



ACHIEF

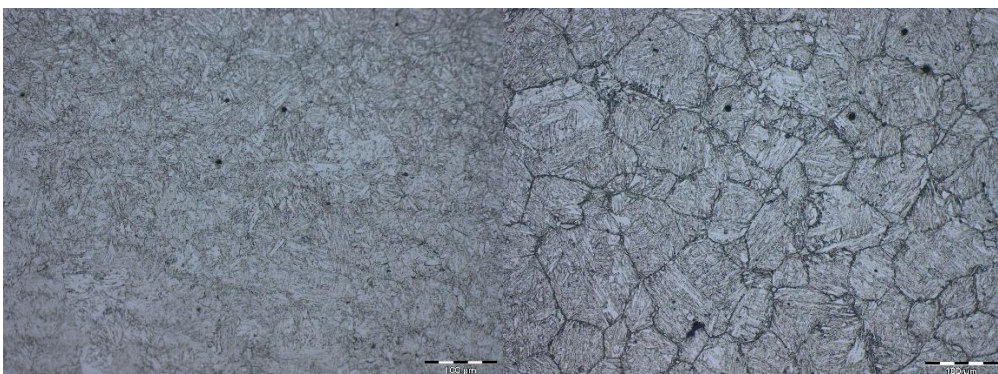
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PRESS-RELEASE

The ACHIEF project has met a new milestone: Novel Cr-Steel Grade for creep applications

In the framework of the EU-funded ACHIEF project, **Tecnalia** and **Tubos Reunidos Group** have developed **a novel Cr-steel grade for creep applications**. The new grade produced at lab scale exhibits improved creep resistance with respect to standard martensitic steel grades, such as T115, together with high-temperature corrosion resistance. As a result, the excellent creep behavior of this novel steel grade has motivated the reproduction of this material at preindustrial scale in the form of pilot tubes.

The novel steel grade is produced and processed in conditions similar to industrial practice but increasing the normalising temperature and decreasing the tempering temperature. The microstructure observed is formed by martensite, with prior austenite grains of larger size in comparison to the steel grade T115.



Microstructure of the steel grade T115 (left) and the novel Cr-steel grade (right).



The project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement N° 958374.

As described in the table below, the mechanical properties of this novel steel grade at room temperature are superior to those offered by the steel grade T115.

Vickers hardness (10 Kg load) and tensile properties at room temperature of the steel grade T115 and the novel Cr-steel grade.

Property	T115	Novel steel
HV (10)	260	280
Yield Strength (MPa)	646	722
Tensile Strength (MPa)	770	876
Elongation (%)	19	19
Reduction of Area (%)	64	65

In terms of creep behavior, the novel steel grade is more competitive than the steel grade T115, whereas the steam side corrosion resistance of the novel steel grade is not as good as that of the steel grade T115 but is still acceptable.

Creep behavior of the steel grade T115 and the novel Cr-steel grade (650°C).

Steel grade	σ (MPa)	Rupture Time (h)
T115	115	591.5
Novel steel	115	8846

Corrosion behavior of the steel grade T115 and the novel Cr-steel grade (600°C).

Test sample	Mass increase (g/mm ²) 1000 h	Mass increase (g/mm ²) 2000 h	Mass increase between 1000 – 2000 h
T115	0.357	0.388	0.031
Novel steel	0.501	0.570	0.069

Considering the results obtained from the characterisation of the steels produced at lab scale, the novel steel grade was decided to be reproduced at preindustrial scale in the form of pilot tubes, together with the steel grade T115 for comparison. The preindustrial casting of these materials was carried out satisfactorily together with the corresponding rolling process in industrial conditions for the fabrication of pilot tubes.

In future investigations, their response to the thermal treatments applied will be explored through the validation of these pilot tubes in terms of creep and corrosion properties.



Preindustrial casting (left); Reduction of diameter in the stretch-reducing mill to final dimensions (right).



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