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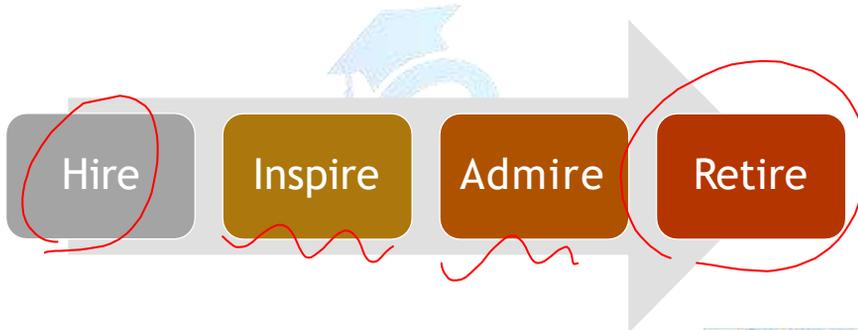
4.4 Develop personnel

Delineate Career Paths:

ENGINEER ACADEMY

Employee Life Cycle

| Hire | Inspire | Admire | Retire |

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4.4 Develop personnel

Delineate Career Paths:

ENG

Succession Planning

the process of identifying and preparing suitable employees through mentoring, training, and job rotation—to replace key players in the organization.

FROM WORKFORCE PLANNING

1 IDENTIFY KEY POSITIONS

6 MAINTAIN SKILLS INVENTORY

2 BUILD JOB PROFILES FOR EACH KEY POSITION

SUCCESSION PLANNING MODEL

5 INDIVIDUAL DEVELOPMENT PLANS

3 COMPETENCY GAP ANALYSIS

4 DEVELOPMENT OPPORTUNITIES

RECRUIT FROM OUTSIDE

PDCA

6 steps

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4.4 Develop personnel

Delineate Career Paths:

Succession Planning

ENGINEER ACADEMY

Right People.
Right Development.
Right Time.

- Focus on the right competencies
- Assess bench strength
- Engage and develop high potentials
- Forecast the impact of succession planning
- Determine if your program has the desired impact

9 Box Talent Model

The Talent Matrix

	C1 – Key Contributor	B1 – Strong Performer	A1 – Star Performer
	C2 – Acceptable Performer	B2 – Solid Citizen	A2 – Rising Star
	C3 – Unacceptable Performer	B3 – Marginal Performer	A3 – Too New

Performance: High / Medium / Low
Potential: Low / Medium / High

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4.5 Lead and manage people

ENGINEER ACADEMY

Develop leadership skills

Assess performance

Promote cooperative work environment

Facilitate communication

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4.5 Lead and manage people

- Leadership
  - The ability to influence others to voluntarily pursue organizational goals, as defined by an organization's vision.

- Leader
  - An individual who looks to the future and charts the course for an organization by influencing others to achieve its vision.

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4.5 Lead and manage people

- Leaders and Managers

Managers	Leaders
Accept the Status Quo	Challenge the Status Quo
Control	Innovate and develop
Administer and Maintain	Ask What and Why
Do things right	Do the right thing
Watch the bottom line	Watch the horizon
	Set the example

PUSH

PULL

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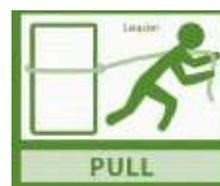
Source: Warren Bennis – On Leadership and Management

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4.5 Lead and manage people

- Leaders and Managers

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— Bernard Blass:
- Although leadership and management overlap, each entails a unique set of activities or functions.
  - Leaders play a key role in creating a vision and strategic plan for an organization.
  - Managers are charged with implementing the vision and strategic plan.

— John Kotter:
- Neither the manager nor the leader is better than the other - they complement each other.
- Managing is about coping with complexity, while leading is about coping with change.

PUSH

PULL

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4.5 Lead and manage people

- What is "Culture"

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Culture in an organization is defined as patterns of shared values & beliefs that over time produce behavioral norms adopted in solving problems. Usually, it's a body of solutions to problems that have worked consistently and are taught to new members as the correct way to perceive, think about and feel in relation to these problems.

