LABORATORY 15 REPORT

Permanent mould casting process

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Date: …… Grade: ……

Group: …….

Task 1: Describe the essence of permanent mould casting process.

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Task 2: Evaluate the quality of the casting (pay attention to surface roughness, flashes and shrinkage defects within the shrink bobs). compare sample casting with permanent mold

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Task 3: Complete main parameters of gravity die casting.

Data:

a) pouring temperature t_{c1} = 726 °C

b) casting temperature during shaking out from the mould t_{c2} = 299,8 °C

c) initial temperature of the permanent mould t_{m1} = 200,1 °C

d) permanent mould temperature when the casting is shaking out t_{m2} = 251,2 °C

Average casting temperature in the casting cycle:

$t_{c\ av}$ =

Average permanent mould temperature in the casting cycle:

$t_{m\ av}$ =

8,5 / 150-8,5 s

Task 4: Determination of the tensile strength of specimens made in the permanent mould as well as in the sand mould.

a) calculation of the tensile strength

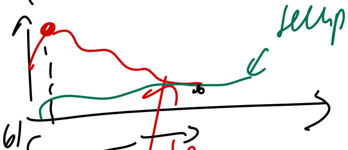
	Specimen type	Permanent mould casting		Sand mould casting
		with filter	without filter	
Data	Tensile force P, N (9,87… 1dN=10N)	1600	1640	2260 dN (2260·9,87)
	Specimen diameter d, mm	10,9	10,7	14,1
	Specimen cross-section F, mm²			
Calculations	Tensile strength R_m, MPa (N/mm^2; decaN ≈ 9,87)			
	Elongation A, %			

b) discussion of the difference in strength of the tested specimens (take into account the effect of casting microstructure on its strength, give reasons for different grain sizes in the casting from permanent as well as sand moulds)

sand mould casting the average grain size is much bigger than in p.m.c

we confirm the theory. Tensile strength

+ CHART (will credit)



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Conclusions:

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① will be filtered -> make casting more pure

② won't be filtered

Compare the properties of the same alloy -> AlSi9

Tensile strength using tensile machine

measure d x 2

① Permanent mould (filler or no)

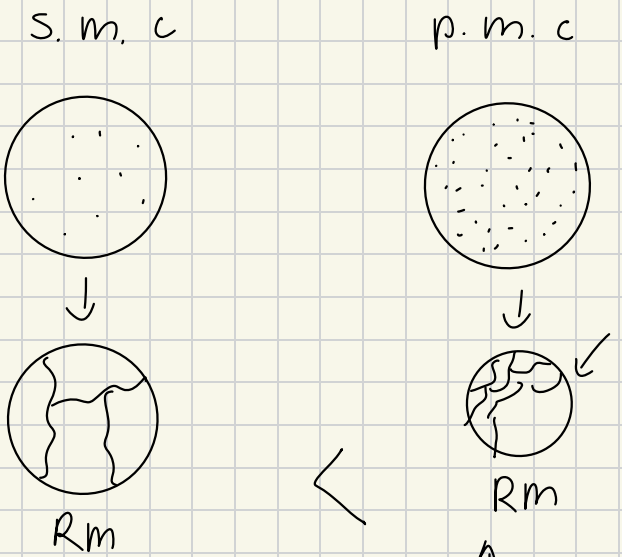
② Sampled casting

0,05 ← accuracy

grain size $\overset{\text{due to}}{\rightarrow}$ cooling rate

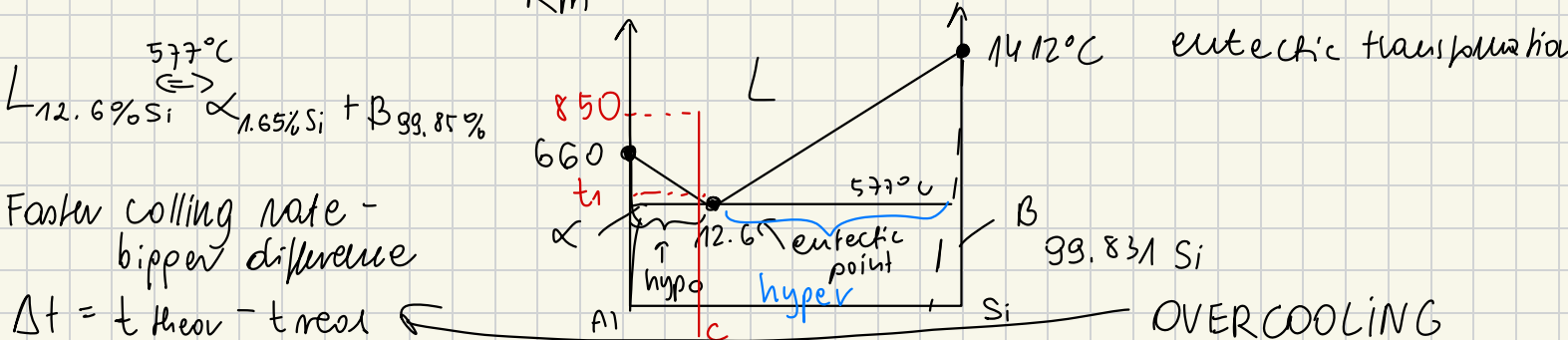
sand to metal → lower cooling rate

TAMMAN'S LAW



smaller gr. grain size = higher mech. prop.

smaller grain size due to cooling rate



Faster cooling rate - bigger difference

$\Delta t = t_{theor} - t_{real}$

OVERCOOLING

non-filtered

filtered