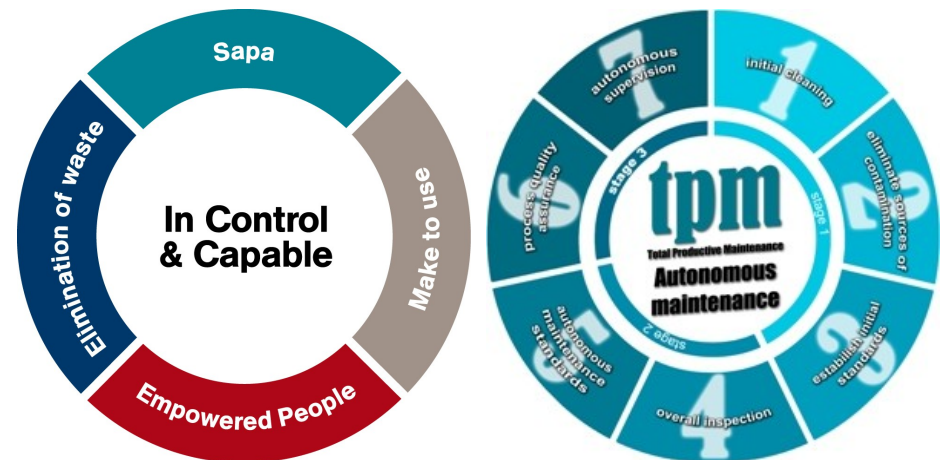


# TPM / AM (Step1-3) Overview

## GENESIS University

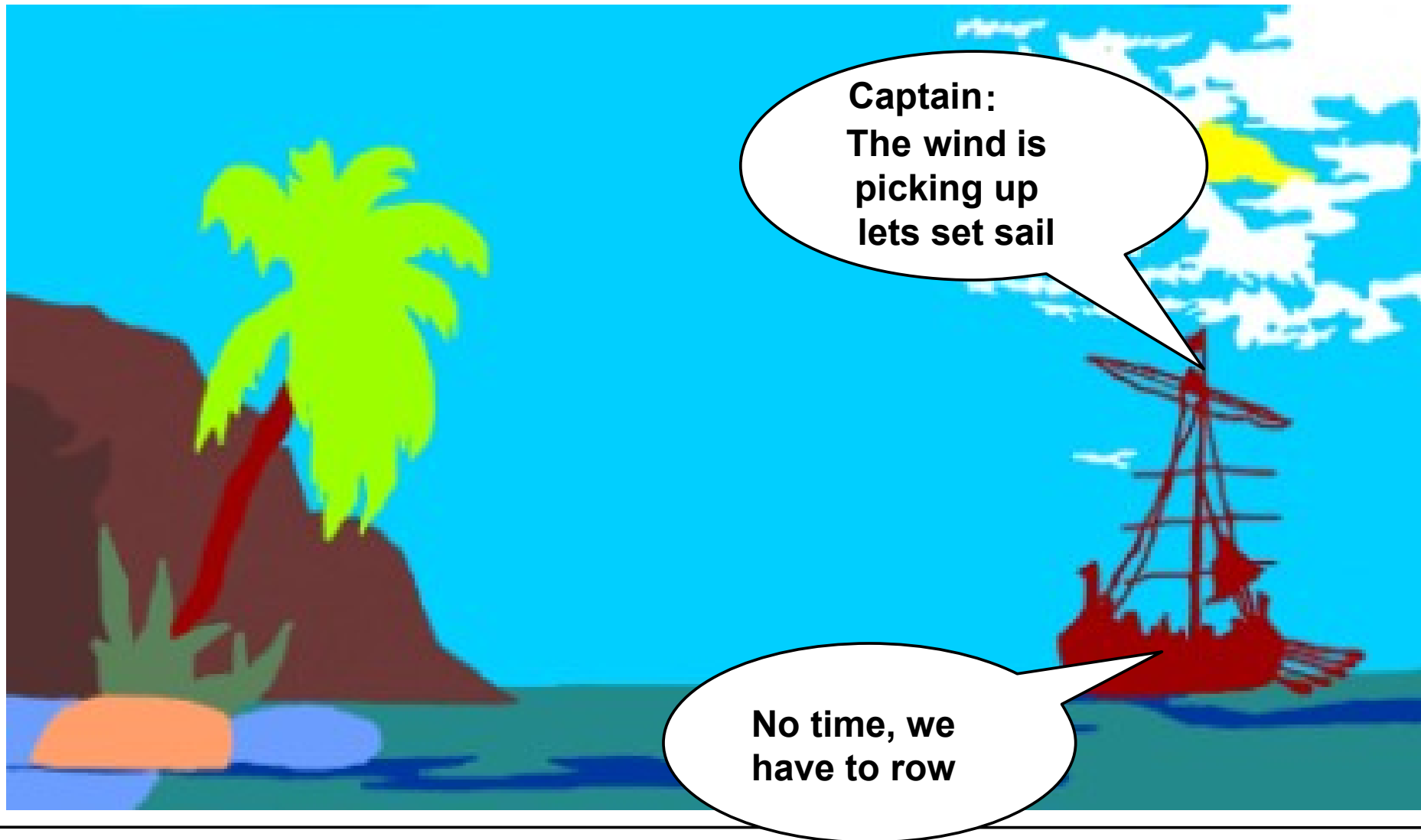




- What is TPM / AM?
- TPM & GENESIS
- 6 major activities of TPM
- Overview of AM (Step 1-7)
- Who owns TPM / AM?
- AM Step 1-3
- Roadmap for TPM implementation



# TPM/AM: The challenge

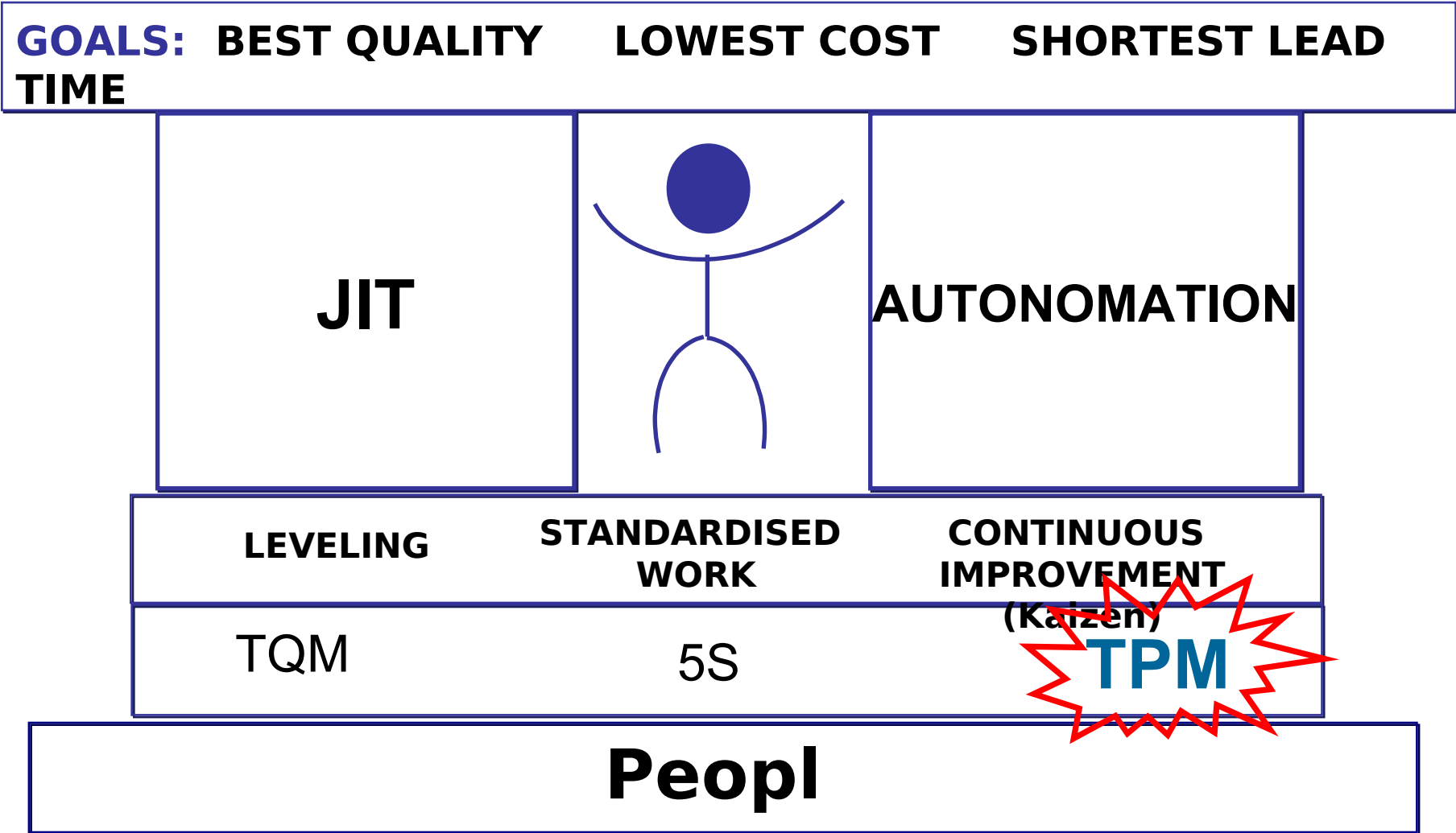


**Captain:  
The wind is  
picking up  
lets set sail**

**No time, we  
have to row**



# TPM & GENESIS





# 6 major activities of TPM

## Activity

## Owner

- |  |   |
|--|---|
| 1. Maximize OEE<br>(elimination of the six big losses)           | • Collaboration of Production and Maintenance |
| 2. Planned/scheduled maintenance                                 | • Maintenance                                 |
| 3. <b>Autonomous maintenance</b>                                 | • Production                                  |
| 4. Failure elimination through Preventive/Predictive maintenance | • Maintenance & Engineering                   |
| 5. Easy to manufacture product design                            | • Product Engineering                         |
| 6. Education   | • All of the above                            |



