FUNCTIONAL COMPETENCY DICTIONARY

for

Coromandel

CROP PROTECTION BUSINESS

Consulting Partner

UniTol Training Solutions Pvt. Ltd.

www.UniTol.in

TABALE OF CONETENTS

1. Introduction to Competencies & Competency Dictionary

In this section we will try to understand what are competencies and why it is important to have, what is known as a competency dictionary. The word competency, for the purpose of this study shall mean a combination of knowledge, skill and attitude. Knowledge, is the data and information about a particular subject or area, which usually accrues to an individual through the formal process of learning. Skill, is the application of a knowledge and therefore the practiced ability that an individual develops. While the typical definition of a attitude is that pertaining to interpersonal skills, in this context, it however, refers to the proclivity of the person to process of learning and applying the same.

Over the period of years, competency definition has moved from KSA (knowledge, skill attitude) to ASK (attitude, skill and knowledge). The reason, is because, competency is continuum and one usually progress along the same over a period of time. If the attitude, as defined above, is missing, then the other two elements either become irrelevant or insignificant. In an organization context, competencies are usually classified into managerial, behavioral, and functional.

The process of identifying the competencies be it functional, managerial & behavioral or leadership, is strategically driven, meaning that the basket of competencies that are identified are derived from organizational vision, objectives and strategies. While the functional competencies tend to be very specific to the industry or the organization, the managerial or behavioral competencies tend to be, common or similar (the extent of which, may though vary). Consequently, some of these competencies form a part of common management/organizational vocabulary, for eg. communication. This however leads to a problem, that

is, since it is a part of the general diction of the organization, there is a general perception that the definition, meaning and what constitutes it (ie the competency) are universally understood to be the same. Which however, is not usually the case. That is, continuing with our example of communication, for some it may mean (excellent) speaking, for some others it may mean ability to make presentation, and to still others ability to make good reports, etc. Though all of this does constitute communication, it is (a) not all of it, and (ii) it is not the same for every one. In order to overcome this problem/issue, **a Competency Dictionary i**s prepared.

"A COMPETENCY DICTIONARY IS A ENTERPRISE/ORGANIZATION SPECIFIC DOCUMENT PREPARED IN CONSULTATION WITH ALL KEY CONSTITUENTS WHICH CLEARLY AND LUCIDLY DEFINES AND EXPLAINS, IN TERMS MEANING, & KEY INDICATORS THE VARIOUS MANAGERIAL /BEHAVIOURAL COMPETENCIES IDENTIFIED BY THE ORGANIZATION"

A competency dictionary is a document which helps those participating in an Development Centre process by establishing common definitions, it helps in ensuring that all the constituents have the same understanding of the competency, the key indicators for the same, the typical methods of improving it and finally (some of) the techniques for assessing the same. Also, this document aids in the development process, since the key indicators for each of the competencies are listed, thereby facilitating the process of drawing up the development road map.

A competency dictionary is not a static document. One, with changing strategies, new competencies get added to the basket. Two, also with changing conditions, new definitions of existing competencies may have to be drawn-up.

For the purpose of this competency development process we have defined our competencies in a four level continuum

Level 1- Novice : This corresponds to someone who has the basic or rudimentary knowledge and can work without supervision

Level 2 – Practitioner : This corresponds to someone who has the working knowledge of the competency and can carry out without supervision (and at times can supervise others)

Level 3 – Developed: In this stage, someone has a good breadth and depth of understanding of the competency and can lead others in this area and can bring about improvements in technology/process

Level 4- Organizational Steward: This refers to someone who is an expert in the said area and is looked upto in the enterprise for guidance and support.

Each of these competency levels are unique, however, it is possible that there is a certain degree of overlap that may exists in defining each of the competencies across these levels.

A competency Dictionary therefore helps

01. In creating an enterprise wide standard definition of the competencies
02. In defining the competencies across various levels, helps in the process of profiling positions in terms of the competencies
03. Act as the base document for drawing up the learning and development of individuals, post the process of assessment
04. In creating the base document for knowledge management in the organization, and finally
05. Form the basis of a CBM- or a Competency Based Management process.

22.1 Competency Development & Development Centers

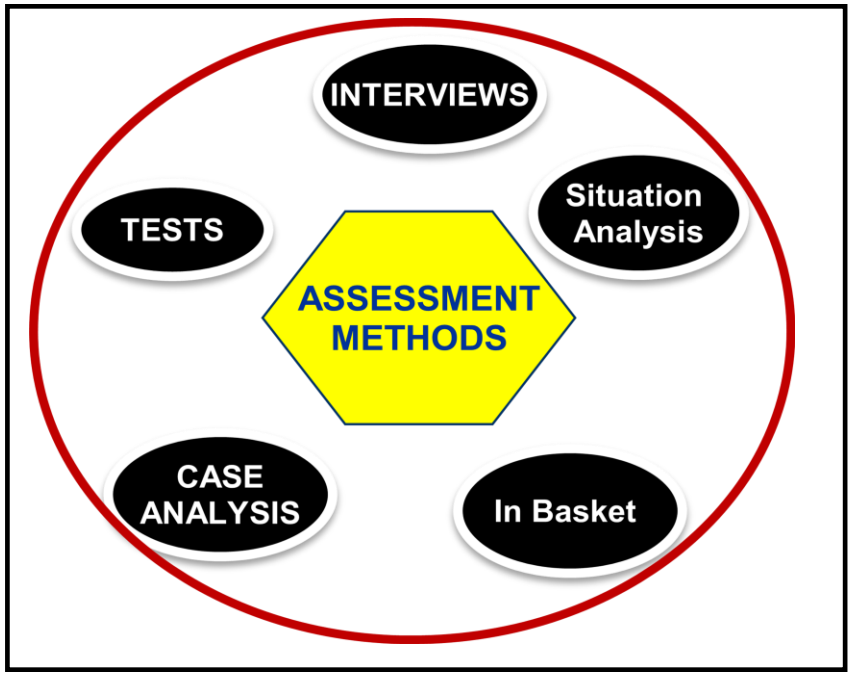
Centers are initiatives taken up by organizations to identify and develop competencies of employees, to address the current and future capability needs of the enterprise. The design of development centers are typically organization specific, that is based on the need and requirements, culture and settings of the enterprise, organizations design their DCs. However, following are common steps that are typically used/followed

Competency Identification: Development Centers, as mentioned before, are based on competencies. The first step of the process in a DC is identification of the Competencies on which the development process shall be carried out. The competencies so identified are a combination of both the present as well as the future requirements of the organization and the positions for which the Development Center is being carried out. Once the competencies are identified, the next step in the process is known as competency profiling. Simply stated, the process (of profiling) is to identify the level of requirement of each of the competencies identified, for a given position. A detailed description in the form of FAQs is given at the end of this document.

Development Center Design*:* The critical aspect of Development Center is the actual design of the various instruments and methods which shall be used for assessing each of the competencies. As shown in Fig. 2, depending on the competencies identified, the methods used in a DC can consist of any or combination of the following

Tests: Either standardized tests (typically used for behavioral parameters) or knowledge based tests for functional competencies.

Power Interviews: This is a method in which an expert panel (from either the industry or function) is created and assigned to identify the strengths and development needs of individuals.



Case /Caselet Analysis: Cases or caselets which focus on critical aspects of a competency are given to participants for analysis. These are then presented to a group of evaluators.

Situational Analysis: Situational analysis is an approach where in the participants are asked to analyse 'close to reality' situations – usually those that occur in the enterprise but which are represented in a different setting. This gives a perspective on how the participants would react to situations which may atypically occur in the organization.

In-Basket Analysis: This is a form of assessment in which participants are given a set of random items of works, which they may typically encounter in a day's work. The objective is to prioritize these and draw-up appropriate actions (decisions and other things) that need to be done, in the given period of time. This method helps in assessing a participants capabilities in planning, prioritizing, decision making, analysis of information, and time management.

2.2 Reports & Recommendations: This is the last part of the development center, in which based on the findings of various assessment instruments used, a final report is prepared. Typically a report would contain the following

- Summary of the assessment results
- Vecotrized Values: Competency assessment – that is measuring the

competency of an individual with reference to the position that he/she is occupying results in a scalar dimension – meaning that one would know the extent of the deficiency or otherwise of the competency but not know the extent of impact of the same, vis-à-vis the position. The process of determining this impact is known as vectorizing – which is assigning value to the competency strengths and gaps.

- Development Roadmapping: These could be ways in which the skills, knowledge are enhanced using variety of methods/approaches – including class room/Instructor lead learning, e-learning, project based learning, On Job Training, special projects, Job Rotation etc.

- The organization will be able to precisely targeted development activities (training, coaching, mentoring) focusing on areas identified in the Development Center as requiring growth improvement, thus increasing your return on investment in employee development.
- It could form an objective basis for comparing employees
- The experience enables participants to "up" their performance
- Based on the evaluation, acceptance and other internal parameters, organizations could use for other HR processes – from recruitment to career planning decisions.

Benefits of a Development Center : There are several benefits that can accrue, to the organization and individual through a Development Center, some of which include

3.0 Competency Based Management (CBM)

Though usually, Competency Mapping and Development are seen as processes required from a Learning and Development perspective, it has to be noted, that once a robust Competency Model is developed, it can be used for all aspects or elements of HR value chain. Just to elaborate, the CBM can be used for

01. Recruitment & Selection: Organization can streamline the recruitment and selection process by CBM through standardization of the advertisement process, pre-selection/selection interviewing and also preparing position specific induction process.
02. Performance Management Process: Most organizations use a combination of KRAs and Behavioral indicators or what are referred to as enablers in their performance evaluation methods. Organization can use its Competency Framework including the competency profiles for having objective PMS process
03. Reward and Recognition : CBM can be used for the purpose of identifying critical skills/competencies required for the organization and therefore draw up differential R&R mechanism for the same.
04. Career & Succession Planning: Growth paths for employees can be drawn up based on their individual competency profile or capability profile. Since in a CBM, all positions with an organizations are mapped, movement of an individual across various positions can easily be visualized and appropriately actioned.
05. Leadership Pipeline: CBM is used for identification of HiPOTs or High Potential employees, which in turn can help in creating the Leadership Pipeline in the organization .

