Warm working is known to offer good scope for energy saving and improving the room temperature mechanical properties in case of many commercial metals and alloys. In the present work, warm rolling of AISI type 316 austenitic stainless steel in the temperature range of 550°C-850°C has been carried out. The effect of the various parameters of rolling on the material behaviour has been assessed using both experimental and analytical approaches. The applicability of the analysis used in hot rolling for the estimation of torque and power in the warm rolling range has been established. The room temperature tensile properties have been evaluated for specimens warm rolled to various strain levels at different rolling temperatures. Analysis of the tensile test data has been carried out using the current views on the formation of the various kinds of sub-structures that are produced during warm working and their effect on the room temperature tensile properties. Two new experimental techniques have been introduced in this thesis, one for the determination of the temperature of rolling using continuous cooling curves and another for calculating the strain rate of rolling from longitudinal strain.