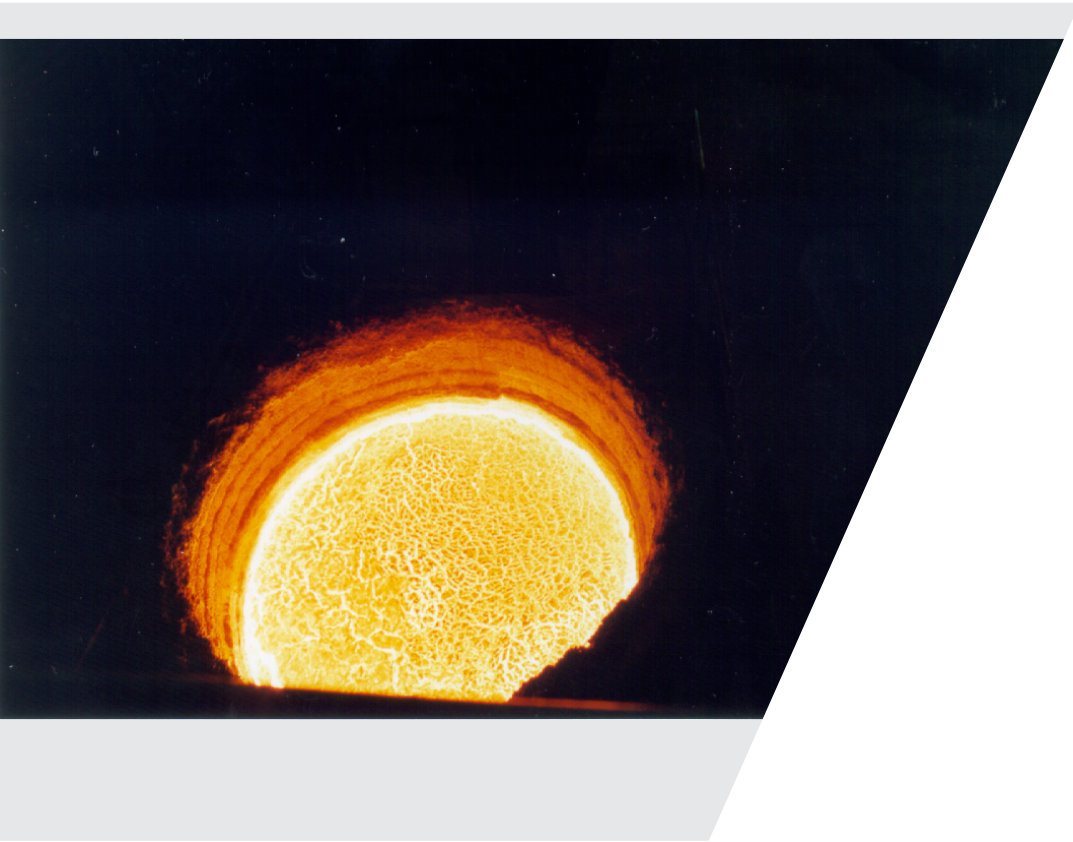


Expertise in Leaf Spring Steels

Technological Developments and Capabilities



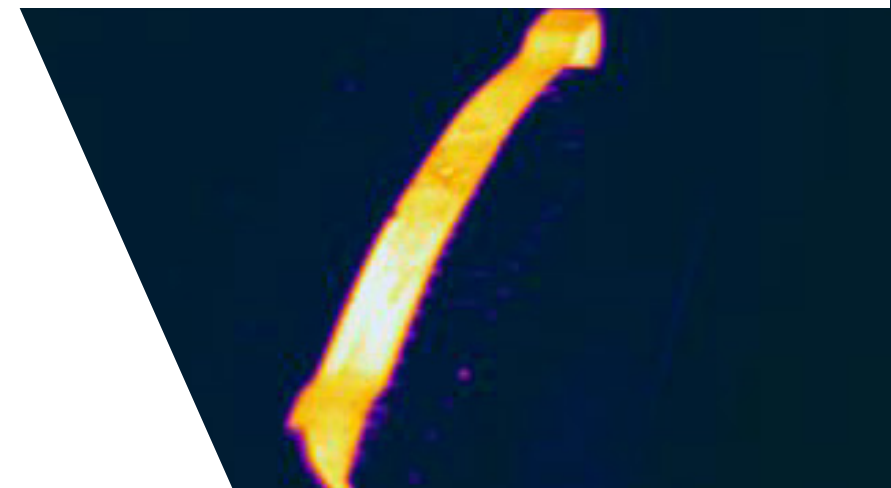
Who is Sidenor as Spring Steelmaker?



