

Austenisation is changing of micro structure of steel into entirely homogeneous austenite, austenisation temperature depends on carbon composition in steel according to diagram Fe-Fe₃C phase. Austenisation temperature for hypoeutectoid steel based on the A₃ line. To obtain a full austenite steel, the temperatures must be at 30-50°C above the A₃ line [Lakhtin, 1977].

Based on the ASM handbook vol.4 on heat treating, Andrews equation is formulated as follow:

$$A_3 = 910 - 203 \sqrt{C} + 44,7 \text{ Si} - 15,2 \text{ Ni} + 31,5 \text{ Mo} + 104 \text{ V} \pm 16,7 \text{ } ^\circ\text{C} \quad (1)$$

Description: A₃ : Austenisation temperatur line A₃ on diagram Fe-Fe₃C phase

C : % of Carbon composition

Mn : % of Mangan composition

Si : % of Silicon composition

Cr : % of Chromium composition

Ni : % of Nickel composition

Research Methodology

The chemical composition test was conducted in chemical laboratory of PT.X by using spectrometer. The purpose of chemical composition test are:

1. to ensure that the carbon steel used is the low carbon steel ($\leq 0.3\%$ C),
2. to know the percentage (%) of alloy elements of Nickel, Chromium, Molybdenum, and other contained alloy elements,
3. to determine the point of austenisation temperature heating (heating above the A₃ line in Fe₃C diagram).

The result of chemical composition test can be seen at the Table 1 below:

Table 1. Data of Chemical Composition of Ni-Cr-Mo Alloy Steel Sample

Element	% of Composition
C	0.2914
Si	0.2297
Mn	1.2431
Cu	0.0304
Ni	0.3219
Cr	0.6239
Mo	0.216
Other alloys	0.0836
Fe balance	96.96