# TPM = Total Productive Maintenance

- A methodology for plant-wide maintenance
- Small group activities requiring total employee involvement
- Establishes equipment standards to facilitate **root cause problem solving**
- Implemented by Production and Maintenance to maximize productivity to realize:
  - Zero accidents
  - Zero defects
  - Zero breakdowns

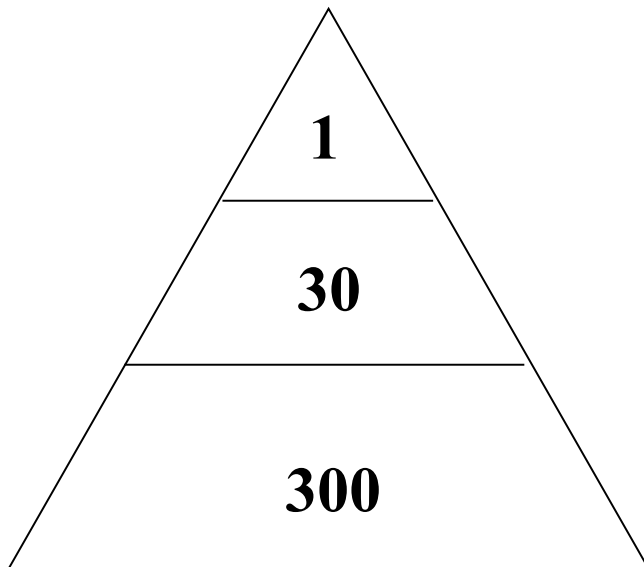


# TPM results in...

- Improves the equipment know-how of the operators
- Elimination of unscheduled downtime caused by equipment failures
- Increased manpower utilization
  - Operators perform mechanical and intellectual activities
  - Maintenance freed up to focus on prevention and prediction activities
- Increased capacity
- Reduction of maintenance expenditures
- Increased life of equipment



# Statistical rule about hidden problems



**Major defects** **40**

---

**Medium defects** **1200**

---

**Minor defects** **12000**

---

**Example: We have 100 machines and we indentified 120 problems / each**

**If we don't solve them, how many small stops would happen?**

**Without TPM...**

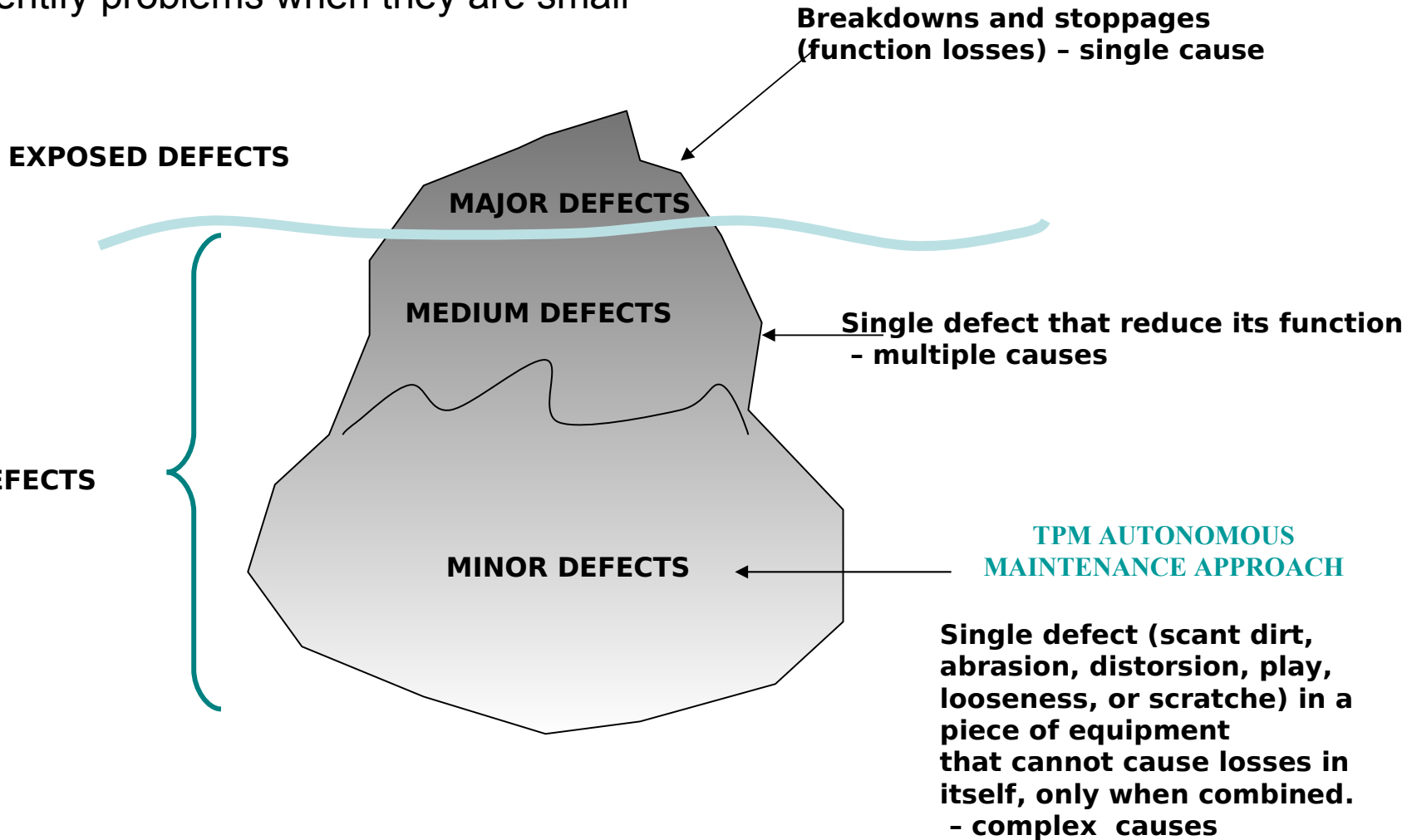
**...How many big crashes would occur?**