Values
Attitudes
Customs
Beliefs

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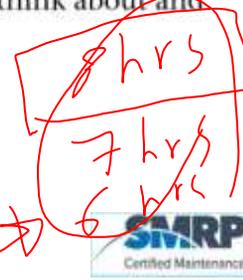
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- What is "Culture"

Company Culture

- A business' culture defines what gets appreciated, respected, and, ultimately, rewarded; those rewards and their linkage to performance are the foundation of changing behavior.

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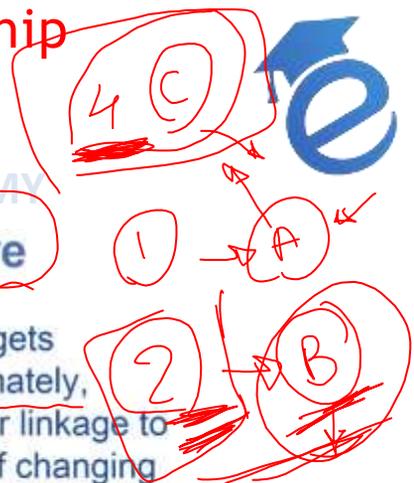
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4.5 Lead and manage people

- Stable Domain Model with Business System Requirements

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- Reliability Culture

In a reliability culture, PREVENTION of failures becomes an emphasis at every level of the organization. The whole workforce has to be focused on asset reliability. The workforce – operators, maintainers, engineers, etc. – think and act to ensure:

- Assets are available to produce when needed
- Assets are maintained at reasonable cost
  - An optimized PM plan (RCM /CBM based) is established and maintained
  - An effective facility maintenance plan –(80/20 principal) is established and applied

PMO

Predictable Behavior + Reliable Process = Sustained Culture of Excellence

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Reliability Culture ?
- Scenario A_1

❖ Plant operations reported that valve # 139 would not close. An operations workaround was used to temporarily divert the process. The breakdown was reported to the Maintenance Dept. with an urgent request in the EAM/CMMS to fix the valve. They needed the valve for next production run.

(EAM- Enterprise Asset Management / CMMS- Computerized Maintenance Management System)

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Reliability Culture ?

- Maintenance dispatched a mechanic to evaluate and fix the valve.
- Mechanic noticed "a burning smell" upon arrival, and suspected the electric motor on a hydraulic pump had burned up. He called an electrician to help.
- Electrician determined that the motor had failed. He asked his supervisor to find a replacement motor.
- Supervisor called the Storekeeper who found that no spare motor was available.
- Supervisor called operations to report that motor failed and will take a couple of days to repair. Operations demanded the repair now, so the supervisor called the Plant Engineer to help locate a spare motor.
- Plant Engineer and Supervisor found the same type of motor on a similar system not being used. Supervisor sent another crew to remove this motor while the other crew removed the failed motor.
- Maintenance replaced the motor and adjusted linkages due to sluggish operation. The valve was released to operation.
- The work order was closed with comment "valve was fixed."
- Operations was so happy with a four hour repair (rather than two days) that they sent an e-mail thanking the maintenance crew for a job well done.

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Reliability Culture ?

Is this scenario real?

What kind of culture does this plant have?

What kind of message is being delivered to the workforce?

Fixing things are recognized and appreciated.

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Creating the Reliability Culture
- Scenario A₂

❖ Plant operations reported that Valve # 139 would not close. An operations workaround was used to temporarily divert the process. The breakdown was reported to the Maintenance Dept. with an urgent request in the EAM/CMMS to fix the valve.

