The purposes of this research were to design, construct, evaluate performance and conduct cost analysis of a heat pump fruit dryer. The dryer consisted of a cabinet dryer and heat pump. Product capacity of the cabinet dryer was 100 kg to 132 kg with 12 trays and the heat pump capacity was 3.5 kW refrigeration. In this work, papaya glace’ was dried in close loop air with drying temperature of 50°C, air flow rate of 0.45 kg/s and bypass air of 63%. Drying operation was divided into two steps. In the first step, papaya glace’ with dimension of $6.35 \times 15 \times 25 \text{ cm}^3$ and initial moisture content of 74% dry-basis was dried. In the second step, papaya glace’ dried in the first step was cut into $0.98 \times 0.98 \times 0.98 \text{ cm}^3$ and dried to a moisture content of 23% dry basis. The results were as follows: drying rate 0.686 kg water/h, moisture extraction rate from evaporator 0.78 kg water/h and drying time of the two steps approximately 80 h (40 h in each step). Energh consumption was 9.93 MJ/kWh or SMER (specific moisture extraction rate) 0.363 kg water evaporation/kWh at specific air flow rate of 21.42 kg dry air/h-kg dry papaya glace’. The coefficient of performance for the heat pump (COP$_{kp}$) varied between 3.71 to 3.85. For the quality of papaya glace’ after drying in terms of color, it was found that the color of papaya glace’ was light reddish-orange (code 34–C from R.H.S. color chart). Cost evaluation found that cost of papaya glace’ drying was 12.8 Baht/kg water evaporation of which 5.3 was energy cost, 1.4 was maintenance cost and 6.1 was fixed cost (US$ 1 = 40 Baht).