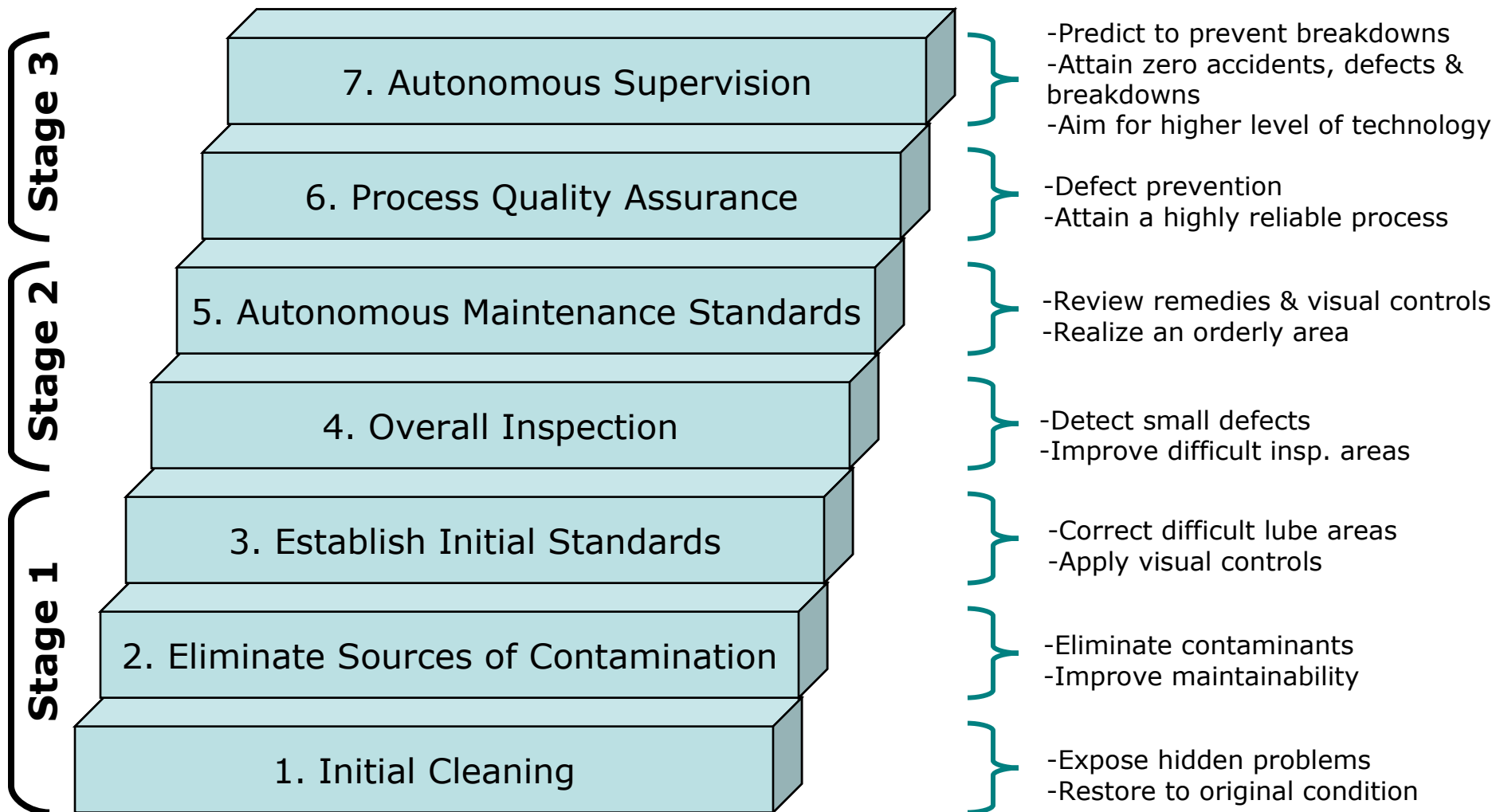
# Autonomous Maintenance

- Identify problems when they are small





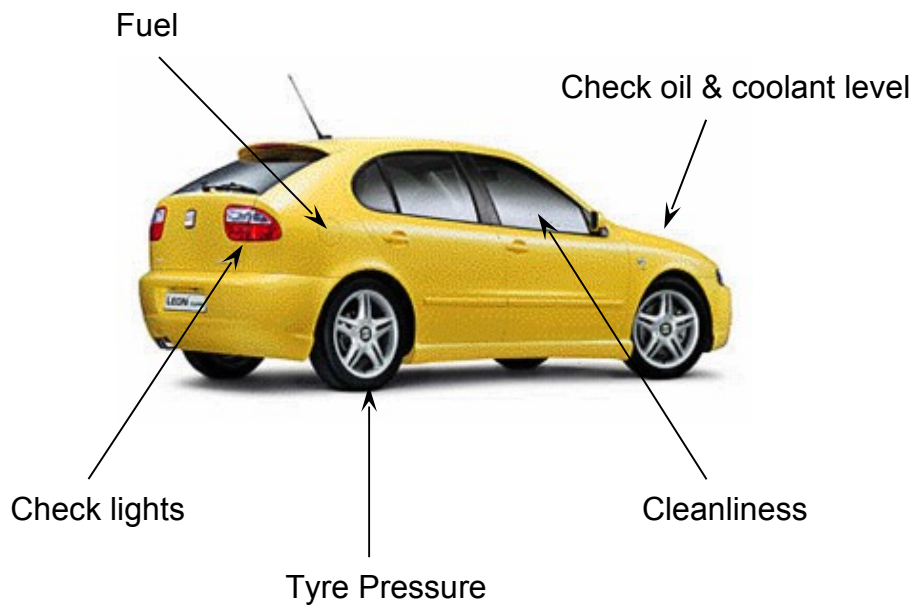
# The 3 Stages & 7 Steps of Autonomous Maintenance



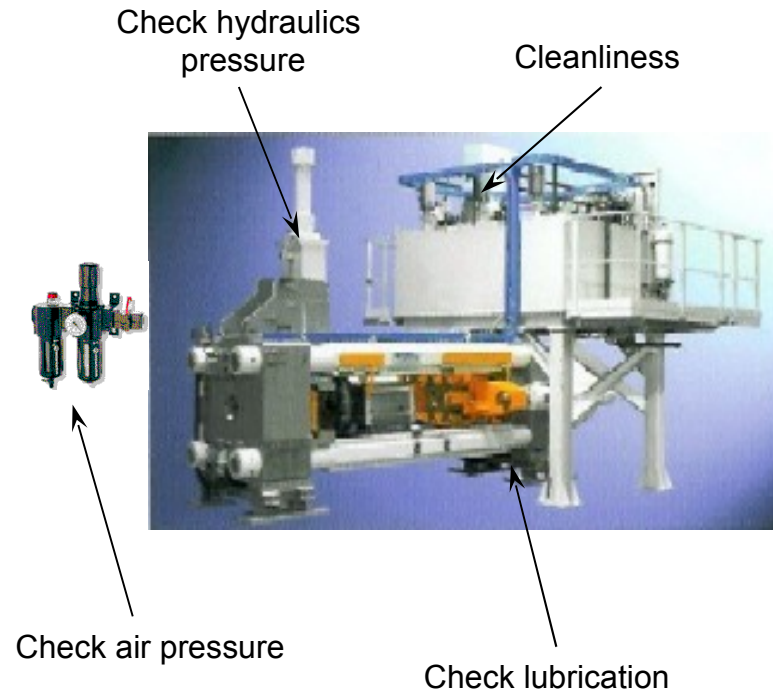


# Who owns AM?

## At home



## At your plant



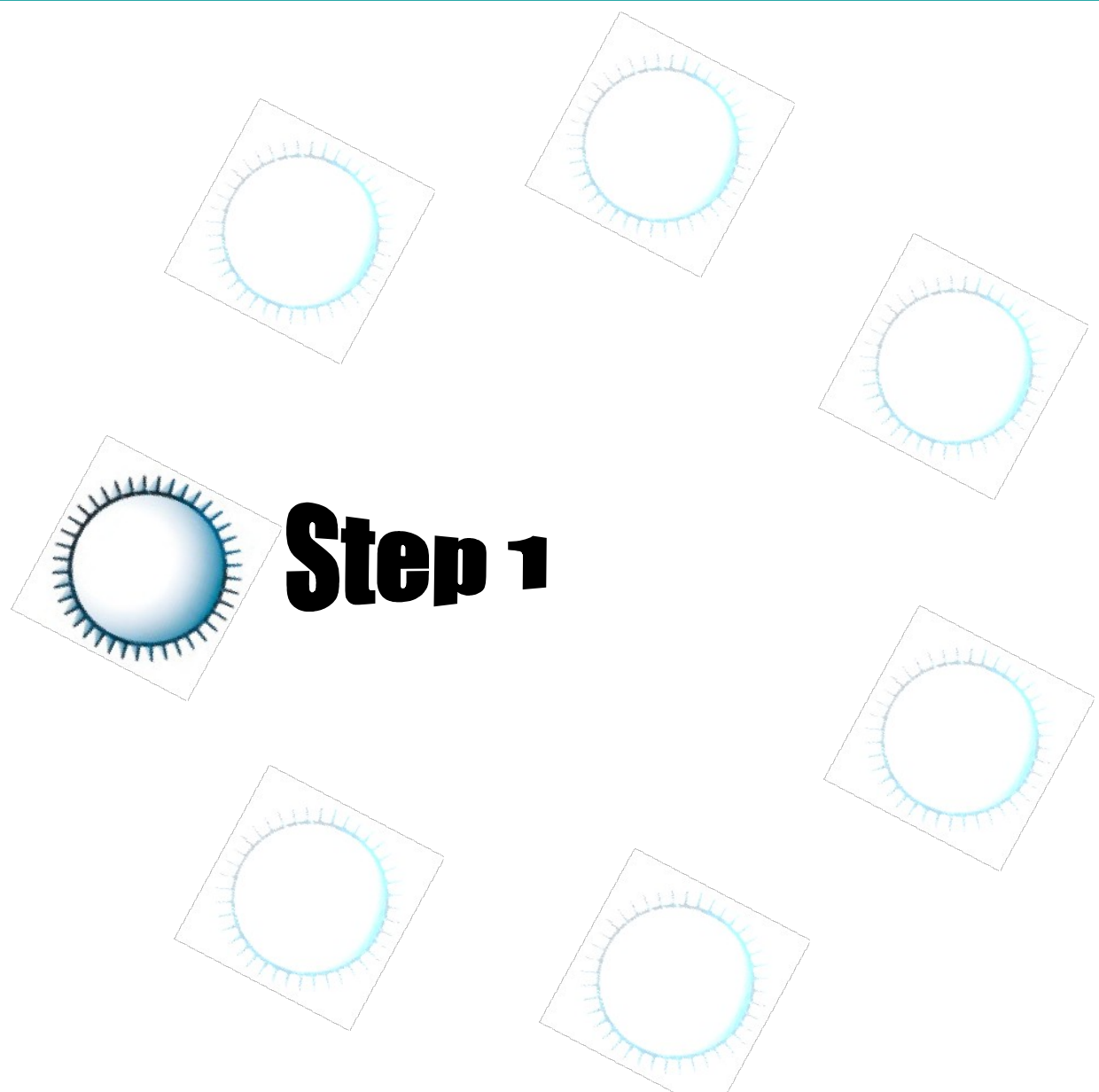


# Who owns AM?

- Operators, Maintenance and Equipment Engineering all have roles within AM
- Primary responsibility for AM falls squarely on the Operator for performing AM, and Production Management for supporting, teaching and coaching
- Maintenance and Equipment Engineering provides support through technical education and providing the skills and knowledge for equipment restoration



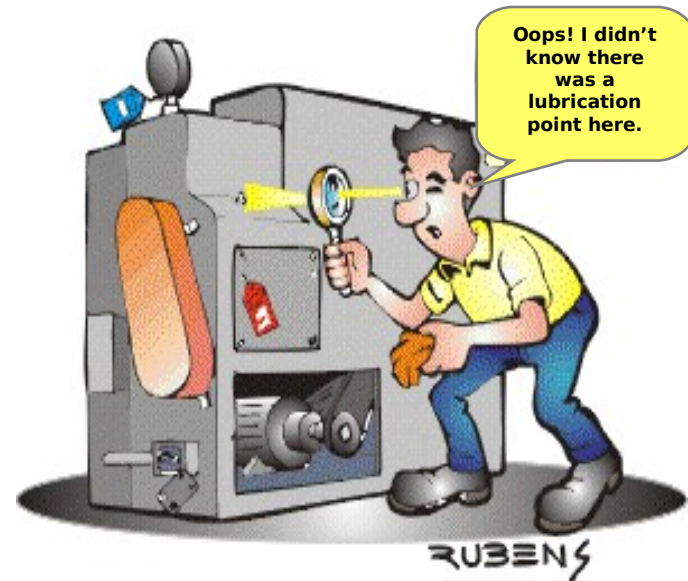
# AM Step 1





# AM Step 1 – Initial Cleaning

- Clean thoroughly to expose hidden defects
- Identify and recognize the harmful influence of contamination
- Detect and remedy broken or damaged components
- Become more familiar with equipment functionality
- Sense of ownership – “We take care of our own equipment”