❖ Same problem scenario, however event happened little differently

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4.5 Lead and manage people

- Creating the Reliability Culture

  - Scenario A₂

- Maintenance Supervisor/Scheduler visited the asset/site and assessed the failure and found that the valve linkage was tight and dry and also found failed electric motor on hydraulic system.
- Supervisor/Scheduler assigned a mechanic and an electrician, requested a 6 month chronological history report and a recommended part list. He also alerted the plant/system engineer of the problem.
- Electrician determined that the motor had failed (burned). The overload relays didn't function properly. Mechanic found that linkage was tight due to inadequate lubrication.
- The repair history (attached to the Work Order) showed the following problem few months ago:
  - Problem with valve closing. Mechanic had adjusted and greased the linkage. The hydraulic pressure on the system had been raised from 1500 psi to 1600 psi to make actuator and linkage work smoothly.
- Repair plan included replacement of the motor and overload relays, restoration of hydraulic pressure to system design, and greasing/adjustment of linkage. Spare motor was available as a part of the Repairable Program.
- Work was completed as planned. Operator was supporting the repair and helped in testing the system. Valve returned to operation.
- The WO was closed and repair details documented.
- Operations was pleased with a two hour repair. Maintenance manager personally thanked the maintenance crew for a job well done and for finding the root cause. He then asked them for a plan of further action needed to improve the reliability for review in 10 days.

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Creating the Reliability Culture
- Scenario A₂

- What kind of culture is in this organization?
- Is EAM/CMMS system providing the data we need to make the right decisions?
- What is the message being conveyed by the Maintenance / Reliability manager ?

(handwritten note: 6 months)

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Creating the Reliability Culture - Scenario A,
Same problem scenario, however event happened little differently

Plant operations (Operator) observed that on Valve # 139

➤ Motor Current data indicate higher current (on operating console- dashboard)
➤ On visual /site visit indicated
  ➤ Valve Actuator running sluggish – linkage problem

❖ Maintenance evaluated the situation with the help of operator and planned the repair
  ❖ No Unscheduled downtime
  ❖ Revised PM task
  ❖ WO created for linkage redesign
    ❖ Linkage was redesigned with input from operations , maintenance and design

(handwritten note: Reliability)

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Creating the Reliability Culture - Scenario A,
*Same problem scenario, however
event happened little differently*

- What do you see in this organization?

  "Failure" was identified and addressed before it happened. Additionally,

  - Operations and Maintenance worked together as a team.
  - System provided the "warning" data.
  - Process was designed to make it happen.

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- Why should we care about leadership & culture?

  People do Asset Management

People, and their knowledge, competence, motivation and teamwork can make the biggest difference to good or poor asset management

The tools and technologies may be helpful, but the engagement of the workforce, the clarity of leadership, and the collaboration between different departments and functions are the real differentiators of a leading asset management organization

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- Have the Right People in the Right Place

  - Leaders who exclaim that "people are our most important asset" usually do not think very hard about choosing the right people for the right jobs.
  - Over time, however, it's choosing the right people that creates competitive advantage.
  - It really is "Having the Right People" is our most important asset.

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Which Leadership is needed by ISO 55001?

Leadership Attributes Survey

1. Charisma
2. Competence
3. Communication
4. Energizing people
5. Vision (in creating)

Charisma	7%
Competence	8%
Communication	21%
Energizing People	31%
Vision	33%

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Which Leadership is needed by ISO 55001?

- o NMA(national management association) Leadership Model

- o (It is a model that defines the **core skills and behaviors required for effective leadership and management**.)

Mobilize Individual Commitment for Change
(inspire and engage others; share power)

Demonstrate Personal Character
(foster relationships, model integrity, build trust)

Set Direction
(envision the future, share vision, focus on customers)

Engender Organizational Capability
(build teams, nurture creativity, deliver results)

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Which Leadership is needed by ISO 55001?

Top management shall demonstrate leadership and commitment with respect to the asset management system by:

Engagement in setting Policy, SAMP(strategic asset management plan) and Objectives	Ensuring the integration and alignment	Communicating asset management importance	Ensuring resources are available
Addressing asset related risks	Supporting improvement activities;	Ensuring intended outcomes.	Establishing a strong collaborative work culture.

