*ABSTRACT*

**High Strength Forged Steel and Process Design**

**Piyada Suwanpinij –** TGGS, KMUTNB

This research focusses on the strength improvement in a vanadium-containing hot forged microalloyed steel that the yield strength reaches 900 MPa. The very high strength is contributed from the fine pearlite through accelerated cooling as well as the precipitation hardening of vanadium atoms during cooling after the forging that the extra hardening and tempering steps can be omitted. It studies also the relationship between the degree of deformation and cooling rate with the resulting microstructure and the developed strength. The synchrotron X-ray Absorption Spectroscopy (XAS) has been employed to measure the amount of the vanadium precipitates as assumed to be a major strengthening microstructural constitute to enable the hardening without quenching and tempering. Finally, the measured yield strength can be measured for different contribution of each strengthening mechanism.