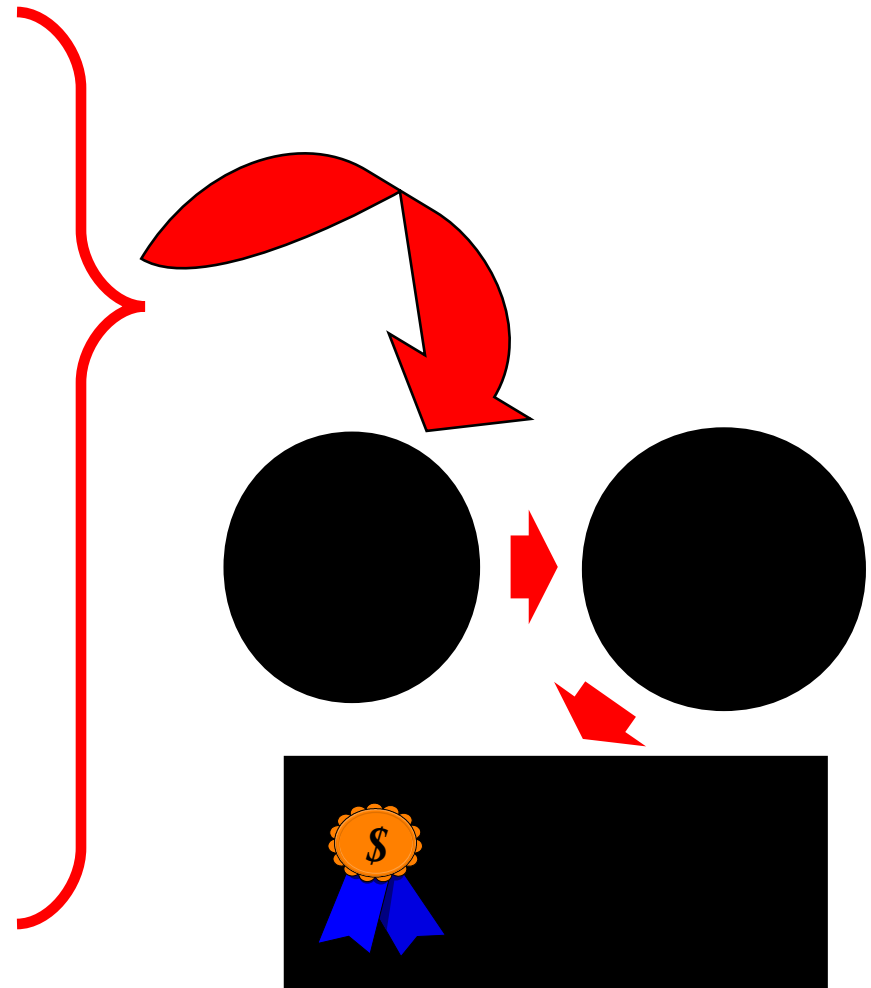
# AM Step 1 – Why Clean?

**CLEAN TO INSPECT**

**INSPECT TO DETECT**

**DETECT TO CORRECT**

**CORRECT TO PERFECT**





# AM Step 1 – Objectives

- Start with involving operators in checking and maintaining the equipment
- Find and solve large amount not known or neglected problems
- Improve ownership of equipment



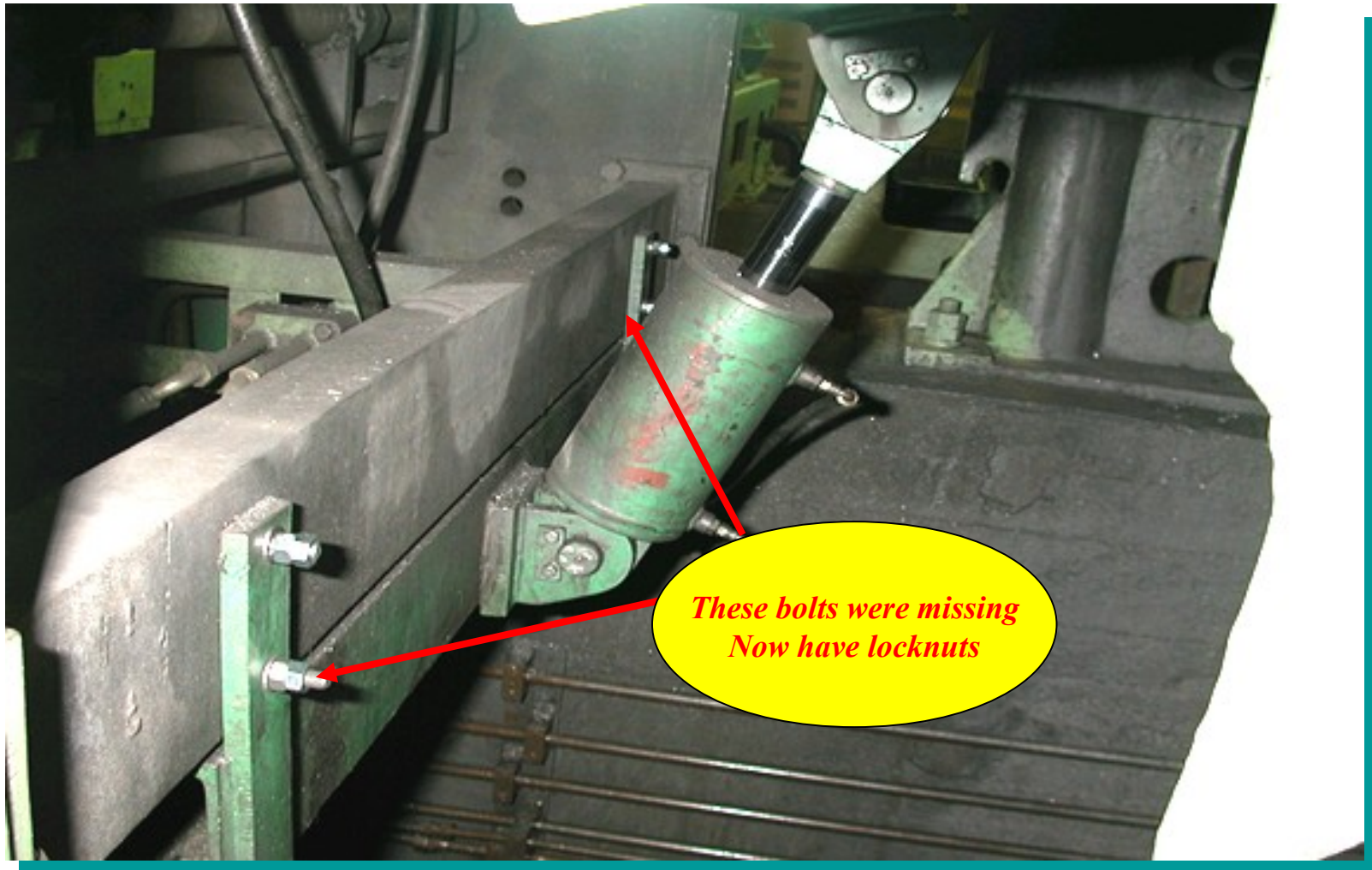


# AM Step 1 – Before / After





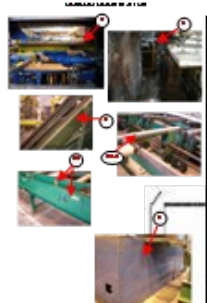
# AM Step 1 – Detect to correct





# AM Step 1 – Standards for checking

sapa:  
GENESIS

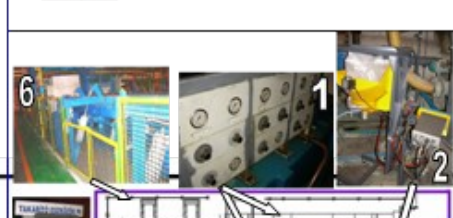


**PRÓBA 8. FUNKCIÓK ÖSSZEKAPÁSA**

**MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL**

№	Funkció
1	... ..
2	... ..
3	... ..
4	... ..
5	... ..
6	... ..
7	... ..
8	... ..
9	... ..
10	... ..
11	... ..
12	... ..
13	... ..
14	... ..
15	... ..
16	... ..
17	... ..
18	... ..
19	... ..
20	... ..

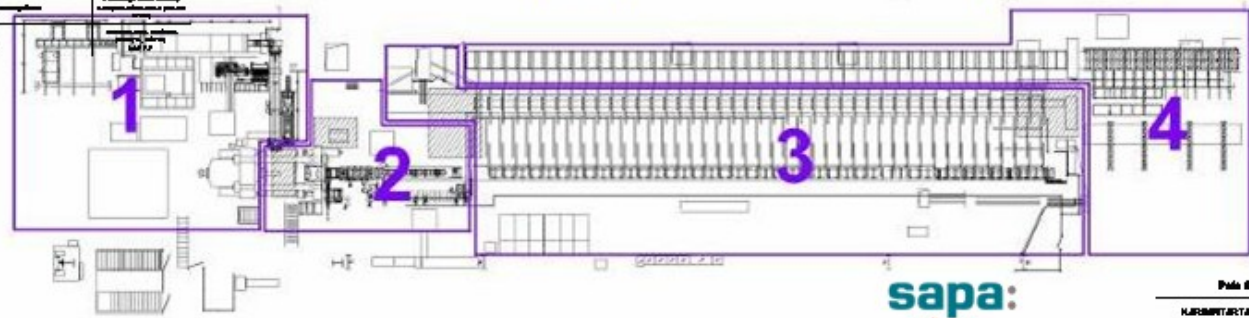
sapa:  
GENESIS



**PRÓBA 8. FUNKCIÓK ÖSSZEKAPÁSA**

**MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL**

№	Hely	Tesztelés	Mérés
1	C típusú kábelcsatlakozás, kábelcsatlakozás	Működés ellenőrzése, kábelcsatlakozás ellenőrzése (DPA, nyomás, szigetelés, kábelcsatlakozás)	Levegő áramlás, kábelcsatlakozás, kábelcsatlakozás
2	Fővezeték elosztószekciójának ellenőrzése	Ellenőrzés, kábelcsatlakozás ellenőrzése, kábelcsatlakozás ellenőrzése	C kábelcsatlakozás
3	Működés ellenőrzése, kábelcsatlakozás ellenőrzése	Recepták, kábelcsatlakozás ellenőrzése	C kábelcsatlakozás
4	Tulajdonosi szelvény ellenőrzése	V-áram ellenőrzése, kábelcsatlakozás ellenőrzése (Cábelcsatlakozás, kábelcsatlakozás, kábelcsatlakozás)	C kábelcsatlakozás



sapa:  
GENESIS

**PRÓBA 8. FUNKCIÓK ÖSSZEKAPÁSA**

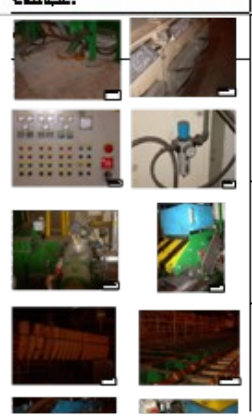
**MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL**



**PRÓBA 8. FUNKCIÓK ÖSSZEKAPÁSA**

**MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL**

№	Hely	Tesztelés
1	... ..	... ..
2	... ..	... ..
3	... ..	... ..
4	... ..	... ..
5	... ..	... ..
6	... ..	... ..
7	... ..	... ..
8	... ..	... ..
9	... ..	... ..
10	... ..	... ..
11	... ..	... ..
12	... ..	... ..
13	... ..	... ..
14	... ..	... ..
15	... ..	... ..
16	... ..	... ..
17	... ..	... ..
18	... ..	... ..
19	... ..	... ..
20	... ..	... ..