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7 Habits of Highly Effective People, Steven Covey

People, and their knowledge, competence, motivation and teamwork can make the biggest difference to good or poor asset management

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4.5 Lead and manage people

7 Habits of Highly Effective People, Steven Covey

Habit 1: Be proactive

This habit is the basis of all further habits and a cornerstone of success. Be proactive means a combination of take action and take responsibility. You are the person who is going to have the biggest influence in how your life turns out. You have the opportunity to use your free will and work hard to change yourself and your circumstances. You are only a victim if you allow yourself to be. The main thrust of this habit is to do whatever is in your power to make things (your situation) better. You are the creator, the actor and the doer in your life, get started and "just do it".

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Habit 2: Begin with an end in mind

This habit could be restated, visualize where you want to go. Before you start doing something sit down and plan it out. A couple of minutes planning will usually save you many minutes of actual work later on. Use your creative forces to create images and plans in your head first, then carry out your plan. The plan is called the first creation, and when you carry out the plan it is the second creation. For your "second creation" to be successful, you should have a well thought-out "first creation".

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Habit 3: First things first

This habit deals with setting priorities. Decide what values and goals are most important for you, then decide what steps are most important for you to take to achieve those goals.

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Habit 4: Think win-win

Many of us grow up with a competitive mindset, "I win, and you lose". Or, a beaten-down mindset, "I give up, do whatever you want to me". Or, a mix of these and other mindsets. Each of these has its place. However, for most of the most valuable interactions we have in family and business, the most mature and effective point of view is seeking situations that benefit everyone involved. When we negotiate, we should seek to make deals that help everyone. In cases where this is not possible, it is best to have the mindset from the outset that you will walk away from the deal.

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Habit 5: Seek first to understand, then be understood

To influence and help others, you must first actively listen to them and understand their situation and concerns. Think of the example of a doctor who gives a prescription over the telephone without getting all of the necessary information about the patient or his condition. This could lead to a serious or fatal error if the patient takes the wrong medicine. In the same way, you should be very careful when you start to give anyone advice that you understand the preoccupations and situation of that person. Even if your advice is very good, it will likely not apply to the situation.

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Habit 6: Synergize

The exercise of all the other habits prepares us for the habit of synergy.

"Two heads are better than one." Through trustful communication, find ways to leverage individual differences to create a whole that is greater than the sum of the parts.

Through mutual trust and understanding, one often can solve conflicts and find a better solution than would have been obtained through either person's own solution.

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Habit 7 Sharpen the saw (It's me time)

 The last habit encompasses all the other habits and ensures our engagement in activities of personal renewal. You will be able to preserve and maintain yourself through seeking balance in the areas of physical, social/emotional, mental and spiritual.

Personal renewal helps you to maintain/increase your effectiveness through striking a balance between your Production (P) and Production Capability (PC). Production refers to the production of desired result and production capability refers to the ability to produce successful results.

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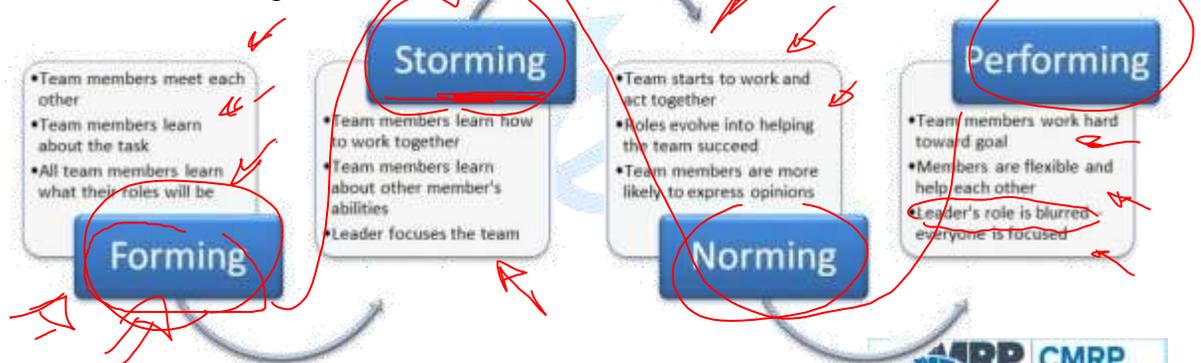## 4.5 Lead and manage people

