Magnesium is the lightest structure material and its high strength-to-weight ratio makes it attractive for applications requiring lightweight materials. There has been an increasing demand for high performance Mg alloy sheets in the automotive and transportation industries to reduce vehicle weight and increase fuel efficiency. However, the development of high performance Mg alloy sheets is difficult to achieve due to high production costs and limited deformation modes. Recently the twin roll casting (TRC) process has been recognized as an efficient process for producing Mg alloy sheets at a lower cost. Although the TRC process has received great attention, only limited Mg alloy sheets have been produced due to solute segregation problems and poor mechanical properties. In order to expand the application of Mg alloys, the development of high performance Mg alloys with controlled microstructure and good mechanical properties is needed. In the present study, TRC Mg alloy sheets with various compositions were produced using the twin roll casting process. The microstructure and texture were characterized by optical microscopy, XRD and EBSD. The mechanical properties were evaluated by tensile and formability tests. New TRC magnesium alloy sheets were successfully developed with reduced segregation and enhanced mechanical properties.