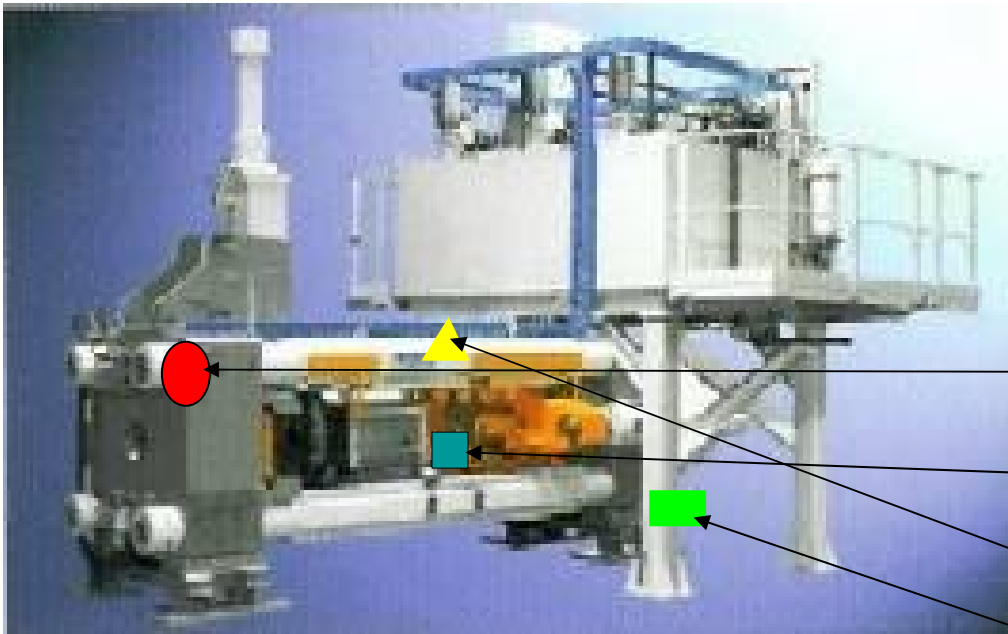
**PRÓBA 8. FUNKCIÓK ÖSSZEKAPÁSA**

**MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL ÉS MÉRÉSRE VÉTEL**

№	Hely	Tesztelés
1	... ..	... ..
2	... ..	... ..
3	... ..	... ..
4	... ..	... ..
5	... ..	... ..
6	... ..	... ..
7	... ..	... ..
8	... ..	... ..
9	... ..	... ..
10	... ..	... ..
11	... ..	... ..
12	... ..	... ..
13	... ..	... ..
14	... ..	... ..
15	... ..	... ..
16	... ..	... ..
17	... ..	... ..
18	... ..	... ..
19	... ..	... ..
20	... ..	... ..



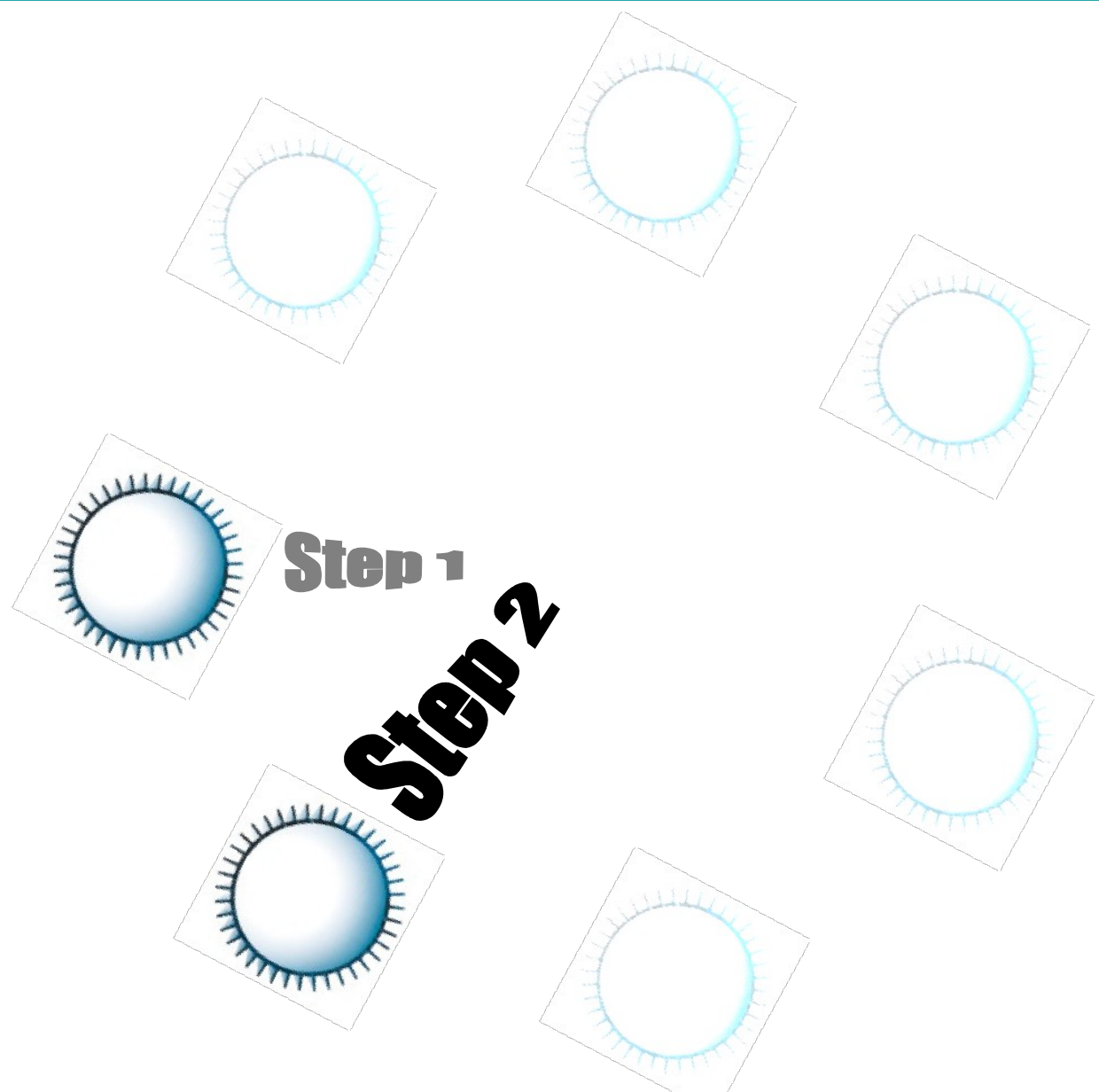
# AM Step 1 – Lubrication schedules



Lubricating plan		
Object:1	Type: Hydraulic Press	
Location	Lubricant	Sort
●	Tellus 46	Hydraulic Oil
■	Omala	Lubricating Oil
▲	C 10	Spindel Oil
■	300	Grease

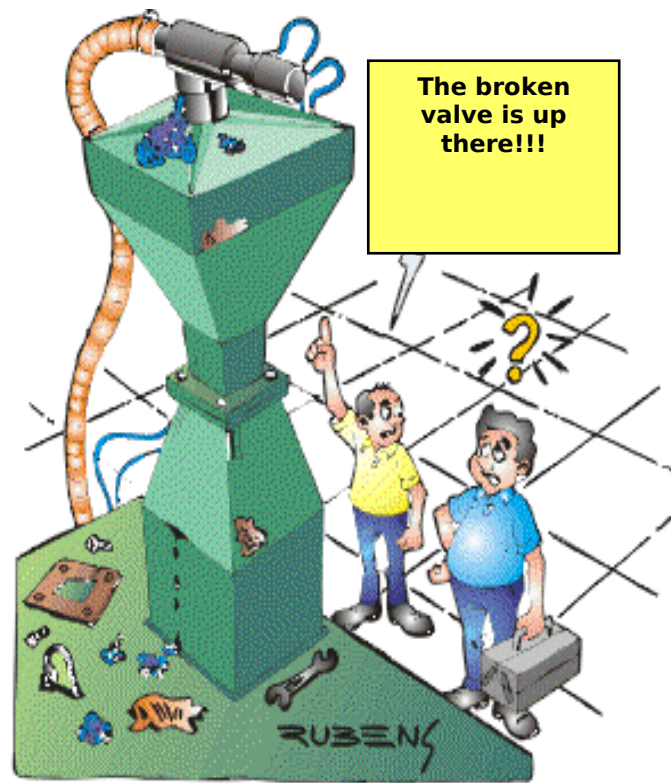


# AM Step 2





## AM Step 2 – Eliminate sources of contamination



- Definitively maintain the equipment cleanliness
- Improve maintainability
- Reduce maintenance time
- Increase reliability of equipment
- Early problem detection
- Improve operator's commitment
- Reduction in cleaning time



# AM Step 2 – Objectives

- Reduce cleaning time
- Reduce checking time
- Identify hard-to-lubricate places
- Simplify lubrication tasks