- SIDENOR might be the reference in leaf spring performance
- It is thinking in the next generation of truck suspensions
- SIDENOR certainly can be a key partner for the future:
 - Experience
 - Knowledge
 - Capabilities
 - Determination

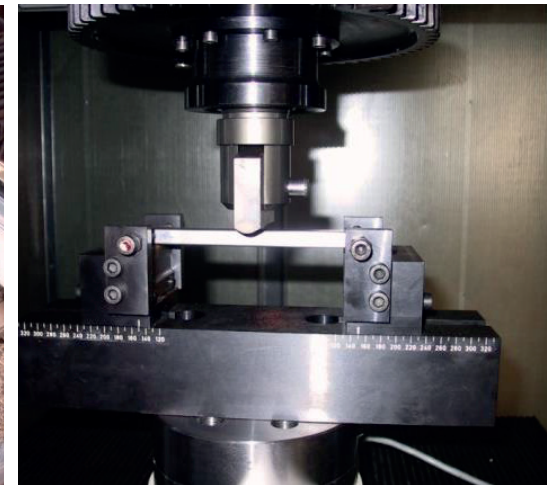
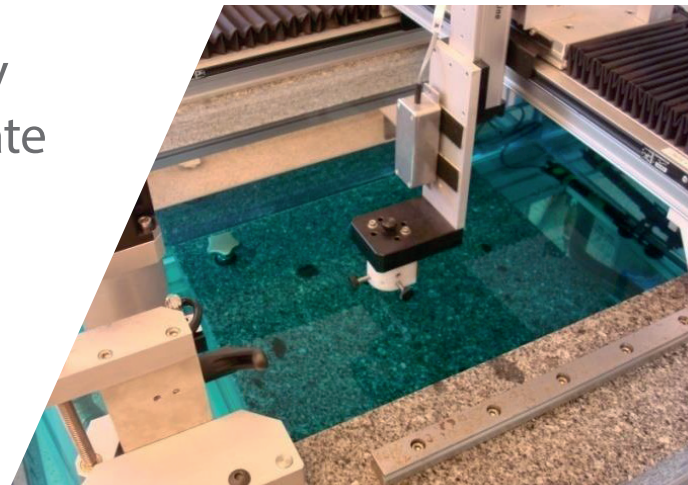
Experience

- **SIDENOR** has been producing flat bars (profiles A, B and C EN10092) for leaf springs for **more than 20 years**
- It is a **reference supplier** for the market leaders among the European leaf spring makers
- Its experts dominate its own **manufacturing processes** and also its customers processes



Knowledge

- SIDENOR has a Research & Development Centre unique among its direct competitors
- No other steelmaker can control its own products by fatigue testing, off-line ultrasound testing or SEM
- Its R&D division participates regularly in European funded projects to update to the latest technological and metallurgical developments