3.0 List of Identified Competencies

Based on discussions, analysis of the JDs and other inputs, the following have been identified as the list of competencies that are relevant/required for the Crop Protection business

Core Functional Competencies

1. Production Technology
2. Formulations – Process & Tech
3. Product Packing
4. Mechanical Maintenance & Utilities
5. Electrical Maintenance
6. Instrumentation & Control
7. Research & Development
8. Process Improvement
9. SHE
10. Quality Assurance & Mgmt

Core Support Competencies

1. Supply Chain Mgmt
2. Purchase Management
3. Civil Construction & Mgmt
4. Project Management

1. Production Technology*

PRODUCTION TECHNOLOGY

This competency may be defined as the knowledge and skills required to manufacture the herbicides, insecticide, fungicides and other related products from starting raw materials and/or key intermediaries

Key Indicators

This competency is demonstrated through the following-

- Understanding the basic chemical processes involved in the manufacture of the various agro chemical products
- Understand the key raw materials, solvents and other material used in the manufacturing process
- Understand the specification of all the raw materials, solvents and other material and the process parameters which impact the quality of the products manufactured
- Understand the design parameters and working of the all the equipment used
- Ability to effectively and efficiently operate the various equipment and machinery used in the production process
- Ability to ensure that the products are made as per regulatory, customer and market required specification
- Ensure that the operations are carried out according to the SHE rules and regulations of both the company as well as the enforcing agencies

Key Coverage aspects

- *Raw Materials, Solvents and other chemicals*

(Soda Ash, Sulphuric Acid, Polielctrolite, Caustic Lye, Sodium Sulphate, NH4Cl, PMG, effluent, Ammonium Sulphate,CS2, EDA, Caustic, H2SO4, MNSO4, ZNSO4,SLS, HMT, Polyeletrolite, TMP, PCl3, TEP, Methanol, Ethanol, Ammonia, HNP, PMIDA, HCL, DEA, O2, Carbon Granules, Phospherous, CHLORINE, Chloral, DMPAT, DMS, AC2O, Ethaile Acitate, MDC, Acitic Acid, MMAA, EDC, Urea, NaCl, MECL, P2S5, Bromine, Methanol, OCP, DMTA, DEM Melic Unhydrate, Alcohol, EBPA, npbr, q salt, HMBT, Toluene, Ethanol, Methanol, Benzene, Xylene, EDC etc.)

- *Chemical Reactions*
- *Unit operations of-*
  - ✓ Drying
  - ✓ Scrubbing
  - ✓ Filtration
  - ✓ Crystallization
  - ✓ Separation
  - ✓ Distillation
  - ✓ Recovery
  - Plant and Machinery/ Accessories
    - ✓ Reactors with different types of Agitators like turbine, flat blade, paddle, high speed disk. Condensers , Scrubber, Spargers, Liquid Coils, heating / cooling jackets and Iimpet Coils, Ejectors, sparkle, centrifuge, blowers, pumps (centrifugal, reciprocating, screw), control valves (pneumatic , Electrical), homogenizers, RCC condensers, Cyclone Separators, back filters, mass flow meters, Safety Relief valves, RTG, TT, TI, PT, PI, PG, LT, VT, LI, Radar, PRV, NRV, load cell, Rotary valves, RVD, RVDF, ANF, Rotary Dryer, HAG, burners, bag house, mechanical Seal, Pinmill, VFD etc., Tanks & Silos, different types of pipes

NOVICE

- Is familiar with the physical and chemical properties, form, type of packaging etc. of the chemicals, intermediates, Solvents related to respective production areas
- Should know the required specification of all the raw materials, intermediates and final products and the vent and drain streams in terms of specifications of moisture, colour, specific gravity, ingredients
- Understands the chemistry involved in the manufacturing process across various sections
- Is able to follow and understand Process Flow Diagrams (PFD) and Piping and Instrumentation Diagrams (PID) related to the manufacturing process
- Should have knowledge of the effluents generated in the process and their applicable limits for the same in terms of pH, TDS, TSS, COD, and MnSO4 content, Mn % , Percentage of soluble content
- Is aware of the products by name, form and packing – eg. MNZ, Propineb, WDG, GLP, Acephat, MCP, DDVP etc.
- Knows all available cooling medium like Cooling Water, Chilled Water, Chilled Brime. For example Brine : -15°, -35°, Chilled Water : 8° to 12° C
- Knows the Heating medium available in the plant and its usage, 4kg steam, 10 kg steam, hot water up to 90° C, Hot Air up to 300° C., Condensate
- Should know what is runaway reaction and condition leading to it
- Is aware of the basic construction features of the major Plant and Machinery used in the manufacturing process like-
- Should know how to read temperature and pressure, vacuum, pH meter, level gauges, level transmitter, the chemical and dust contents in stack in ppm, flow meters, nitrogen quality, motor amperage and know the operating limits
- Is able to follow Standard Operating Procedures (SOPs) indicated for plant operations
- Must be aware of the various safety measures deployed such as relieve valve / rupture disk, interlock systems, siren systems, alarm etc.

- Should know the immediate steps/actions in case of exposure of chemicals in a particular plants
- Must have knowledge of the scrubbing process in terms of the gases incoming to Scrubber and scrubbing Media and should have a broad understanding on how to make scrubber solution based on input gases; and should be able to operate the same (in terms of the knowledge required for reading U-Tube manometers, operating vacuum pressure in the water column etc.) and other SOPs
- Should know or be aware of the basics of filtration process in terms of the equipment used like ANF, Candle filter, Nutch filter, Agitated filter ,sand filter, leaf filter, HBF, RVDF, Filter Press, Pusher Centrifuge & their filtration medium Vacuum Pumps, pressure pump, slurry pumps.
- Has a broad understanding or knowledge of the evaporation process chemicals that are being recovered through the same
- Should be aware of the basic operating metrics in terms of steam temperature, pressure, hot air temperature, vacuum pressure etc that are used in the process of evaporation
- Should know the basic knowledge of equipments, its capacity & MOC for Calentria, Rotary dryer, bag house, Blowers, Pusher Centrifuge, Hot Air Generator & the Ejectors & Pump, steam control valves, feed control valve, steam traps, all control instrumentation, especially with reference to the evaporation process
- Should have knowledge of crystallization and the process & equipment used for the same, such as crystallizer, pump agitators.
- Should have knowledge about the cooling media that is used for the purpose of crystallization (water & brine) and the operating parameters for the same including the pressure to be maintained for effective crystallization
- Based on the product being produced knows the mass coming out from the process and its contents, and the solvent to be recovered and the equipment used in the same – that is like Reactors, Pack & Tray column Condensers & the Ejectors
- Knows the basic operating parameters in terms of the vacuum pressure and temperature that needs to be maintained for the recovery process
- Should know the purity and moisture content of the recovered solvent

- Has a basic understand of the drying and stripping process and is aware of the input material (that is the material to be dried) and the output – in terms of the quantity, quality and feed rates
- Is aware of the basic equipment used for the process of drying such as Reactors, RVD, Condensers, ATFE & the Ejectors
- Has a understanding of the operating procedures and parameters to be maintained (in terms of LOD, moisture content, vacuum pressure, temperature etc) for the carrying out the drying process
- Is aware of the basics of distillation process, in terms of selective evaporation and condensation
- Knows the crude mass coming from the various manufacturing processes in the plan and the product to be distilled
- Is aware of the various equipment used for the distillation process including Reactors, Pack & Tray column condensers & the ejectors and the operating parameters of the same
- Is aware of the input material quality parameters and the output (distilled) quality parameters, especially in terms of the moisture content
- Can identify various Process measurement and control instrumentation used in the plant for pressure/vacuum, temperature, flow and level, control valves, analyzers, transmitters and converters, Instrument air system etc.
- Is aware of the basic function of the Process control & Instrumentation System
- Understands the maintenance issues associated with the operation of plant equipment
- Understands the precautions to be taken while handing over equipment to maintenance
- Is aware of the emergency handling procedures and the on-site emergency plan
- Is familiar with the basic procedure to start and stop the above equipment
- Is familiar with all the process safety interlocks, their functions and criticality in enabling the processes to function safely
- Is aware of the key process parameters to be controlled/ monitored in the process
- Is familiar with the hazards associated with and the precautions to be taken while handling various chemicals used in the plant
- Understands the basic safety aspects / should know the HAZOP, MSDS, PPEs used in the process

- Is aware of the First aid practices to be followed against the exposure to hazardous chemicals
- Is aware of the onsite emergency plan
- Is aware of the fire fighting equipments and methods within the plant
- Understands the environmental issues/ concerns associated with the process
- Is aware of the effluents/ wastes being generated in the plant and where they are treated and its disposal arrangement

PRACTITIONER

- Can take appropriate action (reject, take up for production with deviation etc) based on the analytical reports
- Uses the appropriate material handling technique/method for each of the material, ensuring that all safety precautions are adhered when loading, unloading, moving, packing the same
- Has a complete understanding of the process chemistry (especially with reference to heat of reaction) involved in the manufacture of the each of the products of the organization
- For each of the products manufactured, has a complete understanding of the temperatures, pressure, and other process parameters to be maintained per SOP and ensures that the same is carried out. Can flag and take immediate containment action in case of any changes in process parameters
- Ensures that for all reaction (especially exothermic), the cooling medium is properly controlled and that the temperature (along with other parameters) does not reach runaway levels; has complete knowledge of the runaway temperatures for all the reactions carried out
- Can operate the plant effectively and efficiently by monitoring all the process parameters as mentioned in SOPs and knows how to maintain these parameters by using manual controls, automated instrumentation, SCADA.
- Knows and can ensure that the data is communicated with the central SAP systems for purpose of monitoring and initiating the required improvement procedures.
- Can carry out the sample collection process (by collecting the same in appropriate containers) and prepare the required documentation for the same before sending it off to the QC department can initiate the required action to address any variations in product/intermediate based on the QC reports
- Can keep a track of any changes being recommended by the marketing in product specification and modified the documentation accordingly
- Gets all the process safety appliances like rupture disk, safety relief valves, control valves, level switches calibrated every six months in collaboration with internal stakeholders