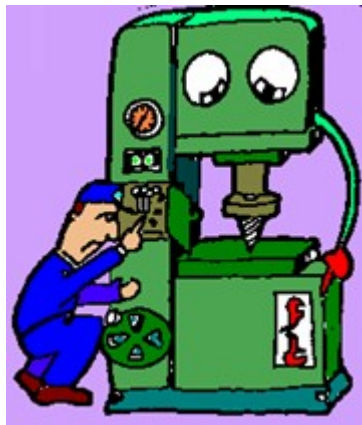


# AM Step 2 – Find the root cause

## 1. Why

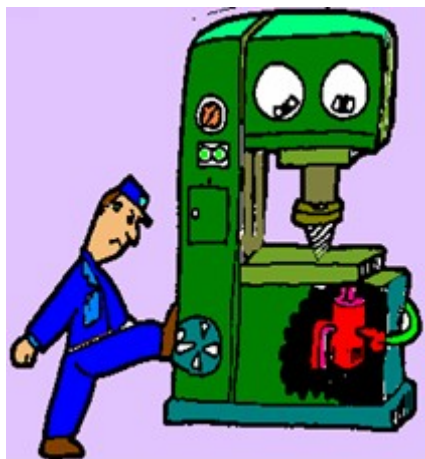
Does the machine stop

Because of overburden

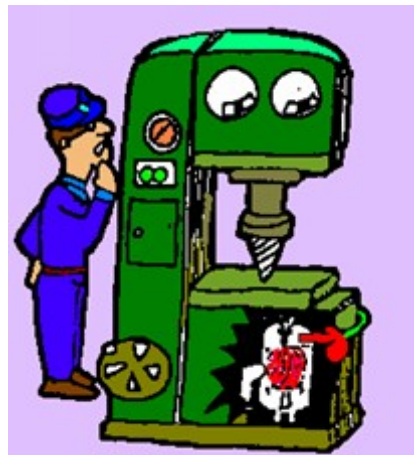


## 2. Why

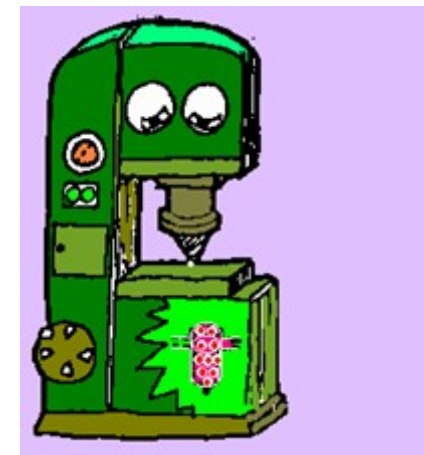
Because the spindle gets hot



3. Why Not enough lubrication



4. Why Pump does not function



5. Why- Filter is dirty





# AM Step 2 – Eliminate bad access



**Construction allows  
swarf to fall into corners**





# AM Step 2 – Improve access

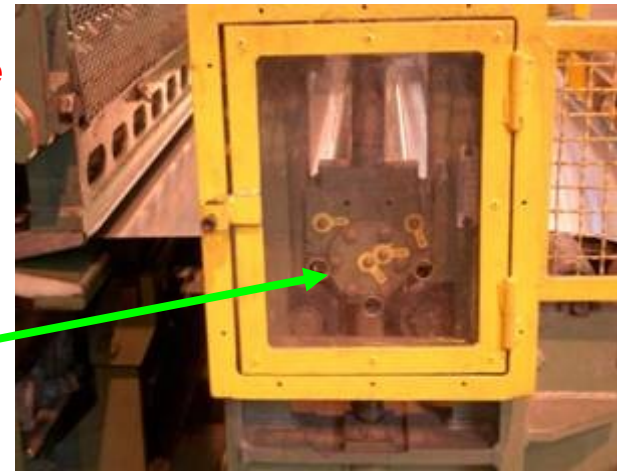
**before**



**to grease you have  
to take away**

**to grease use the  
holes**

**after**



**to change filter  
remove screws**

**to change filter  
just take it out**

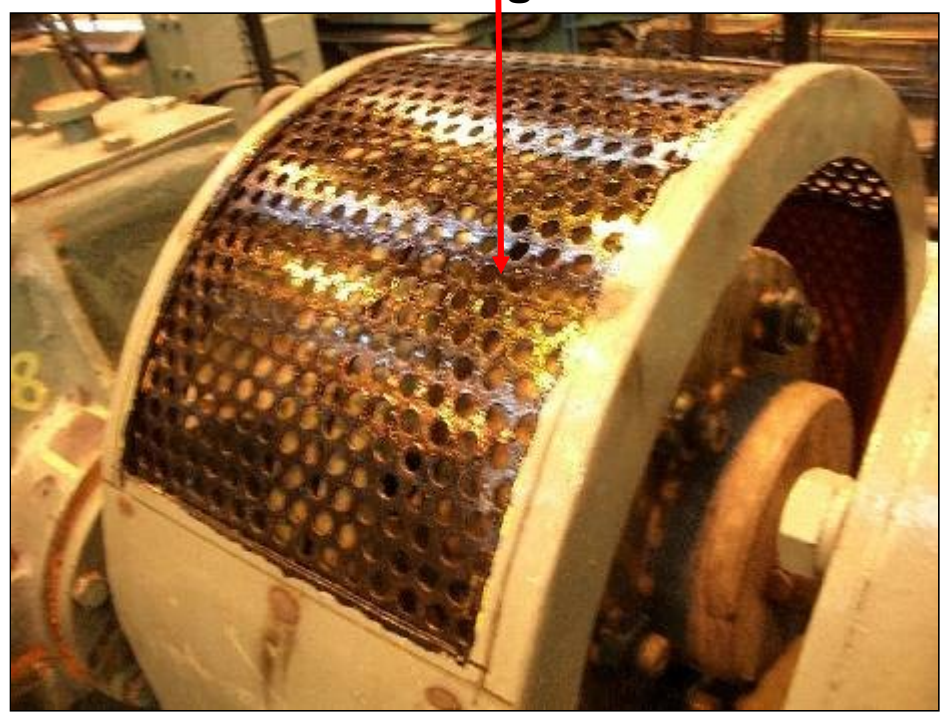
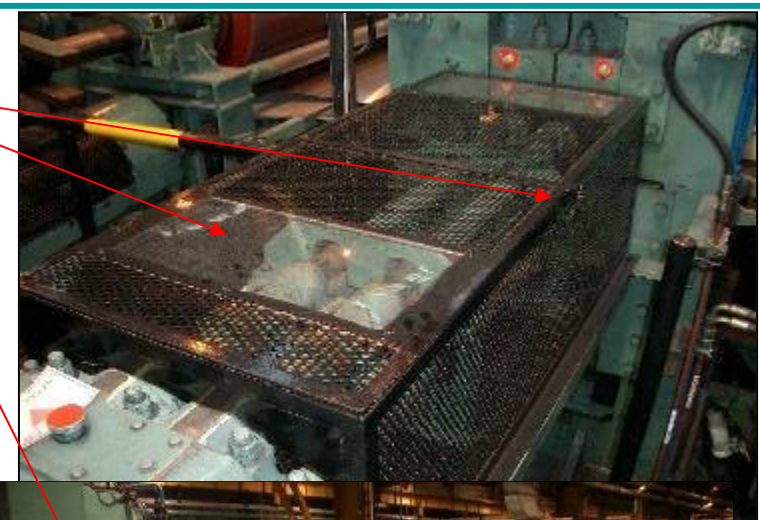




# AM Step 2 – Improve access

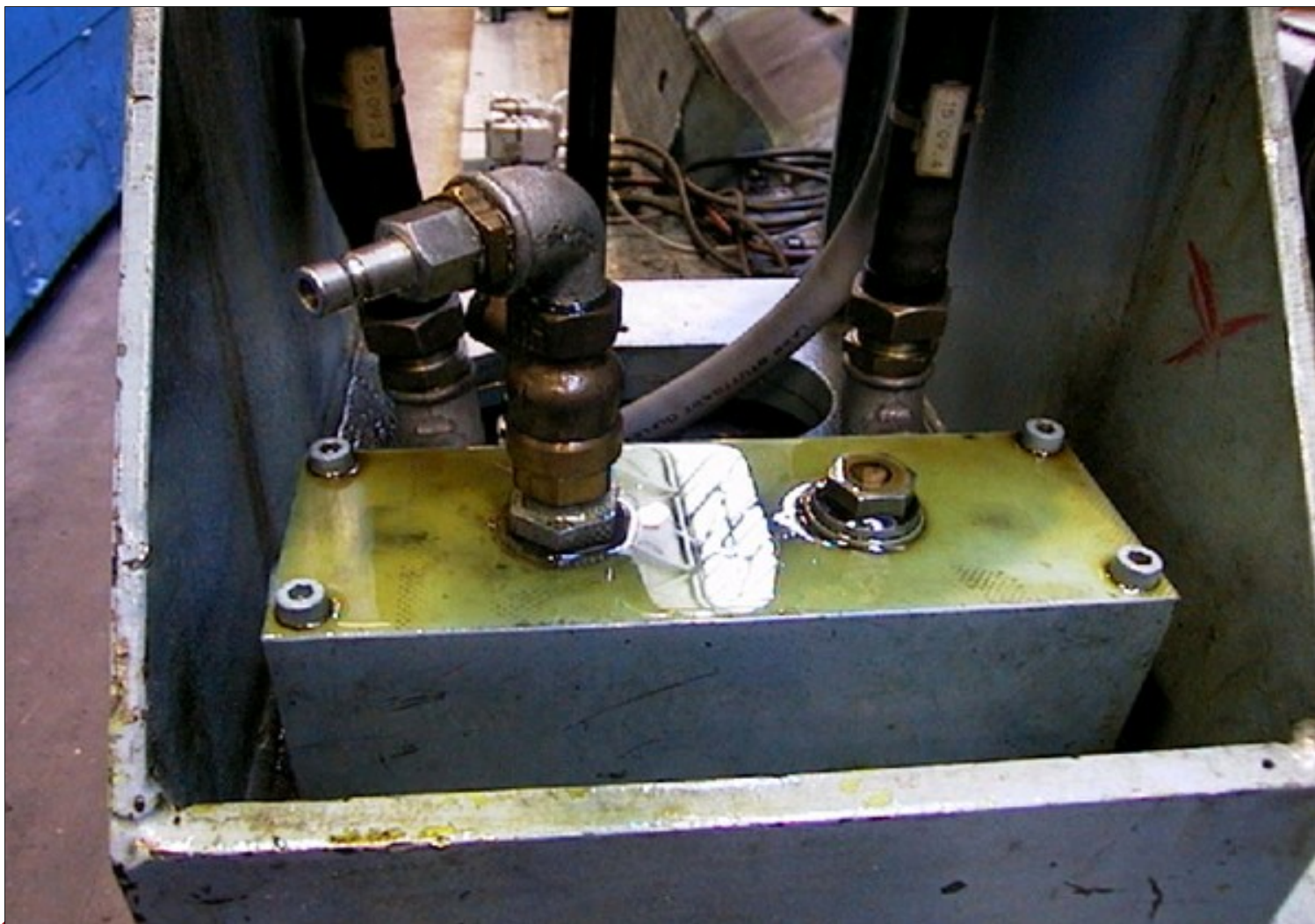
**you can check visibly and open by fixing only one screw**