Effective Teams:

Work groups		Work teams
Share information	Goal	Collective performance
Neutral (sometimes negative)	Synergy	Positive
Individual	Accountability	Individual and mutual
Random and varied	Skills	Complementary

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Effective Teams:

Team formation stages

Forming
- Team members meet each other
- Team members learn about the task
- All team members learn what their roles will be

Storming
- Team members learn how to work together
- Team members learn about other member's abilities
- Leader focuses the team

Norming
- Team starts to work and act together
- Roles evolve into helping the team succeed
- Team members are more likely to express opinions

Performing
- Team members work hard toward goal
- Members are flexible and help each other
- Leader's role is blurred everyone is focused

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Effective Teams:

ENGINEER ACADEMY

Team formation stages with change management

Change Management Objective
Reduce depth and duration of curve

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Pillar related metrics and KPIs

ENGINEER ACADEMY

Rework

Maintenance Training Cost Maintenance Training Hours

Maintenance Training Return on Investment (ROI)

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Pillar related metrics and KPIs

Rework

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Rework is corrective work done on previously maintained equipment that has prematurely failed due to maintenance, operations or material problems. The typical causes of rework are maintenance, operational or material quality issues.

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Pillar related metrics and KPIs

Rework

ENGINEER ACADEMY

OBJECTIVES

This metric is used to identify and measure work that is the result of premature failures caused by errors in maintenance or operation. Measuring rework and its root causes enables plant management to develop and implement effective strategies designed to minimize or eliminate these errors. Typical strategies include: maintenance training, operations training, defective parts elimination, maintenance work procedures development or revision, operating procedures development or revision and improved purchasing and/or warehouse practices.

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Pillar related metrics and KPIs

[handwritten: Leading or lagging]

Rework

FORMULA
Rework (%) = [Corrective Work Identified as Rework (hours) ÷ Total Maintenance Labor Hours] × 100 .

A total of 1000 maintenance labor hours are worked in a month. A total of 40 hours are for corrective work identified as rework.

• Rework (%) = [Corrective Work Identified as Rework (hours) ÷ Total Maintenance Labor Hours] × 100

Rework (%) = (40 hours ÷ 1000 hours) × 100 = 4%   *[handwritten: KPI]*

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Pillar related metrics and KPIs

Maintenance Training Cost   *[handwritten: KPI]*

It is the cost for the formal training that internal maintenance employees receive annually. It is expressed as cost per employee

OBJECTIVES
The objective of this metric is to measure the formal training of internal maintenance employees.
This metric is also used to trend the investment in the skills of internal maintenance employees.

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Pillar related metrics and KPIs

<u>Maintenance Training Cost</u>

ENGINEER ACADEMY

FORMULA

Maintenance Training Cost (per employee) =   Total Maintenance Training Cost ÷ Number of Internal Maintenance Employees

This metric can also be expressed as a percentage of the total maintenance labor cost.

<u>Maintenance Training Cost (%)</u> =   (Total Maintenance Training Cost ÷ Total Internal Maintenance Employee Labor Costs) × 100

It can also be measured for a specific craft like planners or PDM specialists.

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Pillar related metrics and KPIs

<u>Maintenance Training Cost</u>

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Internal Maintenance Employees:
All personnel, salaried and hourly, direct and indirect, who are responsible for executing work assignments pertaining to the maintenance of physical assets and components.

BEST IN CLASS TARGET VALUE:

4% of annual wage

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Pillar related metrics and KPIs

Maintenance Training Hours

The metric is the number of hours of formal training that maintenance personnel receive annually. It is expressed as hours per employee.

OBJECTIVES:

This metric measures the investment in training to improve the skills and abilities of maintenance personnel.

