D. Microstructure of heat affected zone (HAZ)

The typical microstructures of heat affected zone (HAZ) developed at 90A and 120A welding current producing weld heat input of the order of 0.68 and 0.93kJ/mm are shown in figure 7 (a & b). The morphology of weld metal and HAZ is clearly distinguishable in microstructure developed at both the welding currents. The dendrites of weld metal as depicted in figure 7a are comparatively finer produced at lower heat input of the order of 0.68kJ/mm than that of produced at 0.93kJ/mm as shown in figure 7b. This can be attributed to faster cooling rate at lower heat input gives lesser time at temperature for grain coarsening.

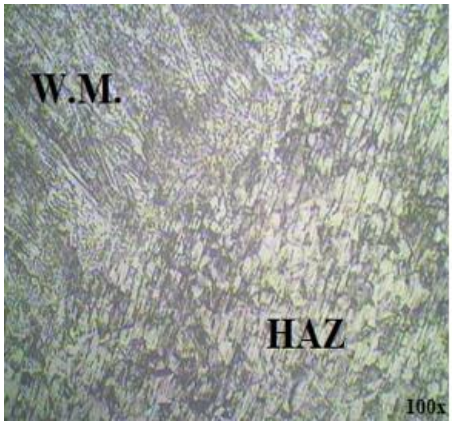

Fig. 8 Microstructures of heat-affected zone (HAZ) developed at 90A

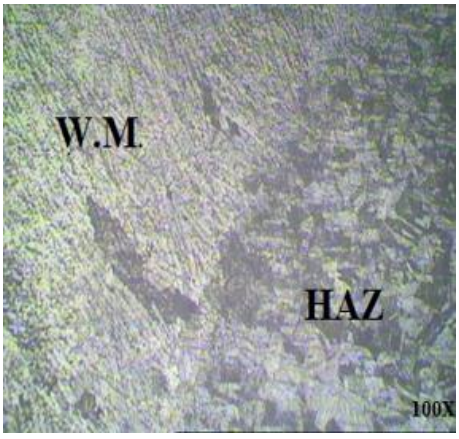

Fig. 9 Microstructures of heat-affected zone (HAZ) developed at 120A

The fusion line of the weldment produced at 120A welding current giving higher heat input of the order of 0.93kJ/mm and the grains in HAZ are visible coarsened in comparison to grain size of HAZ produced at 90 A welding current.

V. CONCLUSIONS AND FUTURE SCOPE

The heat affected zone (HAZ) of weldments produced at lower heat input is higher than that of joints produced at higher heat input. The microstructure of weld metal and heat affected zone developed at lower weld heat input has been observed finer in comparison to that resulted at higher heat input. Complete root penetration with back purging was successfully achieved with appropriate root reinforcement. Authors are working further to establish more elaborated results by incorporating micro hardness, bending strength, impact strength, toughness and brittle strength of the specimens.

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