- Ensures that the pressure vessels/ reactors are tested for thickness and other parameters and timely decisions are made on the suitability for operations
- Should be able to operate all the equipment and should be able to effectively troubleshoot to maintain the permissible discharge norms as GPCB /CPCB
- Will factor external parameters such as ambient temperature, usage of cooling by other production lines, when controlling and monitoring the process with regards temperature by controlling manually or through interlock systems, and ensuring that the stipulated range as per the SOPs of the reaction
- Can save the equipment by employing the emergency shutdown procedure, in case the temperature control is not happening due to the power failure or utility steam failure
- Gets done the thickness testing of the reactors on annual basis and takes decision of its suitability
- Can train all the operating staff regarding MSDS, HAZOP
- Knows the energy consumption required for the reaction. Has Complete understanding of process operating parameters and also is able to utilise the heat of condensed solvent (reflux) to control the reaction and should be able to control the parameters much below the runaway reaction temperature
- Understands the trigger of a run-away reaction and should be able to immediately douse the reaction in case the temperature is shooting toward runaway reaction temperature

Scrubbing

- ✓ Knows the quantity of the gases coming to Scrubber and the capacity of the scrubber for absorption
- ✓ Knows how to maintain the vacuum by controlling circulation valve and incoming gases generation
- ✓ Is aware of the troubleshooting of scrubber equipments

- ✓ Is familiar with how to maintain the required parameters by adjusting vacuum, column circulation and blower and also able to control the emergency situation without affecting the environment
- ✓ Knows how to achieve the required norms
- ✓ Has knowledge of MSDS

Filtration

- ✓ Should have a complete understanding of the filtration process in terms of the filter medium, the particle sizes, operating pressure and vacuum required for filtering, capacity – loading and overload conditions, basic trouble shooting in terms of filter choking, material MSDS etc.
- ✓ Should be able to take appropriate corrective action when the filtration process is choked by initiating the backwashing / cleaning and/or replacement procedure
- ✓ Monitors and controls the process by maintaining proper pressure by adjusting valves or by adjusting the PRV
- ✓ Based on the characteristic of crude mass in terms of the particle size and other parameters, knows the type of filter cloth to be used so as to achieve the required filtration/filtrate
- ✓ Should be able to control pH at different stages by using the required chemicals (caustic, Soda Ash, polielectolites and Sulphuric Acid)

Drying

- ✓ Has a complete understanding of the characteristics of crude mass/wet cake such as, boiling point, melting point, colour, acidity, moisture content and impurity for initiating or undertaking the drying (and striping process) and achieve the final dryness factor as per SOP

- ✓ Can efficiently and effectively operate the drying process - by recording the dryer outlet air temperature (RVD outlet temperature) and regulates the inlet temperature wherever necessary; controlling the ejector vacuum (20-30 mmhg) by regulating HP steam and/or LP steam; and the operating parameters of the RVD
- ✓ Can effectively troubleshoot any typical problems that may arise in the operation of dryers
- ✓ Should know the total solid content and moisture in the slurry and final dryness factors of the dry products, that are being produced (through the dryer)

Crystallization

- ✓ Should know the characteristics of crude mass by the way of percentage solution and crystallization point and crystallization pattern to achieve the desire result
- ✓ Should be able to attend the problem related to agitation during crystallization operation
- ✓ Should know what parameters are to be controlled and how to control pressure and temperature & quantity of cooling media required for the crystallization
- ✓ Should know the troubleshooting methods of crystallization
- ✓ Should know how to maintain the required parameters by adjusting the cooling or chilling valve of the crystallizer jacket
- ✓ Possesses the knowledge of MSDS of crystallized solution

Washing & Separation

- ✓ Should know the characteristics of crude mass by the way of percentage solution, Sp gr,, Acidity, Alkalinity
- ✓ Should be able to attend the problem related to emulsion formed while washing
- ✓ Should know the troubleshooting of Washing and Separation
- ✓ Should know the MSDS of Crude mass and solution

Drying/Stripping

- ✓ Should know the characteristics of crude mass/wet cake by the way of boiling point, Melting point, colour, Acidity, Moisture and impurity and is able to achieve the same
- ✓ Is familiar with what parameters are to be controlled and how to control pressure and temperature of Steam/Hot water respectively by controlling the valve
- ✓ Should know how to maintain the vacuum by controlling steam pressure and vacuum valves
- ✓ Is familiar with the troubleshooting of Drying/Stripping equipments
- ✓ Should know how to maintain the required parameters by adjusting steam pressure/Hot water temperature
- ✓ Should know how to achieve the required norms
- ✓ Should know the MSDS of the materials

Recovery / Distillation

- ✓ Should know quantity of the mass, quantity of solvent that can be recovered and how to handle the residual mass
- ✓ Should know what parameters are to be controlled and how to control pressure and temperature & quantity of steam required for the reaction by controlling the valve
- ✓ Should know how to maintain the vacuum by controlling steam pressure and vacuum valves

- ✓ Should know the troubleshooting of recovery equipments
- ✓ Should know how to maintain the required parameters by adjusting vacuum and steam temperature
- ✓ Should know how to achieve the required norms
- ✓ Is aware of the MSDS of the materials handled

EMS

- ✓ Should know the hazardous content in each discharge and the permissible limits for the same Should know the characteristics (chemically, thermally, physically and microbiological) of the effluents and the permissible limits
- ✓ Should be able to operate all the equipment and should be able to effectively troubleshoot to maintain the permissible discharge norms
- ✓ Should ensure that the equipment and instruments are calibrated as per the schedule to ensure accuracy
- ✓ Should be able to achieve the desired norms by regulating the operating parameters depending on the input quality from various streams
- ✓ Should review the specification of the treated waste vis-à-vis the norms and counter-check with PCB / Third party reports
- ✓ Should work with the production/operations to maintain and if required, correct any anomaly in waste characterization
- ✓ Should know the various methods of analysis of waste

DEVELOPED

- Is fully conversant with the technology used in the plant
- Is able to carry out breakdown analyses of any equipment and suggest/recommend remedial methods to avoid such breakdowns
- Is able to attend to and guide others in managing any operational emergencies
- Can do trend analyses of process operating data and various in-process analytical data to improve efficiencies
- Can diagnose the functioning of each equipment from the data and suggest modifications, repairs, etc.. of the equipment during planned shutdowns
- Is fully conversant with the critical issues that cause occasional stoppages of the plant or effect quality or capacity and can work towards finding a long lasting solution
- Is able to provide inputs to equipment and process designers on critical aspects
- Can guide the project department in procurement/fabrication of equipment / layout
- Can carry out inspection and testing of equipment before final acceptance from any supplier/manufacturer
- Can review and progressively improve operating procedures of equipment
- Can develop training manuals
- Is fully conversant with PFD and PID and can recommend changes to improve the process
- Recommends automation to improve safety aspects and to optimize manual operations
- Can progressively improve the features of the equipment to ease operation and maintenance
- Can progressively standardize equipment and components throughout the plant to minimize the types and number of spares in the store to optimize the overhead costs
- Can initiate methods for reducing effluent generation and/or reducing treatment costs by new technologies or finding alternate commercial usage for discharge streams

- Can suggest modifications/improvements on the safety, health and environmental issues pertaining to the plant
- Can develop on-site and off –site disaster management plans and conduct safety audits
- Can evolve systems and methods so as to ensure optimization of energy costs
- Can device safety systems which will ensure that run-away conditions are not triggered
- Designs and implements systems which will improve the consumption norms, use alternate chemicals, bring about improvement in the Material handling system improvement, reduce wasteges – both chemicals and solvents
- When making changes to process, understands and maps the corresponding changes in upstream and downstream processes

Scrubbing

- ✓ Is able to calculate the scrubber solution requirement as per incoming quantity in Gases and also fix the parameter for operation to achieve the environment norms
- ✓ Knows the repercussions of high gases generation and low vacuum on scrubber
- ✓ Knows the different types of efficient scrubbing methods and equipments to achieve environment norms
- ✓ Should know industry % of scrubbing solution and how to adhere to those system to improve the present scrubber efficiency on continuous basis
- ✓ Should know the consequences and how to mitigate any untoward incident related to scrubber

Drying/Stripping

- ✓ Is able to design appropriate drying /stripping facility with parameter suitable for Crude mass / Wet cake
- ✓ Is able to improve the consumption norms by managing the pressure and temperature of Steam/Hot water respectively by controlling the valve

- ✓ Knows the repercussions of high steam pressure and high vacuum on the Stripping/Drying
- ✓ Knows the different types of Stripping / Drying methods and equipments for removing traces of material from Crude mass/Wet cake
- ✓ Knows industry norms of Drying/Stripping and how to adhere to those system to improve the present Drying/Stripping on continuous basis
- ✓ Knows the implication on quality in case of deviation in LOD and moisture content
- ✓ Knows the consequences and how to mitigate any unsafe incident during Drying/Stripping

Filtration

- ✓ Is able to design appropriate filtration facility with all parameter which will be suitable to filter the desired/Undesired product
- ✓ Is able to fine-tune the filter media to get improvement by decreasing consumption of filter media, Decrease in loss of desired product in Mother Liquor, decrease in filtration time
- ✓ Knows the repercussions of high pressure and Low pressure on the Drying time
- ✓ Knows the different types of Filtration methods and equipments for removing traces of material from Wet cake of traces of material from Filtrate
- ✓ Knows industry norms of Filtration and how to adhere those system to improve the present Filtration on continuous basis
- ✓ Knows the implication on quality and Quality in case of deviation in Filtration and suggest the parameter of control while filtration
- ✓ Knows the consequences and how to mitigate any unsafe incident during Filtration

Crystallization

- ✓ Is able to design appropriate crystallization facilities with all parameter which will be suitable for getting desire product
- ✓ Is able to fine-tune the agitator speed and cooling pattern to get improvement in appropriate particle size and reduction in loss of soluble particle in solution
- ✓ Is able to suggest appropriate cooling medium to optimise the energy cost with desire result

- ✓ Knows the different types of crystallization methods and equipments for better particle size
- ✓ Knows the industry norms of crystallization and how to adhere to those system to improve the present crystallization method

Washing / Separation

- ✓ Is able to design appropriate separation facilities to get the desired result
- ✓ Is able to fine-tune the agitator speed and time to get improvement in clarity of separation
- ✓ Is able to design the suitable equipment and can recommend different types of washing method to get the desire result

