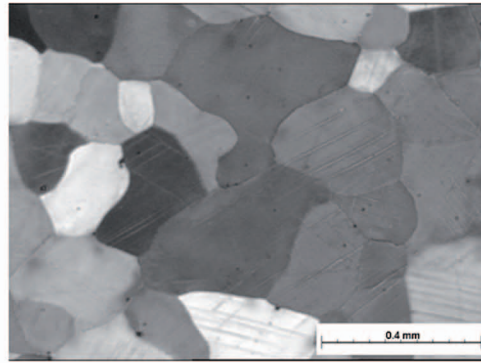
That is why the "Chemins de Fer Fédéraux" and Outreau Technologies, after analyzing the Cost Life Cycle, have set up a 5-year trial and follow-up program to achieve the pre-hardened Cast Monobloc Manganese crossings with welded rails.

Manoir Specialities Business Unit

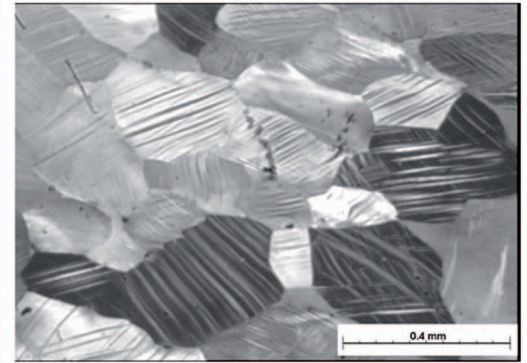
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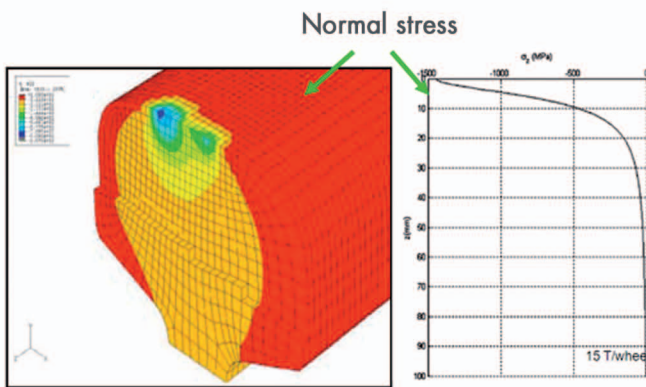
The origin:
Plastic deformations create lines of dislocation which harden the structure from 200 Hb to 450 Hb.



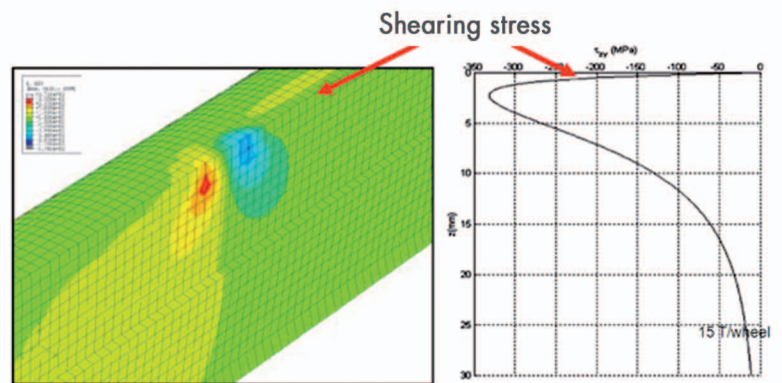
Austenitic structure (before track installation)



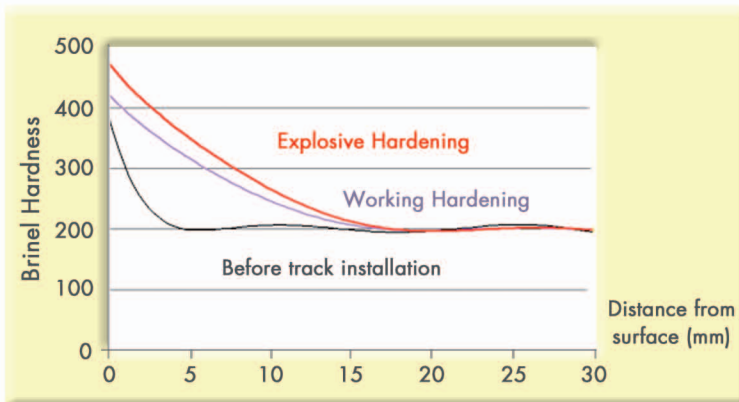
Austenitic structure (after 6 months)



The normal stress is very high, up to 10mm

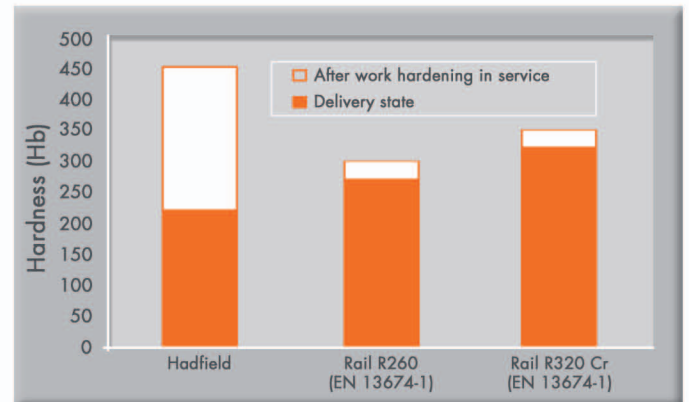


The shearing stress is very high, up to 7mm



Explosive Depth Hardening: Physical effects on the crossing

- Hardness > 352 Hb on surface
- Hardness effect up to 15 mm from surface



Service Life: Wear Resistance

- High hardness reached by work-hardening inducing an excellent wear resistance

