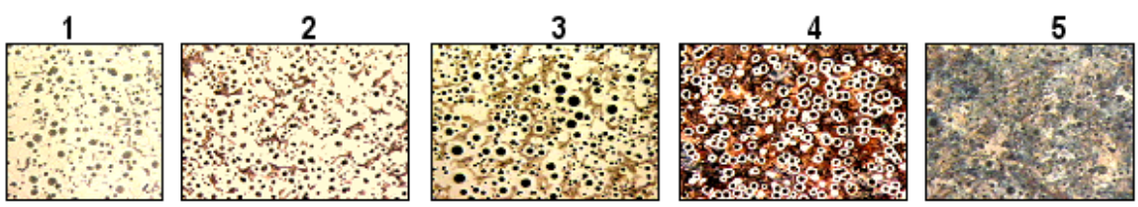
ATAS METSTAR
PEARLITE MODULE

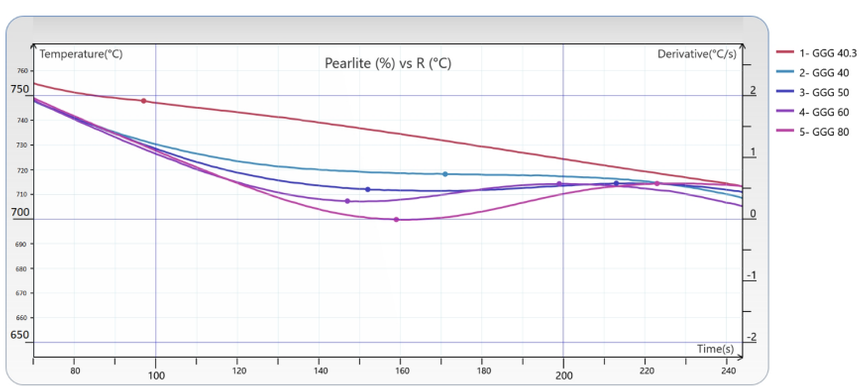
The ATAS Pearlite module can estimate % pearlite and Brinell hardness by analysing the cooling curve during the eutectoid solidification interval. In some cases, the tensile strength may also be estimated. The transformation of austenite into ferrite and cementite or graphite takes place in a temperature interval that is normally between 770 and 670 °C depending on the chemical composition and the cooling rate. The formation of pearlite is associated with an undercooling that is visible on a cooling curve. The higher the undercooling, the higher the amount of pearlite as illustrated below. Tensile strength. as well as hardness and elongation, is a function of the amount of pearlite. This is true especially for ductile iron. Therefore, it is possible to use cooling curves to predict not only % pearlite but also physical properties.

The pictures below show a test with 5 different grades of ductile iron, from fully ferritic to fully pearlitic. It can clearly be seen on the cooling curves that the eutectoid point is reduced with increasing amounts of pearlite. The shape of the curve is also different and a recalescence occurs with increasing amount of pearlite. NovaCast has developed a method for describing the curves using 5 coefficients that are used to calibrate the system. ATAS Pearlite uses a regression formula to predict % pearlite and from that other physical properties.

	Grade (Din 1963)	Tensile (N/mm2)	Yield (N/mm2)	Ferrite %	Pearlite %	Hardness BHN	A %	R °C
1	GGG 40.3	450	338	98	2	164	21,4	0
2	GGG 40	480	351	90	10	174	18,3	0
3	GGG 50	574	394	75	25	190	14,3	2,5
4	GGG 60	680	429	35	65	234	11,2	7
5	GGG 80	920	602	0	100	313	3,8	12

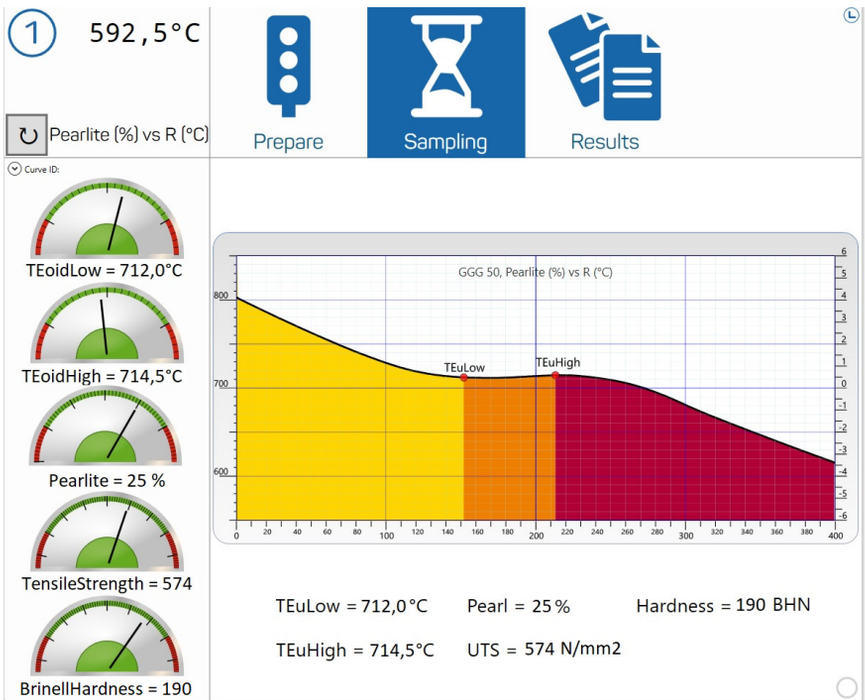


It is necessary to calibrate the Pearlite module for various alloys to obtain high prediction accuracy, however, even without calibration it is possible to get an approximate estimation of the amount of pearlite just by looking at the cooling curve. High amounts of pearlite mean that the eutectoid temperature is low and the recalescence is high.



Once ATAS Pearlite module has been calibrated, the operator has to wait approximately 10 min for evaluation to be concluded and results are shown on the main screen, as in the below picture.

PEARLITE TRANSFORMATION MEASURED IN ATAS METSTAR AND SHOWN ON MAIN CHANNEL SCREEN.



The main benefits of using Pearlite module are:

- Mechanical properties are measured much quicker (approx. 10 min) than what is otherwise possible.
- If the mechanical properties are outside of limits, traditional methods have to be applied.
- Quicker and more reliable production to meet customers high demands on mechanical properties.