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Pillar related metrics and KPIs

Maintenance Training Hours

FORMULA :

Maintenance Training Hours = Training Hours ÷ Number of Maintenance Employees

This metric can also be expressed as a percentage of the total number of hours worked by a maintenance department.

BEST IN CLASS TARGET VALUE:

80 hours per year

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Pillar related metrics and KPIs

Maintenance Training Return on Investment (ROI)

This metric is the ratio of the benefit to the cost of training internal maintenance employees. This metric can also be expressed as a percentage of the total number of hours worked by a maintenance department.

OBJECTIVES
The objective of this metric is to determine the return on investment of training of maintenance employees. It can be utilized to justify the investment in training in order to garner approval from management

Pillar 4– Organization & Leadership
Pillar related metrics and KPIs

Maintenance Training Return on Investment (ROI)

FORMULA
Maintenance Training ROI (%) = [Business Benefits ($) ÷ Training Cost ($)] × 100

Business Benefits :
The financial benefits that impact the business, such as increases in worker productivity, improved work quality, reduced injuries and incidents and other related direct cost savings caused by an investment in training maintenance employees. Benefits must be translated into a cost benefit.
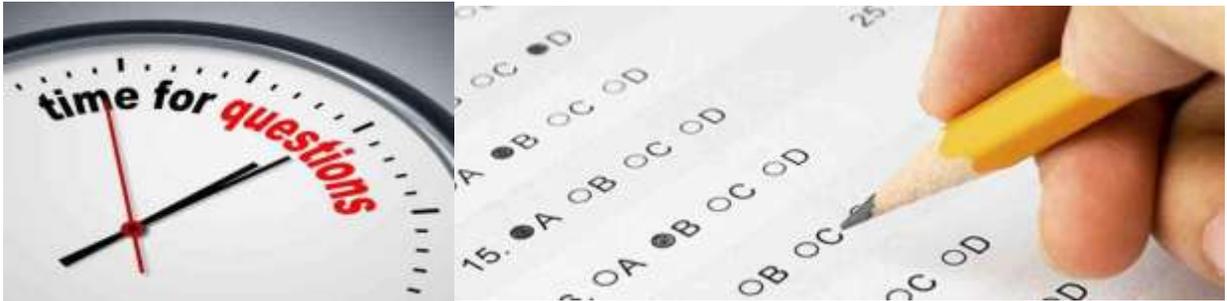
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Pillar practice questions

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Question:
As a team leader, you have to accept and address resistance to change; there are two characteristics for such resistance.
Answers:
A. Active and Passive.
B. Open and close.
C. Managed and unmanaged.
D. Direct and indirect.
Answer :A

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Question:
What are the three most significant constraints when developing a Maintenance and Reliability organization?
Answers:
A. Culture / People / Resources
B. Budget / Operations / People
C. Engineering / Human Resources / Budget
D. Culture / Engineering / Budget
Correct Answer:
A. Culture / People / Resources

Question:
Creating a reliability culture from a reactive mode can be accomplished in a short period of time if enough resources are made available.
Answers:
A. True
B. False
Correct Answer:
B. False

ENGINEER ACADEMY

Question:
What is the high-value safety metric which is often overlooked and not documented? *(missed)*
Answers:
A. Accidents when injury
B. Accidents when no injury
C. Accidents when lost time
D. Accidents when using first aids
Correct Answer:
B. Accidents when no injury (Near Misses)

ENGINEER ACADEMY

Question:
After management leadership and employee involvement, what is the next step in creating a good safety and health program?
Answers:
A. Examination and analysis of work processes and working conditions
B. Kick-off event such as a safety and health fair
C. Finding the right person to be the safety and health manager
D. Getting employee engagement and buy-in
Correct Answer:
A. Examination and analysis of work processes and working conditions

ENGINEER ACADEMY

Question:
What is the crucial element of reliability management?
Answers:
A. Strong leadership focus
B. Business-aligned plant reliability mission
C. Effective inter-function and interplant communication
D. All of these
Correct Answer:
D. All of these

Question:
What is the responsibility of a leader?
Answers:
A. Influence others to accomplish an objective.
B. Inspire and carry out team vision and mission.
C. Recognize the skills, talents, and abilities of those working for him.
D. Provide regular feedback to each employee.
Correct Answer:
A. Influence others to accomplish an objective.

