

Fatigue of TRIP steels

Objective of research

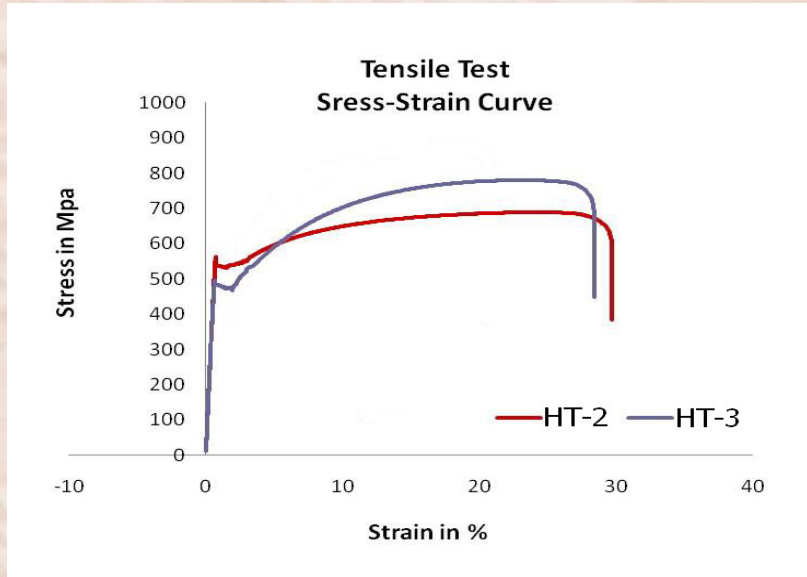
The objective is to study the effect of austenite stability on the high-cycle fatigue of TRIP steels

Methodology

- A Fe-Mn-Si-C TRIP steel has been subjected to two different heat treatments in order to alter the stability of retained austenite.
- The stability has been characterized by the SS-TV-TT test developed at LoM. The method leads to the determination of the Ms(σ) temperature
- Austenite volume fraction has been measured before and after fatigue testing by a magnetic method

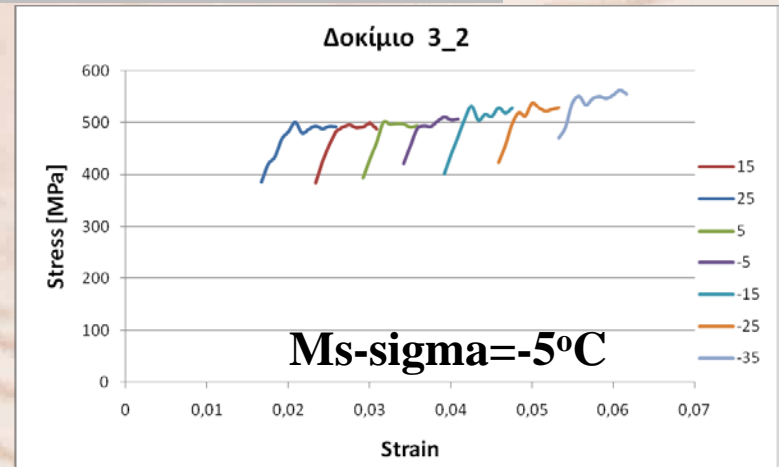
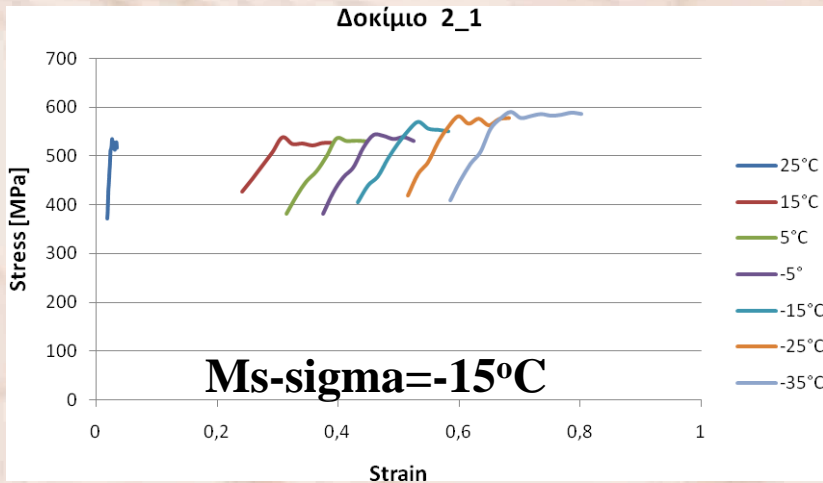
HEAT TREATMENT	HEATING			INTERCRITICAL ANNEALING		COOLING			BIT		FINAL COOLING		
	T _i (°C)	T _r (°C)	Rate (K/s)	T (°C)	Time (s)	T _i (°C)	T _r (°C)	Rate (K/s)	T (°C)	Time (s)	T _i (°C)	T _r (°C)	Rate (K/s)
HT2	25	890	10	890	60	890	400	50	400	420	400	60	15
HT3	25	890	10	890	60	890	460	50	460	120	460	60	15