Recovery / Distillation

- ✓ Is able to improve the consumption norms by managing the temperature and pressure of the steam
- ✓ Knows the repercussions of high steam pressure and high vacuum on the recovery process as well as recovery efficiency
- ✓ Knows the different types of efficient recovery methods and equipments for solvent recovery
- ✓ Knows industry norms of recovery and how to adhere to those system to improve the present recovery efficiency on continuous basis
- ✓ Knows the consequences and how to mitigate any unsafe incident

EMS

- ✓ Is able to identify the alternate methods of disposal of the effluents or explore the commercial exploitation of the waste as co-processing, isolation of the by-product or value added product conversion
- ✓ Is able to improve the efficiency of each equipment
- ✓ Is able to improve the process to adjust to wide variations in the input discharge

  Is able to optimize the utility consumption on a continuous basis

- ✓ Can identify alternate methods of analysis for better u/standing of the waste to enable appropriate process improvements
- ✓ Shows commitment towards environmental protection through proactive approach to rule and regulation implementation
- ✓ Maintains harmonious relationship with the regulatory authorities to avoid any communication gap and legal issues
- ✓ Can improve organizational branding through appropriate CSR activities in the area of EMS

ORGANIZATIONAL STEWARD

- Can recommend improvements in the equipment design and/or recommend replacement for improving the performance
- Is familiar with all the available technologies / latest developments in the world for the manufacture of similar products and their comparative advantages and limitations
- Can recommend improvements in the present plant incorporating features based on learnings from other technologies
- Can recommend newer technologies, which would enable the process to take place at favourable pressure / temperature/ corrosive conditions to reduce maintenance cost as well as increase the life of the plant and machinery
- Is fully conversant with the cost-benefit analysis and can recommend those schemes which offer a financial gain or ease of operation and maintenance or reduces hazards and improve safety
- Can proactively map changes in the environment/pollution policies/regulation to the equipment/processes/materials in the section and also recommend appropriate changes
- Is fully conversant with all governmental and other regulations related to production (related to raw material procurement, transport, process safety, equipment safety, handling of hazardous substances, product and its transport, import, export etc.) and guide the organization
- Can oversee design to help evolve integrated system to use the heat generated in the heat consuming equipment
- Maps and understands the implication of improvement / changes in technology pertaining of raw materials across industry / sector on global prospective – both chemicals and solvents
- Scan and implements the present consumption of chilling to the International exothermic reaction for similar chemicals / solveLooks for the latest development in controlling and preventing accident while handling reactions leading to runaway reactions

Scrubbing

- ✓ Able to search new technology for appropriate scrubbing and also achieve the environment norms
- ✓ Knows the international norms of scrubbing for incoming gases
- ✓ Drying & Stripping
- ✓ Knows the international norms of Stripping/Drying efficiency through vacuum
- ✓ Able to suggest the new method and efficient equipment for Better Stripping/Drying

Filtration

- ✓ Able to find the new technology used in other industries for filtration and find out the possible use of same
- ✓ Able to suggest the new method and efficient equipment for better filtration
- ✓ Able to suggest Automation to avoid any loss of material while Filtration
- ✓ Able to suggest the new technology for filtration with minimum loss while filtration and able to reduce the cost of filtration

Crystallization

- ✓ Able to suggest the crystallization pattern and best International practice followed while crystallization
- ✓ Able to find the new type of agitator used in other industries for crystallization and find out the possible use of same
- ✓ Able to suggest the new method and efficient equipment for better particle size and minimize the losses in crystallization
- ✓ Able to suggest Automation to avoid any loss of material in solution while crystallization

Washing/Separation

- ✓ Is able to suggest the washing pattern and best International practice followed for washing and separation

- ✓ Is able to find the new type of Washing / Separation method used in other industries for washing purpose
- ✓ Is able to suggest the new method and efficient equipment for better washing and separation

Recoveries /Distillation

- ✓ Knows the international norms of recovery efficiency through vacuum

EMS

- ✓ Is able to map the impact of the discharges after treatment on the environment and the undertake research to reduce the generation of this waste
- ✓ Maps and searches for new technologies & equipment for the waste handling
- ✓ Has overall understanding of the waste stream, disposal methods from all the Group companies to create value from waste
- ✓ Can suggest/recommend Feasibility and treatability methods of all waste generated across the Group Companies

How is this competency Assessed

The following are some of the methods which typically used in the assessment process of this competency

- Tests
- Expert panel Interview
- Case lets
- Situational analysis

FORMULATIONS MANUFACTURING

FORMULATIONS

This competency may be defined as the combination of knowledge and skills required for determining the best equipment and process conditions in which the yields can be maximized and to increase the profitability of existing finished goods (products such as herbicides, insecticides, fungicides and other related products) / develop new products

Key Indicators

This competency is demonstrated through the following-

- Understand the unit operations like milling, blending, weighing, packaging etc. involved the manufacturing of Formulations
- Understand the physical and chemical characteristics of raw material, in-process material and finished product and the process parameters which impact the quality of the final product
- Understand the working of the all the equipment used in the section
- Understand the importance of maintaining the physical properties of final products during all the processes so that the product retains the specified quality till the consumer end
- Carry out basic maintenance of the equipment
- Optimize, improve and develop the process/process parameters, input materials and the equipment used in the process

Key Coverage aspects

- Raw Material & Excipients
- Plant Performance
- Milling machinery & Milling type (panel operations)
- Formulation product recipes
- Pre- and Post- Blending
- Process and Process Equipment for Liquid Formulation
- Quality Management
- Descaling
- Packaging – Liquid and small Packing

NOVICE

- Can read and understand process flow sheet, equipment layout, plant layout, Process and Instrumentation Diagram etc.
- Is familiar with the principles, limitations and advantages of different unit operations
- Is aware of the design specifications to be considered for unit operations in the selection of the technology and required equipments / components etc.
- Is familiar with the physical and chemical characteristics of raw materials, in-process materials, and finished goods of each production section
- Understands the basics of milling operations
- Is familiar with how to operate the blower, PGDC (dust collector) and blender
- Knows the operating parameters (speed, feed rate, air pressure) of the milling operation
- Is aware of the panel / PLC operations
- Knows the quality specification of the final product
- Understands the basics of various recipes used and the composition of each of them
- Has a broad knowledge of the SOPs used in the milling operation
- Is familiar with the descaling operations and why it is carried out in the blender, the impact of descaling on safety, the impact of descaling on the output (computation of the input/output ratio)
- Is familiar with the sourcing and storage of raw materials, intermediates and packaging items for producing different products
- Is familiar with the chemistry and production processes of various products
- Is aware of the requirement and availability of utility systems such as water, power, etc. for producing various products
- Is familiar with the consumption norms of utilities and the yields for specific products as per design and rated capacity
- Is aware of the safety precautions as stipulated for each chemical and equipment used in the plant

- Is aware of the various types of raw material used (mancozob, cymoxil, meta technical) and their technical specification, characteristics and various types of excipients, SLS Poly-BX, starch, pigment (blue), DPS, silica, morwet and their technical specification, characteristics etc.
- Knows about the underlying reason for pre-blending operations and Basic operation principles of blending machines (especially time of blending)
- Knows the reasons and rationale for post-blending, time of post blending operation etc. (based on SOP)
- Is aware of the visual aids like colour codes and markings on pipelines, vessels indicating the mediums being handled in them
- Knows the Raw Material used (mancozeb technical), the technical specification, characteristic of the same, the other auxiliaries material used including Titan MS Oil, AD 100, Turgit Oil S5, Turgit Oil S7, Fluidicnt FD, Morvat D45 for Oil based formulations
- Knows the auxiliaries used like Jeemol SDL, MAG, Zenthum Gum, RO water used for the water-based formulations
- Is aware of the various utilities that are used for the Oil-based formulations - including cooling, chilling and boiler
- Knows the various utilities that are used for the water-based formulations - chilling and boiler
- Knows the packing material used for the product such as HDPE
- Knows the various sizes of packing material - 20, 30,60,100 and 200 Lt used for liquid packing
- Is aware of the scales and weight measuring instrument used
- Is aware of the types of instrumentation used to measure and control operating parameters
- Is aware of the various sizes of packing in which the output material is given to the market
- Knows the material used for small packing - LDP and LDP Metallic
- Is aware of the basic information that needs to be made available / printed on the package both from user side as well as statutory requirements
- Is familiar with the basic tests used for sachets
- Is familiar with the documentation related to the operation and the analytical reports generated at laboratory

PRACTITIONER

- Understands detailed physical and chemical specifications and properties of all the materials handled at the plant
- Knows and operates the air classifer mill and also jet mills
- Knows and applies the appropriate pressure air pressure limits in operating the mills for optimal output
- Knows the best / appropriate type milling process based on the final formulation to be made
- Is conversant with the basic maintenance aspects of the milling operations and other associated components
- Is conversant with the use of the right PPEs and other safety items for self and others in the team
- Coordinates with the Quality Dept. and ensures that the process is tuned for right quality output
- Can co-relate the operating data in determining optimum process conditions
- Uses the recipe and maps the output quality to the standards required and suggests to R&D about the changes that need to be made
- Is able to carry out the operations based on the SOPs
- Maintains the log of the required parameters
- Can carry of the descaling operation of the blender manually after every pre-established cycles (15-20 tonnes)
- Is able to use /adhere to the basic safety precautions for carrying out the descaling operations
- Should be able to carry out the charging operations and the quantities based on the recipes
- Can map the changes in the final product quality based on changes in the input raw material
- Knows and can use the substitute excipient material in making the formulation especially in the absence of the standard requirement
- Knows the RM and excipient to be charged Based on the formulation recipe and the quantity to be charged
- Is able to ensure that there are minimal losses during charging
- Can carry out pre blending operation as per SOP (adhering to the time of blending)

