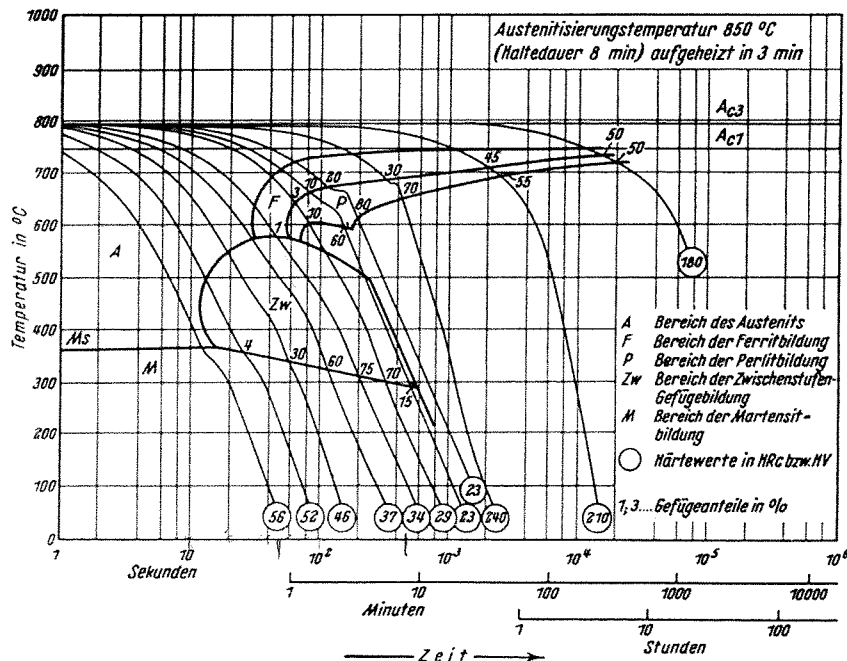
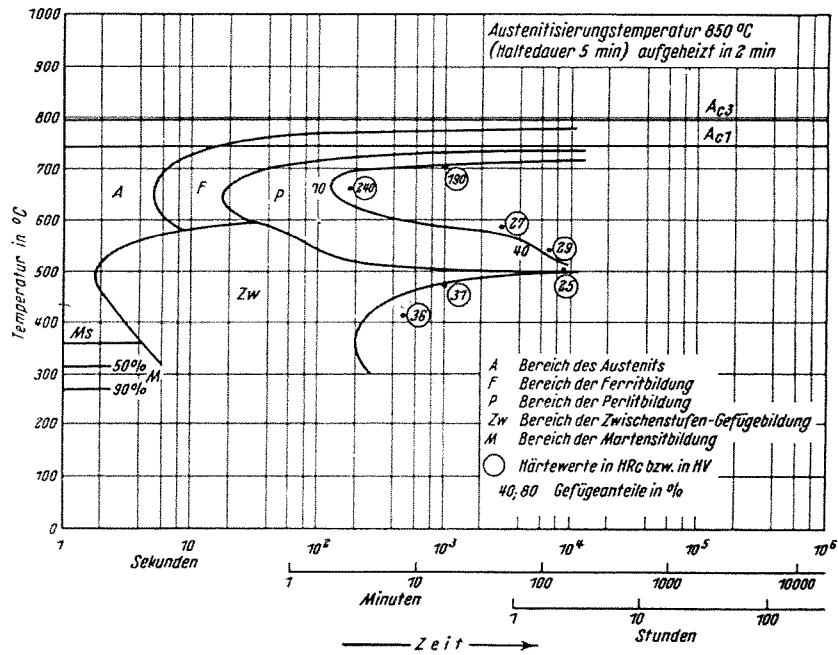


