

EXAM

Production, Maintenance and Quality development (PPU404)

Date: 2015-08-11

Time: 14.10-19.30

Exam: TEN 1

Utilities: Calculator, dictionary

Responsible teacher: Antti Salonen, tel (016-163606), mobile 0709-378469

Max score: 30 p

Pass (Swedish, 3 – ECTS, E): 15p

ECTS, D: 18p

Swedish, 4: 20p

ECTS, C: 21p

ECTS, B: 24p

Swedish, 5: 25p

ECTS, A: 27p

Good Luck!

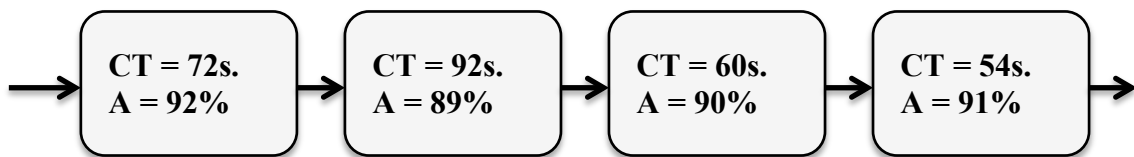
Q 1:

What do the letters SIPOC stand for?

(3 P.)

Q 2:

What's the average capacity (components per hour) of the production line below?



CT = Cycle time, A = Availability

(4 P.)

Q 3:

Name three of the four guidelines that Yamamoto and Bellgran (2010) give for finding problems, when working with Kaizen

(5 P.)

Q 4:

Name four ways to improve the maintenance supportability

(4 P.)

Q 5:

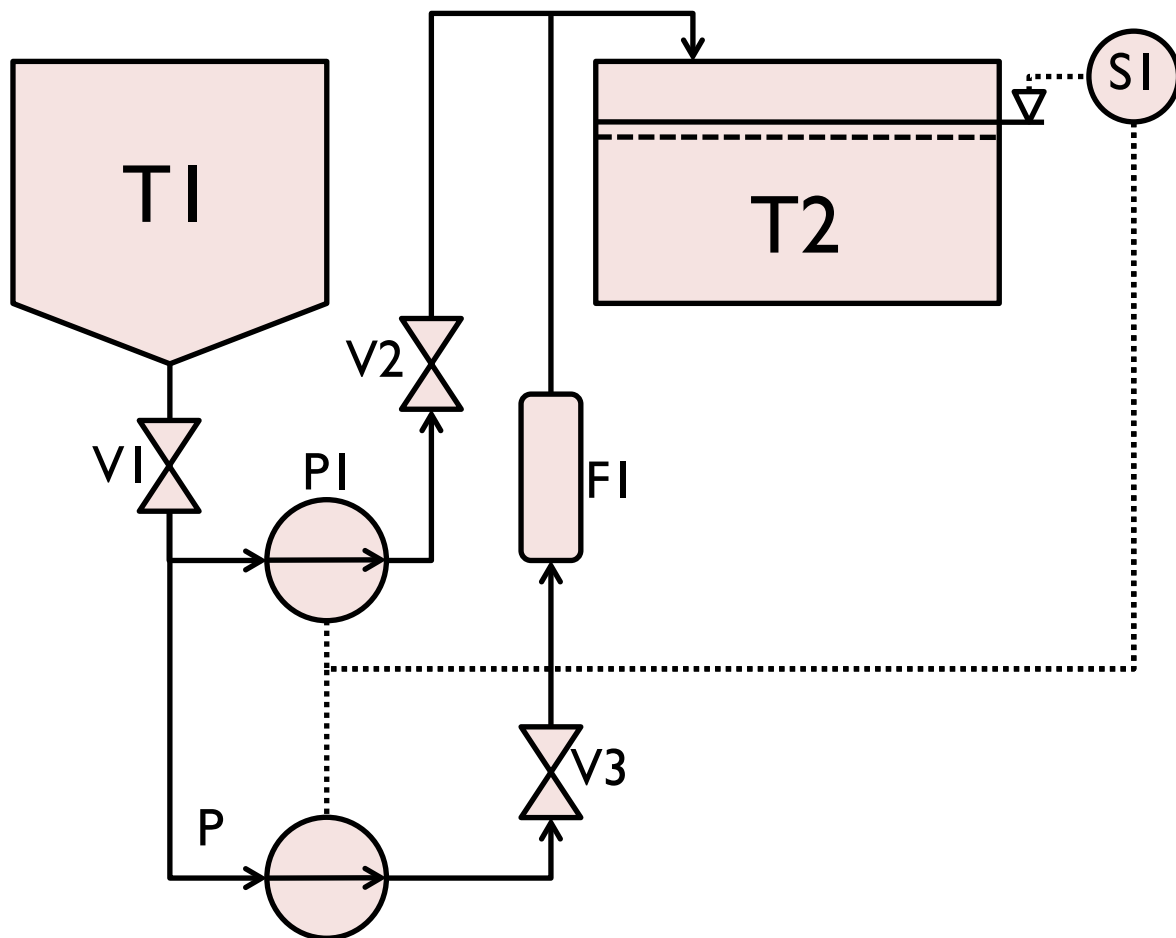
The system that is shown below keep the fluid level in tank T2 at a certain level. In order to function the system need to fulfill the following conditions:

1. The level sensor S1 has to be functional
2. V1 has to be open
3. Either P1 has to be working and V2 open, **or**:
4. P2 has to be working and V3 has to be open and the filter, F1 shall not be clogged.
5. Also, there has to be fluid in tank T1

Draw a Fault tree for the top event: "Low level in T2".

Base the Fault tree only on the above mentioned circumstances.

(5 P.)



Q 6:

Acme engineering is about to start producing a new product with an estimated life cycle of 25 years. In order to produce it, the company needs to buy a new machine and two alternatives have been selected. Both alternatives are expected to run 4300 h/y. The data of the two alternatives is found below:

Data	Machine X	Machine Y
Acquisition cost	135000 €	93000 €
Maintenance cost	11500 €/y	???
Life length	30 y	35 y
MTBF	350 h	300 h
MTTR	2 h	3 h
Cost of downtime	480 €/h	480 €/h
Operations cost	42000 €/y	48000 €/y

Calculate what yearly maintenance cost Machine Y could have and still be an interesting alternative to Machine X.

(5 P.)

$$LCC = C_A + t_C(C_O + C_M + C_{DT})$$

C_A : Acquisition cost

t_C : time of comparison

C_O : Operations cost

C_M : Maintenance cost

C_{DT} : Downtime cost

Q 7:

Name four of the reasons Kotter (1995) mean make transformation efforts fail.

(4 P.)