- Can carry out pre-blending operation based on the formulation recipe as per SOP (adhering to the time of blending)
- Is able to ensure that the sample is provided to QC at the end of the blending cycle and suggest or does changes in the feed rate and/or excipient related to the milling operation in case of QC issues.
- Understands the properties/characteristics of the various inputs materials and the implication of changes in the same on the output product
- Can take decision on input material quality variance, after due clearances
- Is able to ensure that the charging happens after following check-list (bottom valve closed position, descaling is completed and holding tank is in position)
- Is able to carry out the charging operations and the quantities based on the recipes ensuring the time cycles based on SOP
- Understands the need to ensure charging with minimum wastages
- Checks and ensures that the chilling temperature is maintained at 20-24
- Knows and ensures that genthum gum should be thoroughly dissolved water using steam
- Can carry out the calibration of the weight bridges
- Can carry out the computation of the filling based on the SPG of the material
- Is conversant of the various information that needs to be printed on the packets / sachets including Mfg Date, UN Number, Expiry Date, Batch number etc.
- Can carry out the calibration of the weighing machines
- Understands the importance of quality (visual) of the sachets and ensures that the same are taken care of
- Can carry out the required tests on sachets and packing material to ensure that they are as per required specification
- Is able to collect, collate, compute and analyze operating data, utility consumption details and quality parameters relating to other similar plants
- Is able to review performance of the plant periodically with the production and maintenance teams

- Is able to implement the change proposed and taken up
- Is conversant with application and documentation related to SAP
- Can suggest changes in design specifications to be considered while selecting equipments
- Can identify the bottlenecks in processes, products packing and other services and suggest solutions for troubleshooting
- Can provide value-added inputs received from different sources to operating personnel
- Can prepare proposals of energy savings and its optimal use together with their economic evaluation
- Can review the proposals technically for modifications related to equipment layout, piping and equipment design etc. prepared by plant personnel

DEVELOPED

- Is able to develop methods to improve the feed rate at the cycle times without impacting the product quality
- Can carry out the loss analysis (input output analysis) and suggest methods of reducing the same
- Is able to explore new methods of milling which increases the output and reduces costs
- Can help the project management team in capacity planning process with regards the milling operations
- Can coordinate with R&D in carrying out trial batches of new formations or existing formulations with new combinations
- Can provide R&D with feedback on the process and / or final product based on knowledge / information gained during operations
- Can consider end-user feedback and requirement as and when it emanates for improving the product /packing
- Is able to collect and collate data on the raw material, expient used, output volumes and its quality to R&D
- Can work in close conjunction with R&D / Process improvement to explore and / or help carry out pilot scale batches using new material (esp. expients)
- Can work with Process / R&D based on historical data, for optimizing the usage of various material also the utilities required, including temperature for chilling operation
- Can compare the results of operating the process at various parameters to assess the performance of various equipment and improve them
- Can bring back into normality any abnormality observed in the plant
- Is aware of the latest development in equipment designs to perform a given unit operation with much ease in operation and less motive power
- Can monitor the customer complaints and ensures that they are effectively resolved along with the internal stakeholders
- Is able to scan the markets for alternative packaging material with lower cost, better quality and higher reliability
- Is able to scale-up plant and equipment for increased capacity

- Is able to use statistical tools for carrying out trend analysis
- Can plan and arrange market research for new products and for existing major product re-launch or development
- Is able to identify sources of know-how for advanced technology/equipment
- Can interact with technology consultants on technical matters

ORGANIZATIONAL STEWARD

- Can suggest improvements in milling, blending and formulations including packaging operations with reference to primary equipment and/or process and/or raw material keeping in view global best practices in other industries such as pharma and also competitor strategies/technologies
- Is aware of the emerging trends in the formulation of Mancozeb - especially value added products
- Can proactively map changes in the environment/pollution policies/regulation to the equipment/processes/materials in the plant and also recommend appropriate changes
- Has thorough knowledge of the PFD and PID and can make suitable suggestions or modifications so as to improve efficiency, by reducing number of operation steps, alter sequence of operation, combine few operations in new type of equipments, automation of critical operations etc.
- Can recommend proper equipment to reduce energy consumption
- Can plan, organize and execute the start-up and commissioning activities of similar plant
- Can prepare Basic Engineering documentation for a new Formulations plant
- Can interact with detailed engineering consultants and provide technical inputs

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MECHANICAL MAITENANCE

This competency may be defined as the combination of knowledge and skills required for carrying out the maintenance and improvement of all the Mechanical equipment during manufacture of the herbicides, insecticides, fungicides and other related products / key intermediaries

Key Indicators

This competency is demonstrated through the following-

- Understand the construction and operation of all Mechanical equipment used in the production and offsites facilities at the plant
- Carry out preventive, predictive, break-down and shut-down maintenance of the above equipments to minimize downtime and enhance efficiency and life
- Plan short and long shutdowns to carry out non-routine maintenance and to upgrade/revamp the equipment to enhance the efficiency and life
- Educate and train all the Mechanical maintenance personnel in latest techniques to ensure maximum availability of equipment

Key Coverage aspects

- Static Equipments - Ejector system, Scrubbers, Columns, Heat Exchanger, cooling towers etc.
- Rotary Equipments - Air Compressors / Pumps / Gear Box / Blowers / Centrifuge, Separator, RVD, ANF, Hoist etc.
- Boiler, Furnace
- Piping / Valve, Fabrication
- Insulation
- Statutory Compliances

NOVICE

- Is familiar with all the static and rotary equipments of the plant, indicated above and their purpose/basic working principles
- Can read the equipment drawings and can identify the parts/components in the drawings
- Is familiar with operating parameters such as Pressure, Temperature, Capacity, Operating Medium, & its characteristics
- Understands the characteristics and applications of various material of construction such as MS, SS, GI, CS, CI, PP, HDPE, FRP, PVDF, PTFE, PPRC etc.
- Can identify the material of construction of each equipment/component
- Is familiar with the types, purpose and nomenclature of various types of bearings
- Is familiar with the types of oils / greases/ lubricants and their purpose and storage methods
- Is aware of the safety fittings installed on each equipment like - safety relief valves, rupture disks, vibration trips, temperature fuse plugs etc.
- Is familiar with the safety auxiliaries fitted on rotating/moving equipment like- coupling/belt guard, side boards, cages, barricades etc.
- Is aware of the special safety features of the equipment handling explosive material like special earthing, conductive jumpers across flanges etc.
- Is familiar with the types and purpose of anti-vibration supports provided for the high-speed machines
- Is aware of the specifications of general structural steel members used for foundations/supports etc. like I-beams, angles, channels, plates, flats, and special forms
- Is familiar with basic civil construction methods like masonry, RCC etc. for equipment foundations/supports
- Is able to identify critical components such as Crank Case, Piston, connecting rod, bearings, valves, seals, lubricants, filters, screws, lubrication system, refrigerant gas etc.
- Can identify the common defects like- failure of components, fatigue, leakages, corrosion, cracks, deformations, loosened bolts etc.

- Can identify visually, by noise level or by feeling the vibration and/or temperature of bearings the healthy state of functioning of rotating equipment
- Is aware of the common problems in the cooling systems like irregular/insufficient flow of cooling medium, choking of nozzles, algae/foreign matter in water, higher cooling water temperature etc. and can initiate preventive measures
- Is familiar with the common preventive measures like tightening of flanges, tightening of gland, gasket replacement, temporary sealing of leakage with sealing compounds, clamping, tightening foundation/mounting bolts, greasing/top-up of lubricants etc..
- Is familiar with different types of gaskets, packing ropes, o-rings etc..
- Is aware of the maintenance manuals of all critical equipment and understands the troubleshooting methods
- Is familiar with the measuring tools like vernier, screw gauges, callipers, tapes, scales etc.
- Is familiar with all tools and tackles like Chain blocks, spanners, cutting and welding appliances, vice, lathe, saw etc.
- Is familiar with the methods of storing common spares and consumables
- Is familiar with the instruments like gauges for ammeters, pressure, temperature, flow etc.., sensors like thermocouples, limit switches, etc., mounting mechanisms like nozzle flanges, clamps, lugs, etc.
- Is familiar with types/specifications of common spares like bolts/nuts, v-belts, chains/ sprockets, clamps, flanges and fittings etc.
- Is familiar with the stipulated safety practices for the individual areas
- Is aware of statutory requirements of pressure vessels/hoist/lifting tools and tackles etc.

Boiler / Furnace

- Has basic knowledge of Operation, Pressure rating, Temperature, Capacity, Quality & Quantity of Operating Medium, & its characteristics, Types of Accessories & basic working principles
- Is familiar with statutory requirements of Boiler operation
- Is able to identify critical components and its operation, set points, scales, limits

Piping, Valves

- Understands piping systems - underground, over-ground, flanged, welded, screwed, their standard sizes and material of construction
- Is aware of all types of valves used (such as globe, gate, plug, ball, piston, diaphragm, needle, butterfly etc..) their sizes, makes and material of construction
- Is aware of the types of supports, base frames used for static, rotary, high-speed equipment, pipes, valves etc.
- Is able to identify critical components like Crank Case, Piston, connecting rod, bearings, valves, seals, lubricants, filters, screws, lubrication system, refrigerant gas
- Is aware of periodic checklist, preventive and predictive maintenance schedule and checking procedure like Hydro test / thickness test / visual inspection
- Understands specification details of pipe fittings

Fabrication

- Is able to understand basic fabrication process ie., Cutting, Bending, Grinding, Welding, Drilling, Machining, Structural support etc.
- Is able to differentiate material of construction between MS, SS, GI, CS, CI, PP, HDPE, FRP, PVDF, PTFE, PPRC etc.

Insulation

- Is aware of the types of insulations / applications considering operating Pressure, Temperature, Operating Medium & its characteristics
- Is aware of the difference between cold insulation and hot insulation and the material used for such as thermocol, LRB, PUF and cladding as per grade and size
- Is able to understand the quality of work as per required standards

Maintenance Practices

- Is aware of the basic maintenance practices such as preventive maintenance, routine maintenance, breakdown maintenance, annual maintenance, annual turnaround plan in terms of purpose and significance etc.
- Understands the material codification system followed in the company, part descriptions etc..