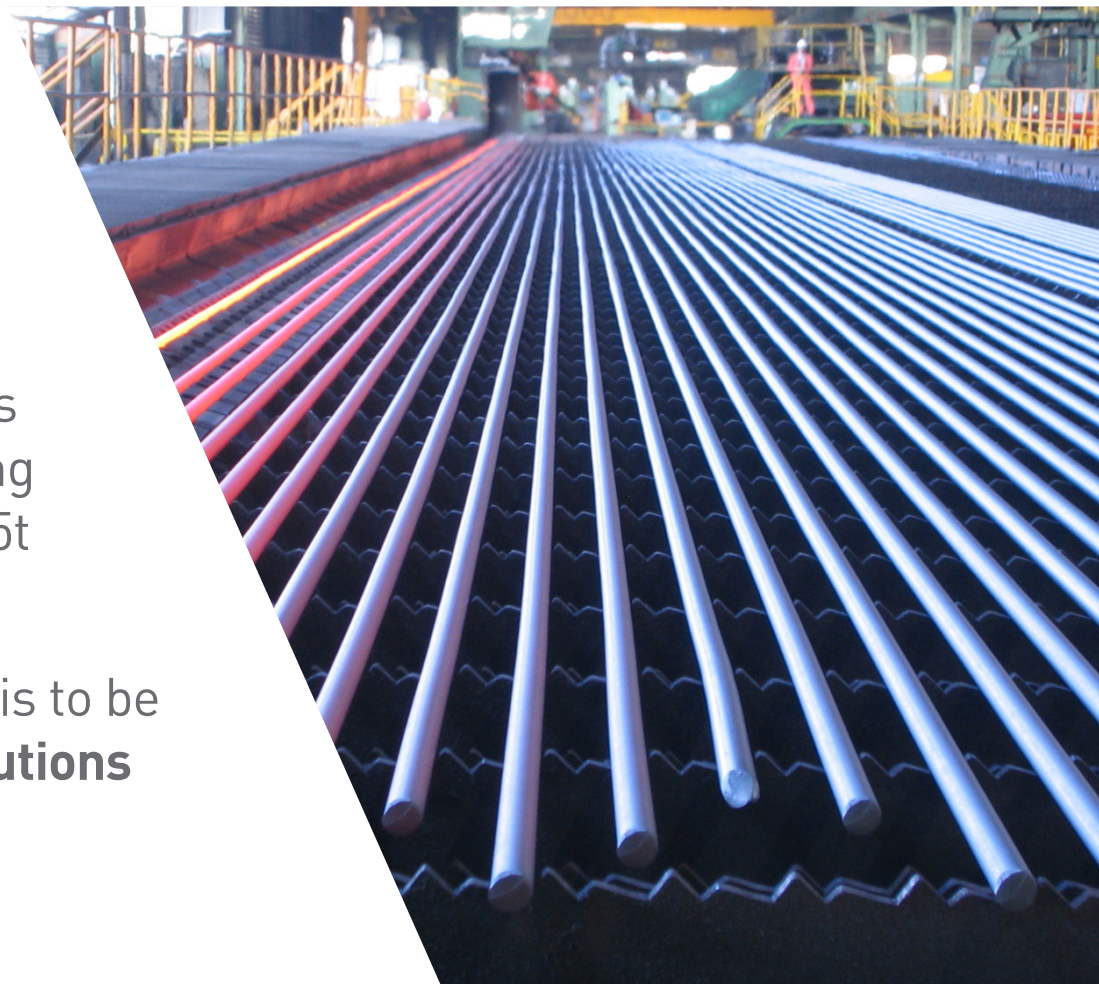
Capabilities

- **SIDENOR** has a **modern steel shop** in Basauri (year 2000, revamped in 2013) and a new flat mill (2008) in Azkoitia
- Thickness: 5-62,5 mm; width: 50-140 mm
- **SIDENOR** yearly capacity of these products is over 60.000 t



Determination

- **SIDENOR** is committed to become the worldwide **reference steelmaker** for the leaf spring market
- During the last 15 years a great effort has been done to **optimize** own manufacturing processes and **develop** new products (7,5t monoleaf spring)... and it goes on
- **SIDENOR** is a steel supplier, but the aim is to be your partner to offer you **customized solutions**



Benchmark evaluation



SIDENOR products periodically are evaluated by key customers against those from direct competitors



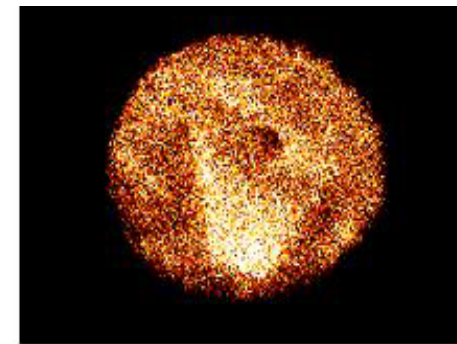
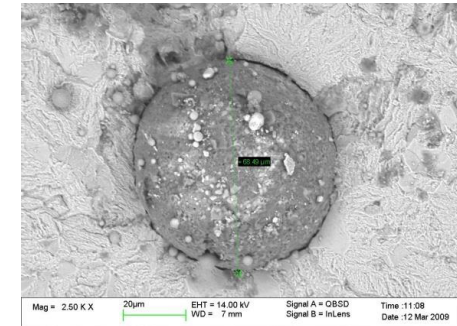
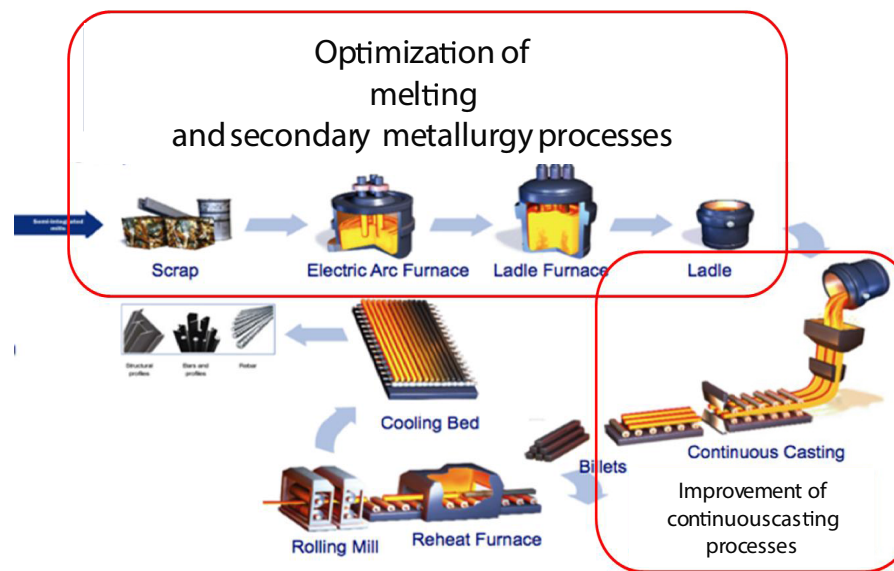
Same testing conditions, heat treatment, hot rolling batch, leaf geometry, etc. to evaluate only steel quality