**it's impossible to check with one view and dangerous**





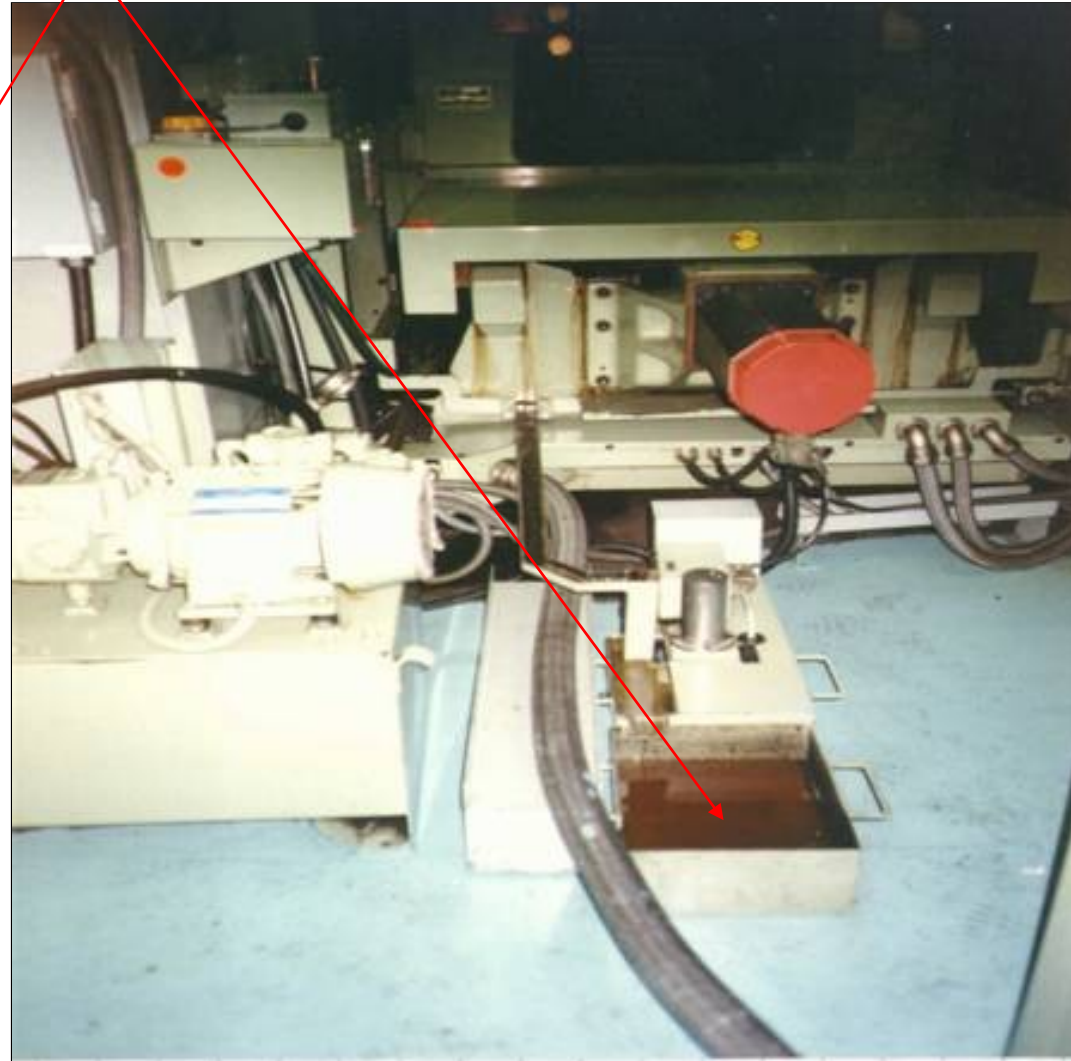
# AM Step 2 – Find sources of leaks and dirt





# AM Step 2 – Direct leaks

**Direct leaks to one point and keep it under control**





# AM Step 2 – Improve inspection





# AM Step 2 – Improve and simplify lubrication





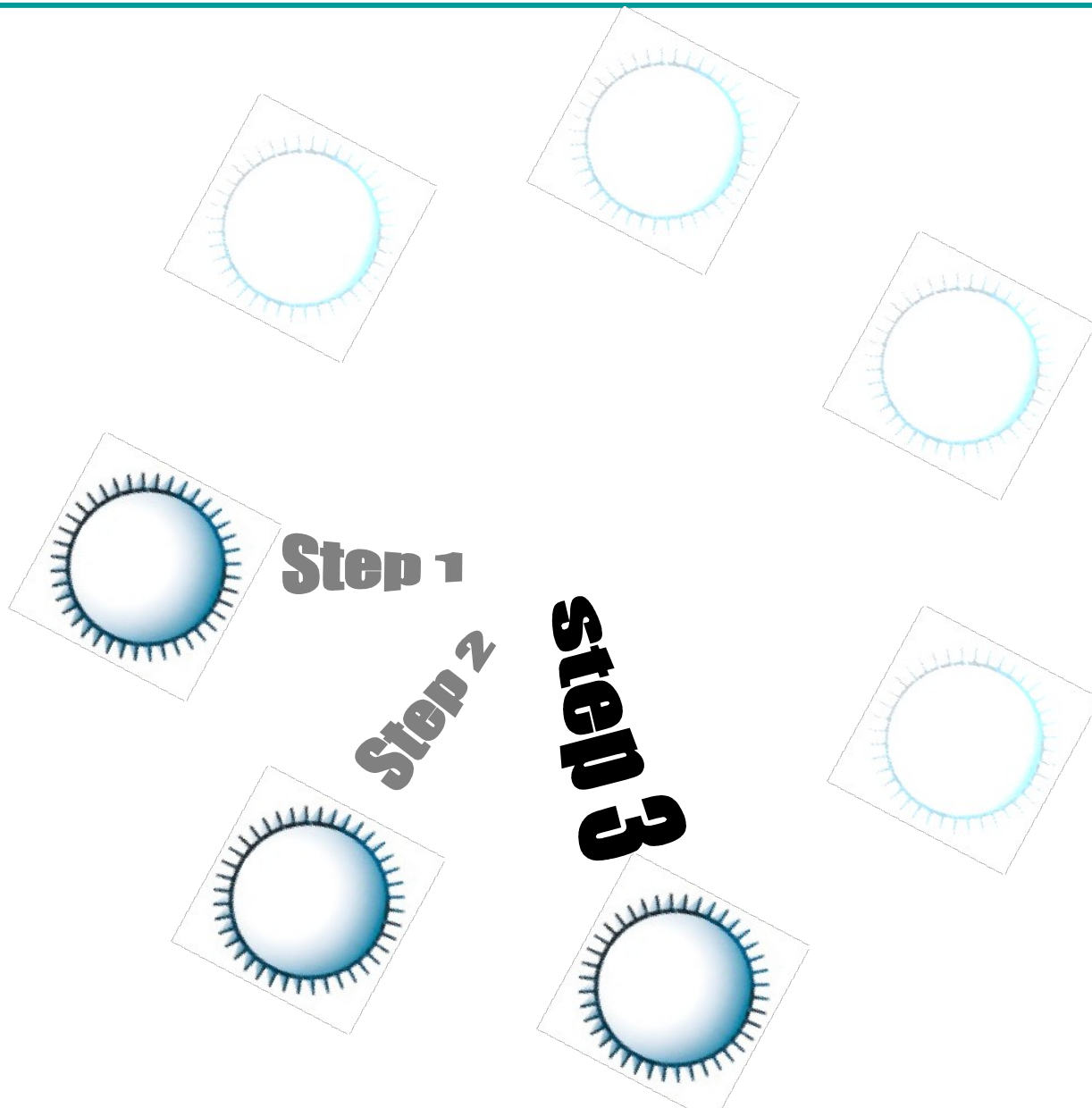
# AM Step 2 – Protect from dirt







# AM Step 3





# AM Step 3 - Establish Initial Standards

- Development of lubrication standards
- Operators set rules by themselves: what, where, reason, methods, timeframe
- Check all lubrication points and surfaces
- People understand the importance of lube tasks
- Difficult to lube and inspection areas are corrected
- Carry out cleaning and lubrication tasks with greater confidence and ability
- Time required must be part of the daily schedule





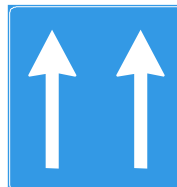
# AM Step 3 - Objectives

- Secure the gained knowledge
- Start transfer of defined work from maintenance to production – greasing and lubrication
- Make work easier and more reliable
- Visualize things to check

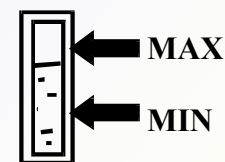
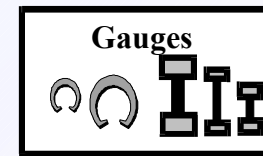
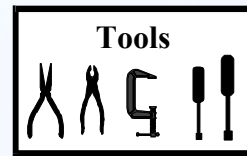
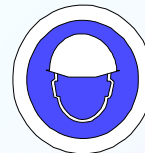