- Is familiar with the engineering drawing numbers and the procedure for carrying out revisions
- Is aware of the regular non-destructive tests like - vibration analysis of rotary equipment, thickness testing of tanks, vessels, piping etc., skin temperature of insulated items etc.
- Understands the equipment alignment terminology and the purpose and importance of alignment for rotating high-speed machines
- Is aware of the importance of using right type/size of tools and tackles
- Is aware of the laid down safety procedure to carry out maintenance in the explosive premises, especially on the equipment handling explosive / hazardous materials and use of special tools and tackles for the same
- Is able to identify requirements of Spare Parts / Consumables / lubricants
- Is familiar with the spare parts purchasing process from raising of purchase requisition to goods receipts
- Is familiar with the basic stores operations; storing, goods receipt & goods Issue and the related documentation

PRACTITIONER

- Is conversant with the duty conditions of various equipment (both static and rotary) in the plant like the chemicals handled, pH, temperature, pressure, flow and other characteristics
- Understands the MOC of the body and the liners (if any) / Size / Rated Capacity / Components / Connected Power / Utilities requirement / Make etc..
- Can read and interpret all the equipment design drawings and manuals
- Is conversant with the specifications/ Indian and international standards of pipes and fittings and their suitability to various fluids/gases being handled
- Can suggest the suitable structural steel members for equipment supports and foundation works
- Understands the safe operating limits of each equipment against pressure, temperature and vibration and can set the safety fittings installed on each equipment like - safety relief valves, rupture disks, vibration trips, temperature fuse plugs etc..
- Is conversant with the special safety protection provided on various equipment handling explosive material like: special earthing, conductive jumpers across flanges etc. and aware of alternative methods, if any
- Is conversant with the type, make, duty conditions and mounting methods of anti-vibration supports provided for the high speed machines, high pressure/steam piping etc.
- Understands the duty conditions of the noise hoods provided for the noise generating equipment like gas turbines, diesel generators etc.. and the ultimate noise permissible outside the hood
- Understands the importance of the civil / structural foundations for the dynamic load of rotating equipment and their insulation method to the surrounding area
- Is conversant with methods of providing protective coatings of equipment and structures such as -

  a) Application of additional coats of protective cement / paint / resins / compounds

b) Doing patch work on the repaired areas

c) Scheduled replacement of the protective coating by removing the old coating, inspecting the surface, repairing/ rebuilding any damaged portion and finally providing fresh coating

- Is conversant with the NDT tools like thickness testing, dye penetration testing, ultrasonic testing, radiography, skin temperature profiling, vibration analysis and can initiate action to prevent anticipated breakdown
- Can identify failures due to corrosion, erosion and fatigue and is familiar with the procedures to avoid such occurrences/ stop further propagation of already started cracks/rectify a damage

- Is able to continuously monitor the availability of spares and take appropriate steps to reduce the stock-outs
- Is conversant with the purchasing procedure, policies and can identify vendors, negotiate and ensure spare availability as per the demand plan
- Can inspect the quality of spares received and plan appropriate actions/strategies to improve the quality aspects with the vendors
- Is able to do vendor evaluation, set norms, parameters for evaluation and monitor the performance and take appropriate actions
- Is able to assimilate the spares requirements of annual turnarounds and plan the availability of spares
- Is aware the frequency of testing of equipments and accessories / components to be covered, as per statutory compliance requirement.
- Maintains track records of equipments inspection

Static /Rotary Equipments

- Is able to differentiate between SS, SS304, 316, 316L, and their mechanical and chemical properties
- Is able to understand suitability of above materials with the medium being handled and the external environment

- Is able to identify the defects in the components which cause the problem and decide remedial measures like repair, replace or adjust to recover the health of the equipment / bring the equipment back to operation
- Is able to recommend inspection schedules depending on the maintenance done.
- Is conversant with the types/specifications of bearings and knows their equivalents and safe and proper storing methods
- Is conversant with the correct methods of removal and mounting of bearings using right size/type of pullers
- Can analyze bearing failures due to material, lubricant, incorrect tolerances, incorrect mounting, vibration, misalignment, improper assembly etc.
- Can identify the type of oils / greases / lubricants required for each equipment and knows the proper methods of their storage / handling /application
- Can identify and replace lubricants before they degenerate and lose their properties
- Understands the purpose of oil analysis and knows the procedure for sampling and testing of oils and lubricants used in rotating equipment
- Knows the effects of imbalance in rotating parts especially in high-speed machines
- Can undertake on-site balancing of impellers / rotors etc.
- Knows how to use balancing machine for balancing of large impellers etc.
- Knows the allowable balancing tolerances for the above
- Is conversant with the handling of appropriate types of tools and tackles available for lifting and transportation of equipment like –Screw jack, Hydraulic jack, Hoist/Winch/Chain Pulley Block, Slings, Eye-bolts, Wire-ropes, Derricks, Cranes etc.
- Can take special precautions before carrying out any hot job in an explosive area
- Is conversant with the repair/ replacement procedures of internals / components like – Gears / pinions, pulleys, couplings, drive chains/sprockets, plumber blocks etc..
- Can inspect and do the alignment of machinery, check the offset, angularity, tolerance allowed etc.

- Is able to identify the problems (Low Oil Pressures, Abnormal Noise, Vibration, the static equipments getting heated up etc.) and take corrective actions & suggest preventive measures to avoid recurrence of the problem
- Adhere to the maintenance schedule, Keep record of observations in history cards and recommended any changes in the schedule and initiate corrective actions as per requirements
- Is able to identify the stock level and recommend any changes in the workshop and engineering store
- Is conversant with the types of heat exchangers like shell and tube, plate type, coil type etc. and their internals, material of construction etc.
- Can analyze causes of malfunctioning of heat exchanger
- Is conversant with the procedures of repairs of tubes like flaring, re-welding, temporarily plugging the damaged tube etc.
- Can identify short circuiting in the plate heat exchangers and replace necessary gasket

  Pumps, Compressors, and Blowers
- Understands causes of common problems of like -
  - ✓ Vibration, flange leakage, high amperage, high skin temperature, body leakage, low pressure developed, low flow, gland leakage etc. and can rectify the same
  - ✓ Is conversant with all critical parts, which need attention like piston rings, gland packing, valves, mechanical seal, balancing disc, balancing piping etc.
  - ✓ Understands the importance of proper mounting of the suction and discharge piping without ant tension being transferred from the piping system to the pump and mounting of expansion bellows to protect the piping
  - ✓ Understand the supporting system of various piping/ valves connected to the pump and can identify any shift causing mal-operation of the pump
  - ✓ Is conversant with the rectification of wear and tear of parts like piston rings, bearings of connecting rod and crank shaft etc. and the lubrication methods

- ✓ Can carry out rectification of common problems arising due to improper functioning of valves and do lapping, timely replacement etc.

- Is able to align and operate blowers at optimum vibration level
  - ✓ check proper functioning of the capacity regulating suction dampers
  - ✓ check the lubrication system for the blower and the gear box
  - ✓ check the Impeller balancing
  - ✓ monitor the functioning of the gland sealing and take preventive measures
  - ✓ monitor the sound level of the blower

Boiler / Furnace

- Is able to identify the problems (Low Pressures, Abnormal Noise, Vibration, getting heated up etc.) and take corrective actions & suggest preventive measures to avoid recurrence of the problem
- Is aware the frequency of testing of Boiler & other accessories as per statutory compliance.
- Can maintain track records of boiler inspection
- Is able to identify the defects in the equipment / components which cause the problem and decide remedial measures like repair, replace or adjust to restore the health of the equipment and put it back to operation.
- Knows the burner functioning, importance of air to fuel ratio, nozzle sizes etc.
- Can dismantle the burner, check the parts and replace worn-out parts
- Can carry out troubleshooting of burners in case of red flame, long or short flame, insufficient heat, fuel dumping etc.
- Can do finer adjustment of air to fuel ratio for efficient fuel consumption
- Is conversant with different types of refractory, insulation bricks and castables used in various equipment, their temperature and chemical resistance properties, application methods, life, standard sizes and special shapes etc..
- Is conversant with the start-up procedure of the equipment after the refractory lining work

Piping, Valves, Fabrication

- Is able to study and understand the P&I diagram of the plant
- Is able to differentiate between SS, SS304, 316, 316L and their mechanical and chemical properties
- Is able to understand suitability of materials with the medium being handled and the external environment
- Is conversant with the common problems in piping like- flange leakage, weld leakage, body leakage etc. and their rectification method
- Understands the importance of proper supports especially for hot, cold, high-pressure piping and how to monitor and maintain them
- Understands the importance of expansion joints, their location, how to monitor their expansion and movement and take preventive actions whenever necessary
- Understands the internal construction of all types of valves and its wearing components like:- the internal seals, seats, gland packing, stem etc. and can identify the defect and rectify the same
- Is conversant with the use of various types of cutting equipments like – Oxy-acetylene, rectifier, plasma etc.
- Is conversant with the use of various types of welding appliances like – arc and gas welding, their use and limitations
- Understands welding techniques of special alloys, dissimilar metals etc..
- Is conversant with the common mishandling of valves like over-tightening, over-opening and its effects, and can train operation staff of proper valve operation

Insulation

- Is conversant with heat losses, the insulating properties, types & sizes of insulation, application methods of insulation etc.. of the available insulation materials for cold or hot insulation
- Is able to identify the damages to insulation work or problems (sweating on cladding) and take corrective actions & suggest preventive measures to avoid recurrence of the problem.
- Understands the suitability of materials with the medium being handled and the external environment

Maintenance Planning

- Is able to plan the weekly and daily maintenance activities taking into consideration the priority, the resource requirements etc..
- Is able to estimate and plan the time, manpower, spares and other requirements and can schedule the activities in a proper manner to reduce the overall non-productive hours
- Is conversant with all types of safety permits necessary for initiating maintenance jobs
- Is conversant with the company's safety policy, environment policy and social policy
- Is familiar with the norms set by inspectorates of factory, boilers, and explosives and can take cognizance of these in carrying out maintenance and to comply with documentation
- Is able to carry out shut-down / annual turn-around jobs using project management tools
- Can prepare & release work orders/maintenance orders etc.. through ERP
- Can generate the maintenance plans for the plant through the use of ERP
- Can collect and analyze maintenance data, failure patterns, MTBF, MTTR etc.. and initiate preventive and corrective actions

