Common Faults - Machinery

- Cover missing or not fitted correctly
  Action : replace or refit covers
- Nuts or bolts missing from covers
  Action : replace
- Seals missing or worn on slide ways
  Action : replace or refit seals
- Too much or too little lubrication on moving parts;
  Action : investigate reason and clear blockage and adjust
- Oil drips from slide ways,
  Action : adjust, clear blockage or fit drip tray
- Guard interlock not working properly or not fitted :
  Action : investigate, replace switches, sensors if necessary, fir interlock if necessary

Common Fault – Drive Elements

- Lubricant site level dirty, difficult to read

  Action : drain lubricant, clean and/or replace or re-position site level
- Low level lubricant Action : top up with correct lubricant
- Drive belt or chain tension incorrect : Action : adjust the tension
- Drive belt worn or frayed : Action : replace belt and set tension
- Drive belt covered with contaminant : Action : investigate source of contamination and eliminate if possible, fit cover around belt
- Drive pulley / sprocket broken : Action : Replace
- Oil leak from gearbox : Acti0on : investigate exact location after cleaning, replace , refit seal or gasket
- Clutch worn and malfunction Action : Take apart, check, replace clutch or parts and re-assemble
- Brakes not working properly Action : Replace
- Bearings worn – excessive play – Action : remove bearings and check, replace bearings, and shafts if necessary

Common Faults – Pneumatics and hydraulics

- Filter clogged and old : Action : replace or clean thoroughly
- Pressure gauge not working properly : Action : Replace
- Pressure gauge broken: Action : Replace
- Valve leaking Action : Investigate, tighten fittings, replace seals or replace valve
- Screws missing from valve mounting Action : Replace screws
- Pipes or fittings leaking Action : Replace pipes, investigate using different material, tighten fitting, replace

Common Faults – Electrical equipment

- Wire insulation frayed or cracked : Action : replace
- Connections loose : Action : Tighten or replace
- Wires, conduit, trunking not properly secured : Action : secure with correct clips or mountings
- Limit switch mounting loose Action : Tighten screws
- Switch or sensor unprotected from dirt or debris Action : reposition and /or fit a cover
- Push button broken Action : Replace
- Push button not working properly : Action : investigate and replace if necessary

Operating Problems – Machinery and equipment

- Access door very stiff and heavy Action : investigate reason, clean or replace rollers, replace door mechanism
- Inadequate guard : Action : Re-design or replace
- Debris, oil, fluid sprays on to the operator : Action : investigate sources and design cover/deflector to eliminate spray
- Holes or pockets in machinery structure Action : fill in holes
- Access for setting and adjustment is difficult Action : Investigate and re-design machine access or tooling if necessary

Example – High volume production

- Special purpose drilling and tapping machine making electrical terminal blocks. Working conditions 2 shift, 8 hrs per shift, 5 days week: Planned throughput = 60 units per hour; Actual output = 3320 units per week. List of losses are:

1. The circular saw blade which cuts off material breaks and has to be replaced. This happens once per week and takes 30 minutes

   While blade is being replaced the machine is not available for production >> Availability loss

2. The saw pivot arm gets congested with swarf and oil it becomes stiff and will not function properly. It has to be dismantled and cleaned, happens twice a week and takes 45 minutes

   Pivot arm dismantled and cleaned, m/c not available for production >> Availability Loss

Example – High volume production

3. Cutting fluid sprayed onto bar feeder causing bar to slip and not feed properly with two consequences:
   a) If a part feed occurs then the block is cut off too short,this happens 3 times a day takes 10 minutes to clear and 3 parts are damaged
   b) If the bar does not feed then the m/c stops, has to be cleared and re-set. This happens 2 times per week and takes 45 minutes

   when a) occurred > minor stoppage >> performance loss + >> also quality loss –parts damage

   when b) occurred substantial down time encountered, causing lost of production >> Availability loss

Example – High volume production

4. On first drilling head the main bearings get dry (no lubricant) causing head to slow down and then seize up. This happens once every 6 weeks, the m/c operates at half the speed for one day prior to breaking down and to repair and replace the head takes 18 hours

    drilling head seize up, immediately m/c not available for production > availability loss + just before break down, drilling head operates at speed about half its designed to achieve, therefore > performance loss

Example – High volume production

5. On the second tapping head the tap breaks and is undetected meaning that parts have to be tapped by hand. This happens once every day, 20 parts have to be re-worked, 10 parts scrapped, and it takes 15 minutes to replace the tap

   since tap is broken, the 20 parts reworked are quality losses. Some parts damaged and scrapped > also quality loss . The tap is replaced >> availability loss

6. To set up the m/c for anew block, the machine parts have to be swapped (exchange) and re-set and the stroke of the drills adjusted. This happens four times a week takes 2 ½ hours

   In this case m/c not available while being set up for another product >> availability loss

Example – High volume production

7. Swarf builds up at the rear of the m/c and has to be shovelled into a barrow. The operator has to stop the machine whilst doing this. This happens 3 times per day and takes 10 minutes each time

   Swarf causes minor stoppage affects performance >> performance loss

8. The operator has to wait for compressed air pressure to build up at the start of the shift. This takes 15 minutes each day

   The operator is available but machine cannot be operated for the first 15 minutes. >> therefore, availability loss incurred

Situ	Availability Loss	Performance Loss	Quality Loss
1	30 min x 1/wk		
2	45 min x 2/wk		
3	(b) 45min x 2/wk	(a) 10 min x3/dayx5day/wk	3 parts x 3 x 5
4	18 hrs x 60 min /6wk	4hrx60min/6wk	
5	15 min/day x 5 day		20 parts x 5 10 parts x 5
6	2.5hr x 60 min x 4/wk		
7		10 minsx3/dayx5day/wk	
8	15minsx5days/wk		
Total	1140 mins per week	340 mins per week	195 parts /wk

- Loading time = 8 x 2 x 5 = 80 hrs/wk = 4800 min/wk
- % Availability = (loading time – break down and setup time loss/loading time) x100= 4800-1140)/(4800) X100 = 76%
- % Performance = (time run – minor stoppages – reduced speed)/(time run) = 3660 – 340)/(3660)x100 = 91 %
- % Quality = actual output – quantity defects/actual output = (3320-195)/3320 = 94%
- **OEE = 0.76 x 0.91 x 0.94 = 0.65 = 65%**