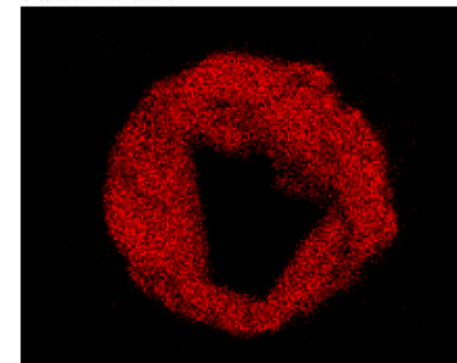
According to these evaluations, fatigue behavior of the SIDENOR flat bars is the benchmark of the European market

Analysis of fatigue failures

All the broken tested parts are analyzed by electron microscopy (SEM + EDS) and correcting actions are implemented in the steel manufacturing process



Aluminum Ka1



Calcium Ka1

New developments

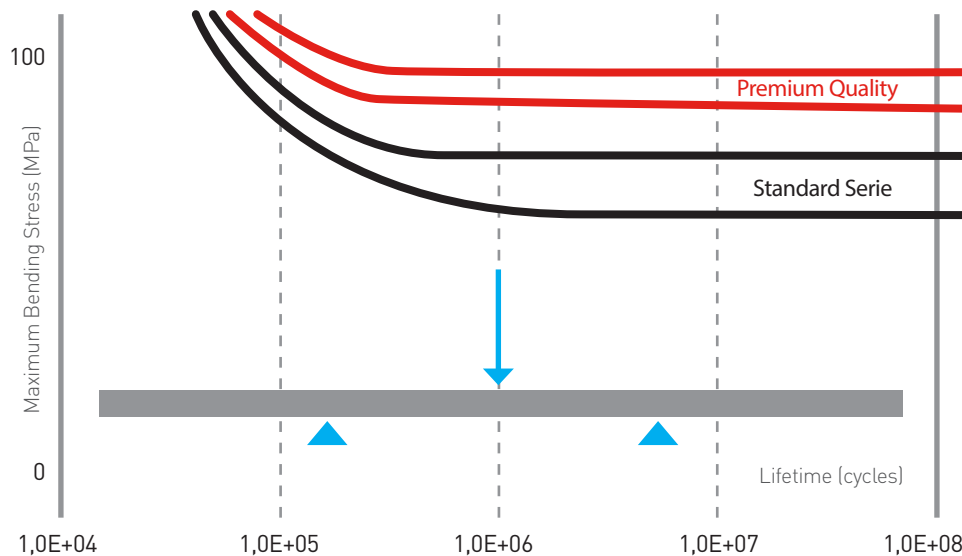
- These capabilities allow **SIDENOR** developing new steel solutions for its customer demands and challenges
- Since 2006 **SIDENOR** is the unique European steelmaker homologated for the 7,5-t monoleaf spring for EURO-6 trucks