DEVELOPED

- Is competent to choose right size and model of the equipment from the performance data and technical details provided by the suppliers, also keeping in mind the energy consumption of various models and sizes
- Can analyze the recurring problems in some of the critical equipment and can interact with the manufacturers to modify the designs to avoid such problems in operation and maintenance
- Is able to develop alternative suppliers for critical spare parts
- Can design and specify an efficient piping system including valves, fittings and supports for specific process needs keeping the pumping costs in mind
- Can initiate procurement actions by identifying suppliers and conduct technical negotiations
- Is conversant with the worldwide developments in the equipments of plants and can take appropriate action to improve life of plant and machinery
- Is aware of the new types of bearings and lubricants developed to optimize energy consumption and increase life of equipment
- Can identify new materials of constructions to withstand better the corrosive nature of some of the chemicals handled in the plant
- Can progressively monitor the consumption pattern of spare parts and components and can identify non-moving items and finds alternative use for these items or disposal method to realize best value possible
- Can interpret the statutory rules and regulations / amendments related to the plant equipments and guide personnel on these issues
- Can evolve action plans to enable the company achieve the objectives of safety / environment policy
- Is able to carry out trend analyses and determine the best life of critical components in every equipment and recommend a schedule for their replacement even before their failure to provide uninterrupted service of the equipment
- Can analyze non-destructive test results for all the critical equipments to bring about improvements
- Can analyze causes of static and dynamic unbalancing and suggest proper actions

- Is fully conversant with developments worldwide in the design and construction of various rotating / heavy duty equipments / their components including newly developed materials to enhance the effective life of equipment
- Can prepare the preventive and predictive maintenance schedules and procedures to minimize equipment downtime
- Can develop good and reliable spare part suppliers
- Can study the operation parameters and interpret the working of the equipment vis-a-vis its design conditions to monitor its performance.
- Is fully conversant with the present Indian and international safety rules to recommend maintenance procedures
- Can decide on outsourcing of jobs to optimize the cost of maintenance
- Can select the jobs/activities for inclusion in the annual/planned shut down
- Is able to prepare the schedule based on PERT/CPM techniques for shut-down/ annual turn jobs and monitor the same
- Can plan, design and execute new projects, modifications, de-bottlenecks etc..
- Can co-ordinate with maintenance of other functions like electrical and instrumentation
- Is aware of latest instrumentation and controls available for automation of the operation of different types of equipment and role of mechanical maintenance in their installation and upkeep
- Can give inputs in developing computer-based maintenance management system
- Is able to plan the monthly, half yearly, Annual Turnarounds etc.. taking into consideration the priority, backlogs and the resource requirements
- Can recommend methods to streamline spare parts management and also eliminate inconsistencies in the system
- Can identify mandatory and discretionary preventive maintenance activities and build credible preventive maintenance procedures for weekly/monthly/yearly PM activities
- Can identify the tools & techniques for carrying out the predictive maintenance and other activities

- Can carry out accurate estimation for large maintenance works such as shutdown, annual turnarounds etc.. and prepare the detailed estimation sheet (including the time and manpower details)
- Can execute large maintenance works such as annual turn-around, commissioning, projects, modifications etc.. and meet the time and cost objectives of the project through the use of PERT, CPM etc..
- Can shortlist and select contractors, vendors and suppliers through past performance data, vendor evaluation techniques etc.. and monitor their performance
- Can develop adequate performance measurement and management system for the maintenance function and benchmark the indicators such as MTBF, MTTR etc..
- Can work towards achieving lowest maintenance cost and maximum equipment availability
- Is able to generate the demand plan of spare inventories in a scientific manner using the MTBF, asset usage levels, planned maintenance, and vendor returns to ensure the assets are serviced in the best possible manner
- Can carry out a FMEA (Failure Mode and Effects Analysis) for critical spares and plan corrective and control activities
- Can guide in building an indigenous supplier network to reduce the overall costs and also provide critical inputs and support to vendors in indigenising the spares
- Understands the trade-off between repair and replacement and frames guideline for the department in the above context
- Can carry out reliability assessment of critical spares
- Is able to formulate service-level agreements with key suppliers and monitor their performance on a regular basis

ORGANIZATIONAL STEWARD

- Has thorough knowledge of the process and the corelation to the equipment design across the process value chain
- Is conversant with the changing technologies, as used by the company and benchmarks the performance of the equipment performance against the best in industry class standards with respect to the life cycle cost and other critical dimensions
- Develops corporate strategy which aligns organization requirements with that of the vendors and ensures that the organization benefits from the same
- Is aware of competing technologies, their special features with reference to maintenance cost and can recommend adopting these features in the existing plant
- Keeps track of global changes on maintenance practices and recommend new initiatives at plant
- Is aware of the latest amendment in regulatory acts and maps the same with aspects of maintenance
- Can make comprehensive evaluation based on economic, technological, proprietary information etc. for purpose of partial or in-toto outsourcing options of maintenance
- Can negotiate/form alliance and partnerships with key vendors and identify methods to reduce the overall spares costs for the plant
- Understands the Total Cost of Ownership (TCO) concept and is able to institutionalize and integrate it in the pricing procedure

ELECTRICAL MAINTENANCE

This competency may be defined as the combination of knowledge and skills required for carrying out the maintenance and improvement of all the Electrical equipment during manufacture of the herbicides, insecticides, fungicides and other related products / key intermediaries

Key Indicators

This competency is demonstrated through the following-

- Understand the construction and operation of all electrical equipment used in the production and offsites facilities at the plant
- Carry out routine, preventive and predictive maintenance of all electrical equipment
- Plan short and long shutdowns to carry out non-routine maintenance and to upgrade/revamp the equipment to enhance the efficiency and life
- Educate and train all the electrical maintenance personnel in latest techniques to ensure maximum availability of equipment

Key Coverage aspects

- All electrical equipment utilized in the plant such as Power Control Centres/Motor control centres / their components, Switchgears, all types of motors (HT and LT), All types of Transformers, Power cables (both HT and LT), cable ducts, cable trays, conduits, bus bars, etc., Sub-stations, Turbo Generators and related equipments, All protection systems, Lighting systems, Emergency/Standby power systems, Communication system (PA system, telephone exchange etc.), Air Conditioners (window, split and package type), Portable tools (welding machines, grinders etc), Diesel Generator Sets (electrical system), Fire-alarm system, Earthing system, Batteries and battery chargers etc.

NOVICE

- Is familiar with all the electrical equipment, listed above, at plants
- Is aware of materials of construction, operational features of equipment etc. of all the equipment
- Is familiar with single-line diagram
- Is aware of standard sizing of equipment and components based on kw, voltage and amperage
- Is familiar with different voltages used in the plant (such as 24V AC/DC, 240 Volt, 415 Volts etc.)
- Is familiar with different types of motors (both LT and HT), their ratings and insulation systems
- Is familiar with routine checks of motor
- Is familiar with standard sizes/specifications of power cables of different materials like - Aluminium conductor, copper conductor etc..
- Is aware of common defects like short circuiting, thermal trips, fuse failures etc. and the needed actions
- Is familiar with various equipment in the sub-station and functions of DG Sets
- Is aware of various types of interlocking system used especially with respect to captive power units
- Is familiar with cable ducts, cable trays and supports, field switches, control switches, insulators, relays, breakers, metering devices, potential transformers, current transformers, power transformers etc.,
- Is familiar with working knowledge of power control systems, bus bars, circuit breakers, switch fuse units / MCCBs, control switches/selector switches, indicating lamps and push buttons, cable terminations, control wiring, power capacitors & capacitor control panels, underground cables, sealing boxes and testing
- Is aware of earthing including a) pipe earthing b) plate earthing c) strip earthing, testing earth resistance etc..
- Is familiar with Power Capacitors, Capacitor Control, Conduits (PVC, MS etc.), distribution boards and Panels
- Is aware of the working of batteries and battery chargers
- Is familiar with the types, purpose and nomenclature of various types of bearings and can identify them

- Is familiar with the types of oils/greases/lubricants available for maintenance and their purpose
- Is aware of the safety auxiliaries fitted on rotating/moving equipment like - coupling/belt guard, side boards, cages, barricades etc..
- Is familiar with the equipment alignment terminology and knows the purpose and importance of alignment for rotating high-speed machines
- Understands the importance of using right type/size of tools and tackles including those for use in the explosive area
- Is aware of the laid-down safety procedure to carry out any maintenance in the explosive premises, especially on the equipment handling explosive /hazardous materials
- Is aware of the purpose of noise hoods provided for the noise generating equipment like diesel generators etc.
- Is aware of the special equipment like payloader, cranes etc. and their electrical needs
- Is familiar with the equipment related to telephone exchange and the cabling work in plant
- Is familiar with regular non-destructive tests like- vibration analyses of rotary equipment, motor insulation tests, IR value tests, conductivity test of breakers, relay tests, cable insulation tests, skin temperature of drives/generators etc.
- Is aware of safe operations of all the electrical equipment
- Is familiar with the working of fire fighting and safety equipment
- Is familiar with all the associated documentation
- Is familiar with different requirements of protection class and their relevance with respect to location (general purpose, flame-proof, non-sparking etc.)
- Is able to differentiate FLP/NFLP Equipments
- Is aware of the basic maintenance practices such as preventive maintenance, routine maintenance, breakdown maintenance, annual turnaround plan etc. in terms of purpose and significance etc.
- Is aware of all assets in the plant in terms of their life, utilization levels, past behaviour etc..
- Understands basic civil construction methods like masonry, RCC etc. including materials for foundation works

PRACTITIONER

- Is conversant with the purpose of each equipment in the process of manufacturing of different products in the plant and the electrical equipment/accessories related to the facilities
- Understands the power requirement of each equipment and the drive capacity
- Can read and interpret engineering drawings related to the electrical circuit and equipment layout etc.
- Is conversant with the constructional features and materials of construction of all the equipment in the section
- Can identify the capacity of the Equipments like Contactors, Relays, Meters, Breakers, Bus Bars, Cables, Fuses, SFU, Lamps, Glands, MCB, Connectors, MPCB, Protection Devices, Relay Cards, Motor starters, Control Transformers and recommend appropriate selection
- Is conversant with the current carrying capacities and voltage drop across various types and sizes of cables
- Is able to select—fuse capacity, trip amperage, motor size, overload relay settings etc.
- Is conversant with the calibration standards/methods of all measuring instruments
- Is conversant with the recommendations of the manufacturer regarding lubrication and can specify the type of oils/ greases/lubricants (and the equivalents) required for each equipment and knows the proper methods of their storage / handling
- Understands the alignment of machinery, checking of offset, angularity, tolerance allowed etc.
- Is conversant with the use of different grades of greases and lubricant oils
- Is conversant with the correct method of removal and mounting of bearings using right size/type of pullers
- Is conversant with the balancing of rotating parts especially in high speed motors/generators
- Can design and maintain history cards for each equipment and interpret them to determine the preventive maintenance and frequency