ENGINEER ACADEMY

Question:
From the following list, which is not a critical structural element of a strategic plan for maintenance and reliability?
Answers:
A. Current levels of performance
B. Benefits available through implementation
C. Historical direction of the business
D. Vision of the future state
Correct Answer:
C. Historical direction of the business

ENGINEER ACADEMY

Question:
Which best describes the difference between mission and strategy?
Options:
A. The mission sets goals for the board of directors while the strategy sets targets for managers.
B. The mission includes objectives for the next 5 years whereas the strategy sets them out for just the year ahead.
C. Mission sets the vision of a business while strategy sets out the plan to achieve the mission.
D. The mission describes the business plan in words while the strategy sets it out in numbers.
Correct answer:
C. Mission sets the vision of a business while strategy sets out the plan to achieve the mission.

ENGINEER ACADEMY

Question:
The best way to achieve employee buy-in acceptance of the Maintenance and Reliability Program is to:
Options:
A. Sub-contract all maintenance work and have existing employees become inspectors.
B. Develop a pay structure that rewards reactive maintenance performance.
C. Begin a campaign to recruit volunteers to participate in the Maintenance and Reliability program.
D. Link employee to his job, link the job to the process, and link the process to the organizational goals.
Correct answer:
D. Link employee to his job, link the job to the process, and link the process to the organizational goals.

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Question:
When developing and presenting a new strategic plan to stakeholders, which of the following is the most important?
Options:
A. Implementation timetable
B. Gaining the trust of stakeholders
C. Craft (trade) flexibility
D. Establishment of a common goal
Correct answer:
D. Establishment of a common goal

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Question:
In terms of goals, what does the acronym SMART stand for?
Options:
A. Short, Measurable, Actionable, Results-focused, Tactical
B. Specific, Measurable, Achievable, Realistic, Time-bound
C. Specific, Maintenance oriented, Achievable, Readiness-level, Tactical
D. Specific, Meaningful, Applicable, Realistic, Trademarked
Correct answer:
B. Specific, Measurable, Achievable, Realistic, Time-bound

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Question:
What is the best way to set an overall reliability goal?
Options:
A. Draft a design specification requiring a product to have high reliability and incorporate it into a contract
B. Set numerical requirements for reliability and duration given function(s) and environment
C. Have management identify a person responsible for achieving the desired reliability
D. Require that the reliability goal be expressed as Mean Time Between Failure
Correct answer:
B. Set numerical requirements for reliability and duration given function(s) and environment

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Question:
In the maintenance and reliability goal setting, it is recommended to have a SMART goal. Which of the following statements adequately represents a SMART goal for Joe?

Options:
A. Joe's goal is to lose weight by eating less junk food
B. Joe's goal is to lose 20 lbs by exercising a lot more than he should
C. Joe's goal is to lose 20 lbs in 6 months by eating 2000 calories per day
D. Joe's goal is to eat fewer calories and walk more frequently

Correct answer:
C. Joe's goal is to lose 20 lbs in 6 months by eating 2000 calories per day

Question:
What is the term for the action in which managers at an organization analyze the current situation of their organization and then develop plans to accomplish its mission and achieve its goals?

Options:
A. Synergy planning
B. Strategy formulation
C. Functional planning
D. SWOT analysis

Correct answer:
B. Strategy formulation

ENGINEER ACADEMY

Question:

When would a strategic plan for Maintenance and Reliability be most appropriately required?

Options:

A. Planning and scheduling are not being properly implemented at that plant (facility).

B. Improved plant (facility) throughput is required to allow the business to commit to the requirements of a new customer.

C. The markets that the company operates in are changing on a weekly basis.

D. Fixed costs need to be reduced by 20% within the next year.

Correct answer:

B. Improved plant (facility) throughput is required to allow the business to commit to the requirements of a new customer.