An industrial-scale prototype of spouted bed dryer with a capacity of around 3500 kg/h was constructed and tested. The prototype is shown to have a desirable feature of a spouted bed as well as the capability of continuous drying and offering consistent results throughout the testing period. Experimental results show that the prototype performs well in reducing the moisture content of the paddy and yields high product quality in terms of the milling quality. The high temperatures up to 130-160°C were applied to dry paddy from various initial moisture contents to the range of 14-25%, dry basis without significant change in quality. Thermal energy consumption, in the range of 3.1-3.8 MJ/kg water, is comparable with other commercial dryers.