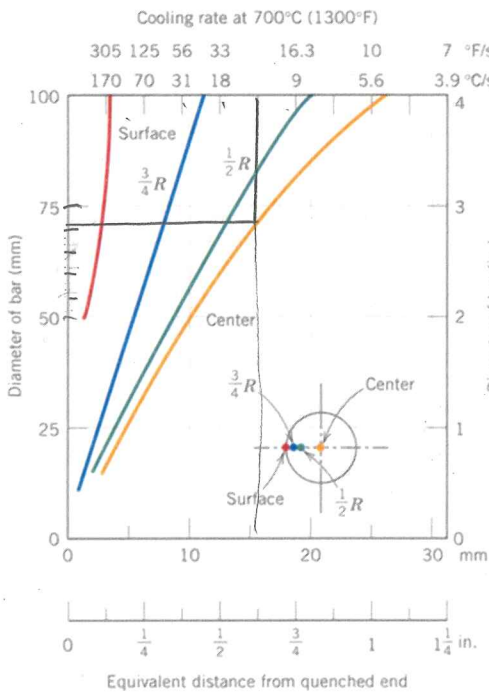
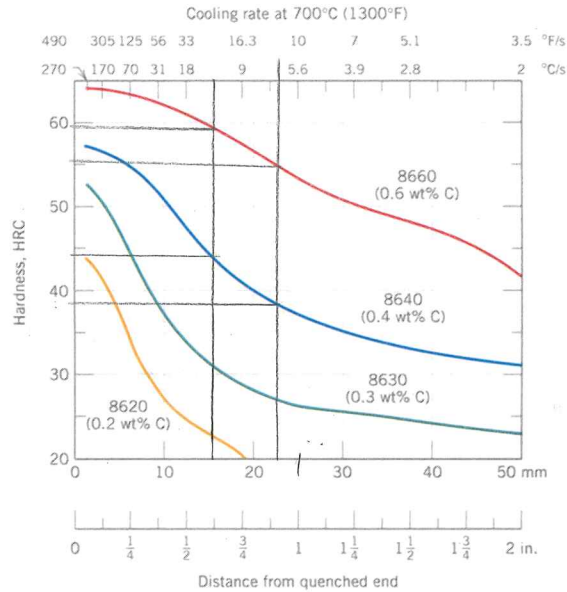
MEC-E6001 Engineering metals and alloys
Exam 19.4.2018

1.
 - a) What are classes of wrought aluminium alloys?
 - b) What are the main alloying elements for each class?
 - c) Identify the classes as low strength, moderate strength, or high strength alloys.
 - d) Name at least one typical application for each class.

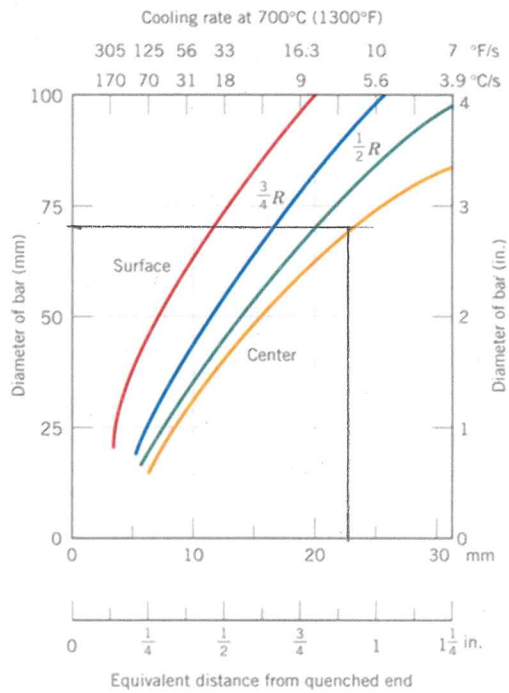
2. Below are presented CCT and TTT diagrams for 34Cr4 steel.
 - a) Identify the diagrams, and explain in what kind of heat treatments they are used.
 - b) If your target is to have end hardness of 35 HRC for the steel, what would be the most appropriate way to get that, and what kind of microstructure it would represent?
 - c) What would be the case for end hardness of 56 HRC?



3. What are classes of Ti alloys and their typical properties and applications?
4. a) What are the steps in quench and tempering of steels and precipitation hardening of aluminium alloys?
 b) Describe the microstructural changes during the steps in both cases.
5. a) What factors affect the hardenability of steels?
 b) A cylindrical piece of steel 70 mm in diameter is to be austenitized and quenched such that a minimum hardness of 40 HRC is to be produced throughout the entire piece. Of the alloys 8660, 8640, 8630, and 8620, which will qualify if the quenching medium is (1) moderately agitated water, and (2) moderately agitated oil? Justify your choice(s) using the following diagrams.



water quench



oil quench