1) Pumps fighting each other for suction
    a. Suction line needs to be sized to accommodate increase in flow.
    b. Pump placement needs to be near existing pumps so frictional losses in suction line are similar.
    c. Pump suction piping may need to be modified to ensure correct flow distribution between each pump pair combination. "Normal" piping configuration for single pump operation can result in mal-distribution of flow for parallel operation resulting in significantly lower reliability of one of the pumps.

2) One pump backs out the sister pump
    a. Pump performance curve needs to be an exact or near match.
    b. Recommended to have flow meters on each pump installed to identify if one pump is being backed out. This can routinely occur due to wear.
    c. Control Valves or Regulating Valves may be required to maintain even flow rates between pumps.
    d. Pump total differential head (TDH) at deadhead needs to be 10% above pump TDH for minimum expected operating rate. This will prevent pump from shuttling and damaging its thrust bearing.
    e. If pump is turbine-driven, the likelihood of this consequence occurring is greater due to variations in rotational speed. A turbine driven pump operating in parallel with a motor drive pump should also have the normal governor replaced with an electronic governor to improve speed control.

3) Long-Term Design Life
    a. Recommended piping velocities may be exceeded resulting in additional inspection/maintenance costs.
    b. If pump operation is further back on the curve, this will generally result in poorer reliability and higher maintenance costs.

4) Economics
    a. If steam turbine spare pump is expected to normally operate now, there is significant energy cost.
    b. Life cycle costs would typically be 50% higher than of normal two pump system. This reminds me of Dilbert…
    c. Parallel pump operation results in both pumps operating at lower efficiency (potentially much lower) resulting in an adverse effect on the site Energy Intensity Index (EII) and the LT should be engaged to endorse the tradeoff.
    d. PSM requirements around spare pump operation will increase the complexity of operator tasks for this configuration and increase the probability of human error.