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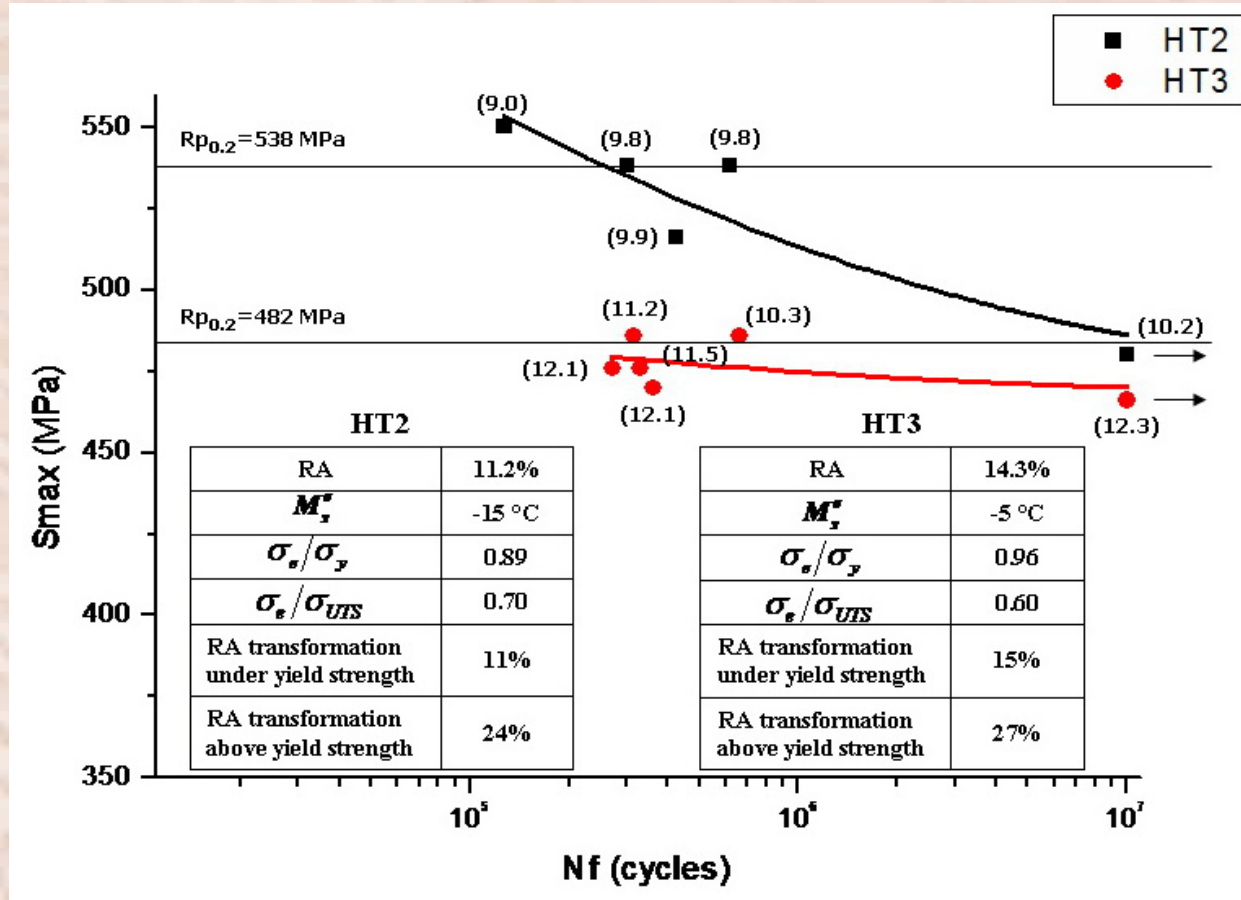


Treatment HT2 results in higher austenite stability and to higher uniform elongation

SS-TV-TT tests for the measurement of Ms(sigma) temperatures



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Treatment HT2 has better fatigue properties. It also has higher austenite stability. Austenite transforms during the fatigue test even at maximum stress below the yield strength



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Support

Research on the fatigue of TRIP steels has been partially supported by the IKYDA program between University of Thessaly and IEHK-RWTH Aachen.