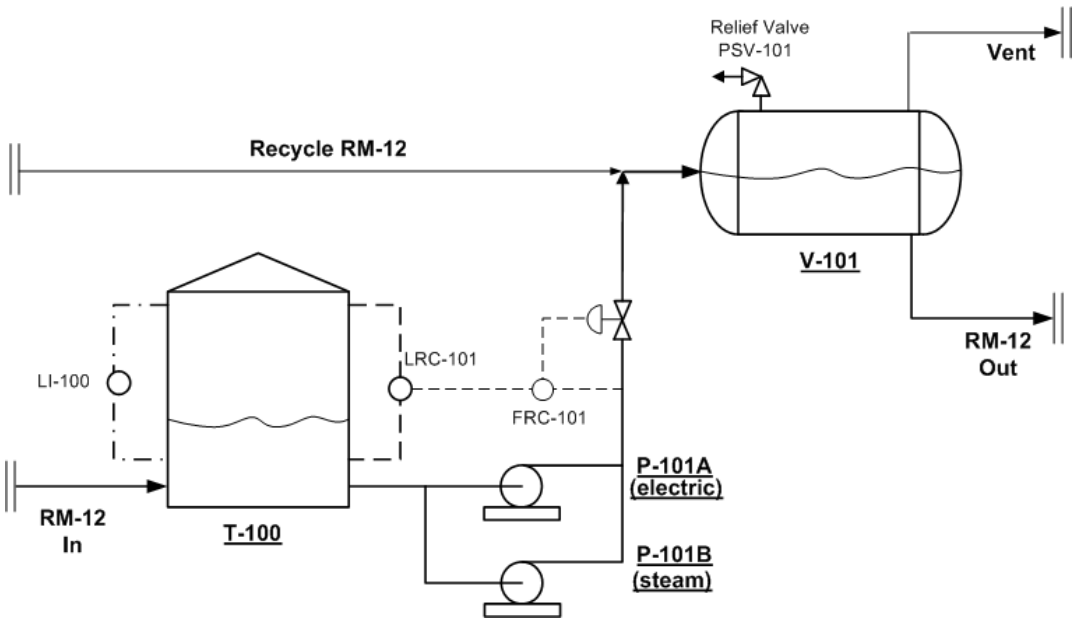
STANDARD EXAMPLES

The examples shown here are used throughout this series of ebooks and videos to illustrate some of the concepts and ideas that are used in the various publications.

EXAMPLE #1

The sketch liquid flowing into an atmospheric tank, T-100. The liquid, which is both flammable and toxic, is called Raw Material Number 12—abbreviated to RM-12. From T-100, RM-12 is pumped to pressure vessel, V-101, using Pump P-101A or P-101B, either of which can handle the full flow (A is normally in service, with B being on standby). The pumps are driven by a steam turbine and an electric motor respectively.

The flow of liquid both into and out of T-100 is continuous. The incoming flow varies according to upstream conditions and is outside the control of the operators responsible for the equipment shown. The flow rate from T-100 to V-101 is controlled by FRC-101, whose set point is cascaded from LRC-101, which measures the level in T-100. The level in T-100 can also be measured with the sight glass, LI-100. V-101 is protected against overpressure by safety instrumentation (not shown) that shuts down both P-101 A/B, and by the relief valve, PSV-101.



Failure and repair times for the pumps are shown below.

Item	Failure Rate, yr^{-1}	Failure Rate, hr^{-1}	Probability of Failure on Demand	Mean Downtime (MDT), hr
P-101A	0.5	0.000057077	—	8
P-101B	—	—	0.1	3

Summarizing the Table in words:

- P-101A (which is the pump that is normally in operation) is expected to fail twice a year. It takes 8 hours to repair.
- When P-101A stops working, P-101B is started. It is expected that P-101B will fail to start on demand once in 10 times. If P-101B does not start immediately, its anticipated repair time is 3 hours.