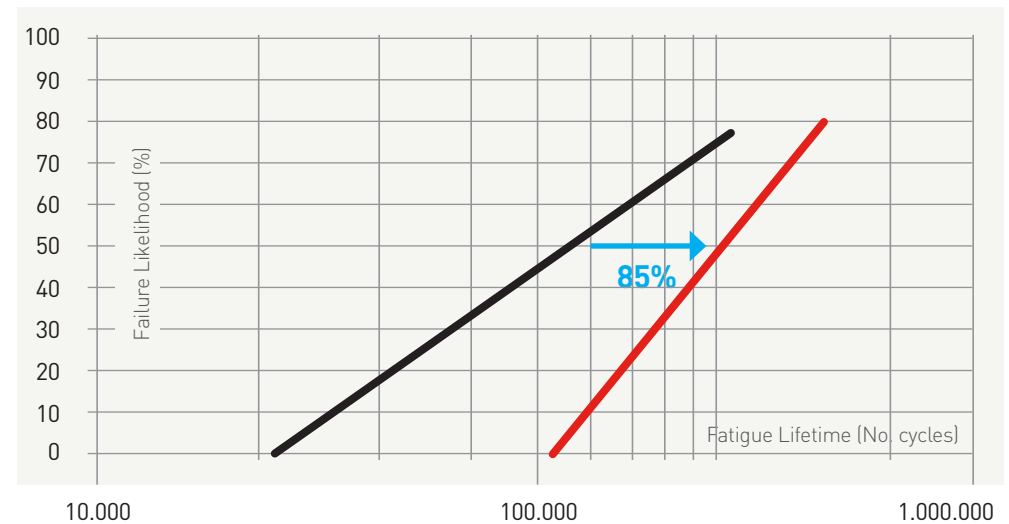
Knowledge applied to improve the final product

The knowledge of steelmaking and leaf spring processes and product requirements is applied to new high quality products, as **Premium** leaf spring steels

Standard vs. Premium

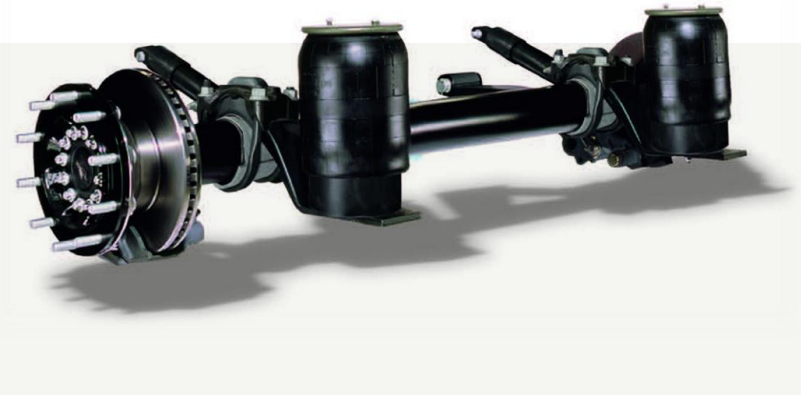
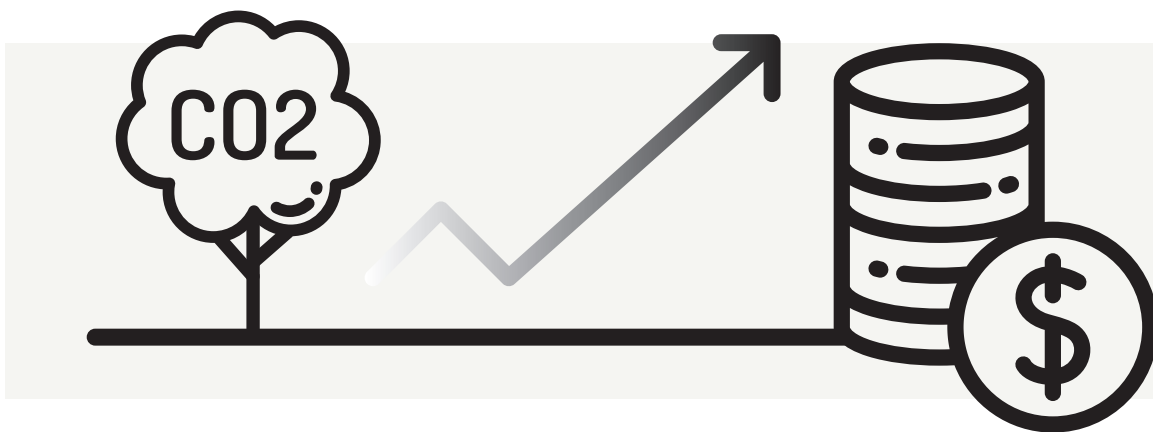


Standard vs. Premium



Long term research

In spite of the attained achievements, **SIDENOR** aim is to keep on track of technological leadership and accompany its customers to reach new challenging goals



Partnership spirit

- **SIDENOR** wishes to become not a simple supplier, but a key partner for its customers in a win-win strategy
- **SIDENOR** know-how is beyond the state-of-the-art of leaf spring steels and the aim is to go further



Innovation and Reliability built into every solution



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