# AM Step 3 - Using visual standards

## Daily Life



## Company





# AM Step 3 – Standardising lubrication

## What do we mean by Standards ?



Example. A standard helps to fill a grease or hydraulic tank correctly

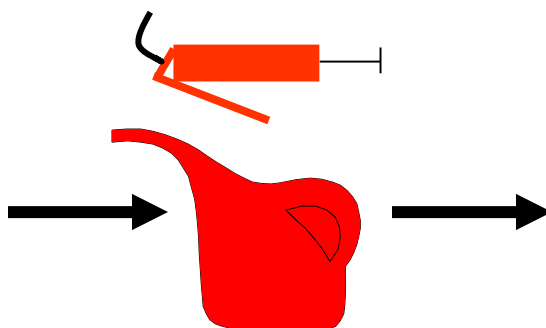
### Standard 1

Identify and mark grease barrels



### Standard 2

Identify oil cans and grease guns



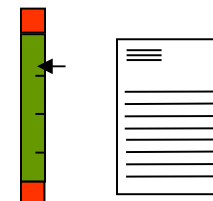
### Standard 3

Mark Grease points with colours and label



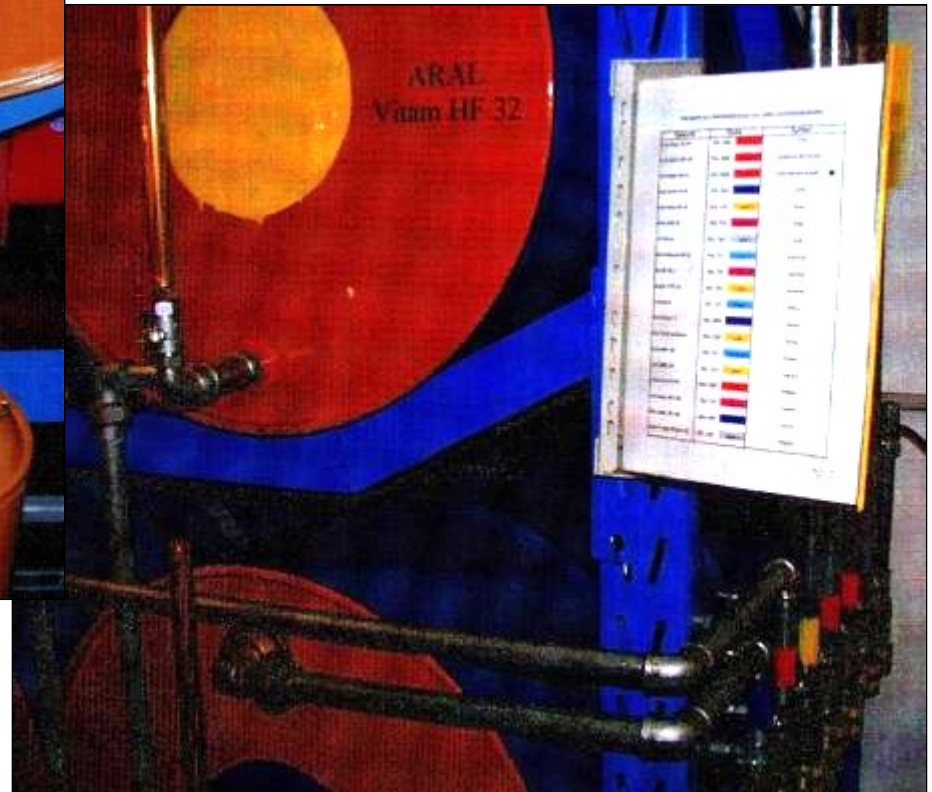
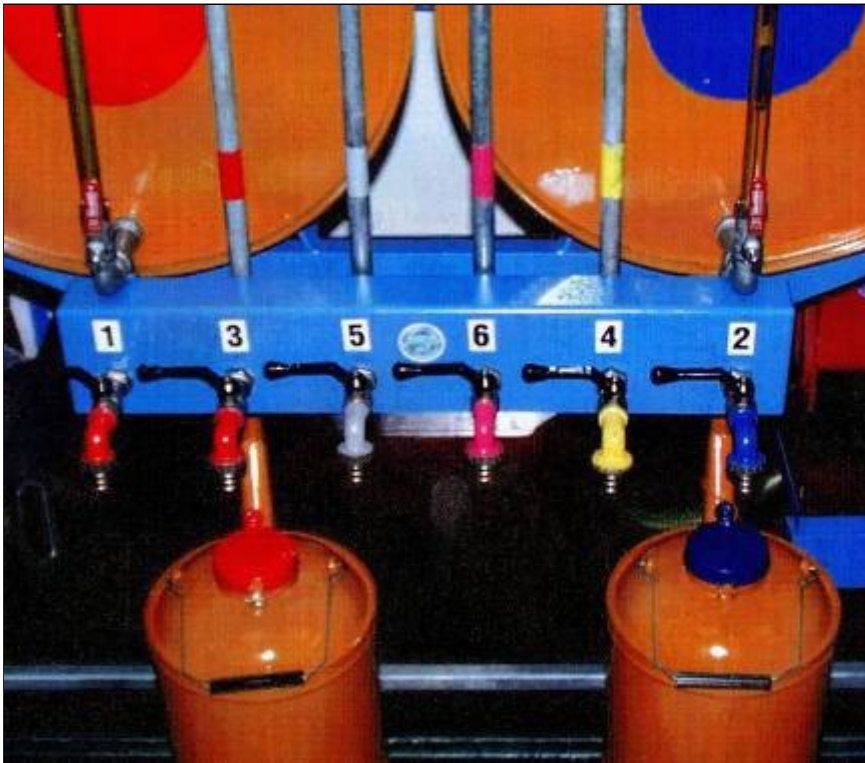
### Standard 4

Mark filling levels and/or record greasing





# AM Step 3 – Colour coding





# AM Step 3 – Visual inspections





# AM Step 3 – Visual inspections







## Person

- Enhanced technical knowledge of the equipment
- Direct involvement in the training elaboration (self-learning)
- Speed the knowledge transfer
- Encouraged to teach what they have learned
  - Teaching motivates an improvement in morale
- Provides a greater ability for the Operator to make improvements
- Develops skills in problem solving
- **Zero injuries**

## Equipment

- Like-new condition
- Problems made visible and identified immediately
- Small problems are corrected and never allowed to grow into larger problems
- **Zero breakdowns**
- **Zero defects**



# Roadmap for TPM implementation

1. Identify your critical equipments (Reliability / Process)
2. Create plan to reach steps in TPM(AM)
3. KickOff Event – Cleaning and Inspecting (Use Tags to identify, document and visualise problems)
4. KickOff Event – Review/create TPM standards/checklists
5. Use regular audits on the area based on audit list
6. Post results and information to a board visible for the operators
7. Implement regular TPM workshops for operators to keep the momentum

\*TPM is used here for Autonomous Maintenance



# AM KickOff Event - Tagging

Number of faults tagged – 24

Mechanical – 14    Electrical – 10

Tags completed on day – 11 = 46 %





# Before event





# After event





# Before event





# After event



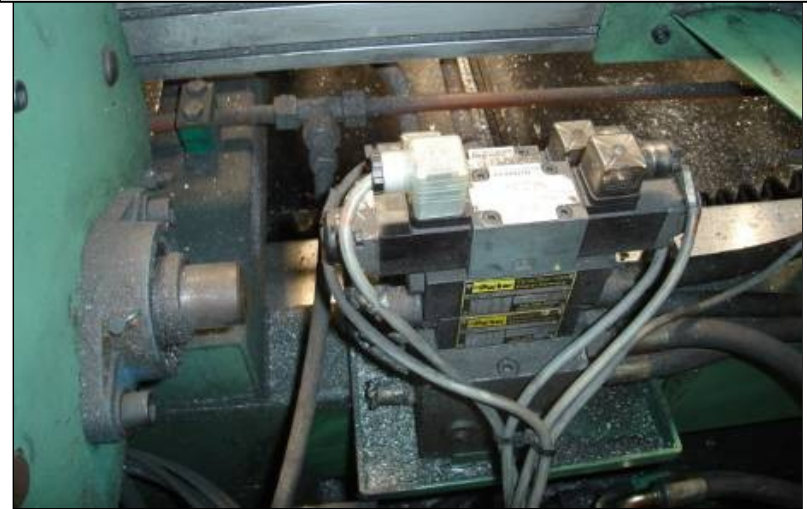


# AM KickOff event results

Magnetic switch fixings



Valve solenoid broken / replaced



Broken plastic conduit



Crushed steel conduit







# AM KickOff event results

Solenoid fixing cap missing - replaced



New pipe and fitting to cylinder



Damaged belt - replaced

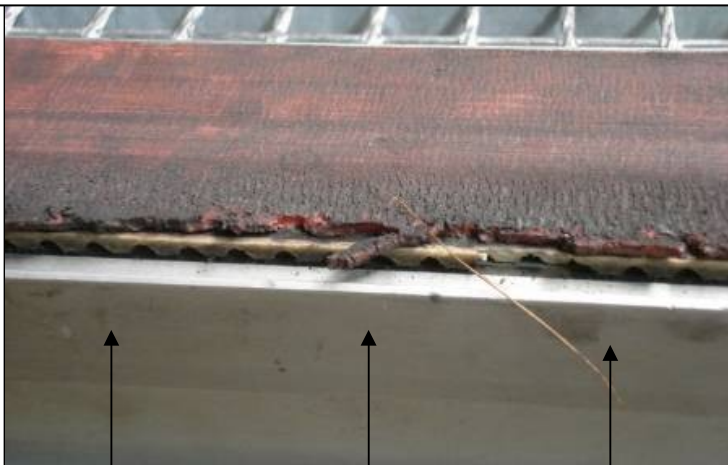


Photo cells damaged - replaced



# Do you have a „TPM eye”?





# ANY QUESTIONS?



# THANK YOU FOR YOUR ATTENTION