- Can carry out Preventive and Predictive Maintenance—
  - ✓ Can decide what is to be inspected and at what intervals
  - ✓ Can plan and execute the maintenance works on these equipments
  - ✓ Can identify the causes of failures on these electrical equipments
- Can undertake maintenance of all types of transformers, HT/LT Panels, Battery banks and Battery charger, UPS etc.
- Is conversant with various types of bearings available and equivalents available in the market and their safe and proper storing methods
- Understands the type, make, duty conditions and mounting methods of anti-vibration supports provided for the high-speed machines
- Can undertake maintenance of motor-operated valves (electrical system) and variable-frequency drives
- Can undertake troubleshooting and checking of electrical interlocks / repairs of all electrical protection systems
- Can execute cable joints of various types and testing and repairs of lightning arresters
- Can undertake testing and repairs of air-circuit breakers
- Is able to correlate electrical equipment rating with the machinery requirements, its selection and suitability as per standards
- Is able to identify the problems of motors (such as high current, winding failures, overheating, bearing Failures etc.) and take corrective actions & suggest preventive measures to avoid reoccurrence of the problem
- Can organise overhauling of HT/LT Motors and DG sets (Electrical) with original equipment manufacturers / service agencies
- Can conduct skin-temperature profiling, cable insulation test, conductivity meters (mho test), megger test, IR test etc. to know the condition of the equipment and initiate preventive action to avoid any breakdown
- Understands the methods of vibration analysis and can interpret the results with assistance from specialists
- Can conduct all the tests required for cabling like a)Insulation resistance test(sectional and Overall), b)Sheathing continuity test, c) continuity and conductor resistance test, d)Earth test, e)High voltage test etc.

- Is conversant with use of appropriate types of tools and tackles available for lifting and transportation of equipment like – Screw jack, Hydraulic jack, Hoist/Winch/Chain Pulley Block, Slings, Eye-bolts. Wire-ropes, Derricks, Cranes etc.
- Can undertake repairs and testing of earthing and is familiar with Indian Electricity Rules, “code of practice for earthing” etc.
- Is conversant with tests as per Indian Standards and National Electrical Code
- Can maintain power capacitors and capacitor control panel
- Is conversant with tagging procedure and isolation of the equipment for repairs
- Is acquainted with all the instrumentation mounted on various equipment, their purpose, sensitivity and their mounting methods
- Can measure the lux levels at working areas and specify the appropriate lighting fixtures
- Able to select light / fixtures as per FLP / NFLP requirements, energy conservation initiatives such as use of LED or Solar lamps
- Is conversant with winding of motors and insulation of the windings with proper varnishes including through vacuum impregnation method
- Is conversant with the regular maintenance of equipment related to telephone exchange and the cabling work in plant
- Can plan and execute annual shutdown wherein major part of maintenance work is carried out in all electrical installations, which are in operation throughout the year like - total dedusting, functional testing of primary and secondary sides of relays, bus-bar cleaning, tightening of all bolts, conductivity test of HT and LT circuit breakers, replacement of carbon brushes, slip-ring polishing, cleaning and polishing / replacement of all contactor’s mating parts, transformer oil top-up/replacement, checking of electrical interlocks etc..
- Is conversant with ERP-related documentation
- Is conversant with the documentation required by the electrical inspectorate
- Is conversant with the air conditioners operation and maintenance requirements
- Can adhere to the statutory compliance, keep record of compliance and initiate corrective actions as per requirements
- Is able to identify the frequency of replacement / able to recommend necessary changes in equipment / component, based on failures
- Can plan and schedule minor maintenance activities together with shutdown work

- Can identify critical and routine spare parts with quantities and specify required stock levels
- Is able to plan the weekly and daily maintenance activities taking into consideration the priority, backlogs, the resource requirements etc..
- Is able to estimate and plan the time, manpower, spares and other requirements and can schedule the activities in a proper manner to reduce the overall non-productive hours
- Is able to continuously monitor the availability of spares and take appropriate steps to reduce the stock-outs
- Is conversant with the purchasing procedure, policies and can identify vendors, negotiate and ensure spare availability as per the requirement
- Can inspect the quality of spares received and plan appropriate actions/strategies to improve the quality aspects with the vendors
- Is able to do vendor evaluation, set norms, parameters for evaluation and monitor the performance and take appropriate actions
- Is able to assimilate the spares requirements of annual turnarounds and plan the availability of spares
- Is conversant with safety measures in the electrical installations during operation and maintenance
- Can inspect and monitor the working of the fire alarm system
- Can prepare & release work orders/maintenance orders etc. through ERP
- Can generate the maintenance plans for the plant through the use of ERP
- Can collect and analyze maintenance data, failure patterns, MTBF, MTTR etc.. and initiate preventive and corrective actions

DEVELOPED

- Can prepare electrical distribution system design / basic design specifications with necessary protections
- Can recommend trip limits for protection relays for protecting main equipment from permanent damage
- Understands the recurring problems in some of the equipment and can interact with the critical equipment manufacturers to suggest modification of the engineering design to avoid such problems
- Can specify and sketch simple spare part drawings for shop manufacture
- Can prepare elaborate specifications for equipments/parts
- Can identify means of reducing downtime of maintenance
- Has thorough understanding of the metallurgy of all components and their selection procedure for specified conditions of wear, erosion, strength and environmental conditions etc..
- Is aware of the different types of equipment/parts available in the market and can identify the alternatives for existing ones
- Can analyze failures of equipment and parts (such as motors, bearings, Circuit Breakers, transformers, etc.) and take appropriate action to avoid recurring failures
- Can design preventive and predictive maintenance methods, frequency, tools and instruments to be used for the same
- Can predict the main causes of defects in any running equipment feeling its vibration, sound generated and temperatures
- Can understand the energy aspects of the equipments and take control measures
- Has thorough knowledge of the electrical safety and electricity rules
- Can suggest improvements in sub-station equipment and their maintenance methods
- Can suggest modifications to minimize noise pollution
- Can develop safety systems in the plant and monitor the earth resistances, lightning arresters, fire protection smoke detectors in cable galleries etc.. at all places in the plant

- Can recommend erection of lightening arresters at appropriate place
- Can optimize consumption of spares
- Can develop training modules in electrical maintenance for both production and maintenance personnel
- Can prepare Standard Operating Procedures for electrical maintenance
- Can plan and execute modifications, de-bottlenecking etc.
- Can utilize ERP for tracking and monitoring of inventory, budget, expenditure etc.
- Is able to plan, schedule and execute developmental projects related to electrical
- Is able to plan the monthly, half yearly, Annual Turnarounds etc. taking into consideration the priority, backlogs and the resource requirements
- Can identify mandatory and discretionary preventive maintenance activities and build credible preventive maintenance procedures for weekly/monthly/yearly PM activities
- Can identify the tools & techniques for carrying out the predictive maintenance and other activities
- Can carry out accurate estimation for large maintenance works such as shutdown, annual turnarounds etc.. and prepare the detailed estimation sheet (including the time and manpower details)
- Can execute large maintenance works such as annual turn-around, commissioning, projects, modifications etc.. and meet the time and cost objectives of the project through the use of PERT, CPM etc..
- Can identify processes and procedures which can be mapped to ERP system to enhance the performance
- Can develop adequate performance measurement and management system for the maintenance function and benchmark the indicators such as MTBF, MTTR etc.
- Is able to generate the demand plan of spare inventory in a scientific manner using the MTBF, asset usage levels, planned maintenance and vendor returns to ensure the assets are serviced in the best possible manner

- Can carry out a FMEA (Failure Mode and Effects Analysis) for critical spares and plan corrective and control activities
- Can review equipments and their protection system to safeguard other equipment and recommend improved / latest version
- Can guide in building an indigenous supplier network to reduce the overall costs and also provide critical inputs and support to vendors in indigenising the spares
- Can analyze and choose any one between repair and replacement and frames guideline for the department in the above context
- Can carry out reliability assessment of critical spares
- Can shortlist and select contractors, vendors and suppliers through past performance data, vendor evaluation techniques etc. and monitor their performance
- Is able to formulate service-level agreements with key suppliers and monitor their performance on a regular basis

ORGANIZATIONAL STEWARD

- Can recommend modifications which will lead to lower power consumptions by the use of special motors etc.. and higher productivity
- Can control the downtime due to electrical failures by undertaking appropriate precautions
- Is aware of the latest developments in equipment design / advanced methods in electrical maintenance
- Can incorporate measures to increase MTBF (Mean Time Between Failures)
- Can recommend the latest NDT inspections in predicting the soundness of the equipment
- Can prepare and adhere to budget for revenue and capital expenditures through effective tracking and scheduling of activities as per plan
- Can use quality tools like SPC for tracking and improving the departmental performance
- Is well conversant with ERP for better inventory management, spare parts management and trend analysis
- Can scan, map and correlate maintenance best practices, including establishment of benchmark metrics for various key performance indices
- Can make comprehensive evaluation based on economic, technological, proprietary information etc. for purpose of partial or in-toto outsourcing options of maintenance
- Can negotiate/form alliance and partnerships with key vendors and identify methods to reduce the overall spares costs for the plant
- Understands the Total Cost of Ownership (TCO) concept and is able to institutionalize and integrate it in the pricing procedure
- Can recommend methods to streamline spare parts management and also eliminate inconsistencies in the system

INSTRUMENTATION MAINTENANCE

This competency may be defined as the combination of knowledge and skills required for carrying out testing, installation and maintenance of instrumentation and process control systems during manufacture of the herbicides, insecticides, fungicides and other related products / key intermediaries

Key Indicators

This competency is demonstrated through the following-

- Understanding the construction and operation of field and control room instruments, special or vendor-package instruments, workshop test and safety related instruments of the production facilities and Offsites
- Carrying out testing, inspection, repair and installation of instruments and control system
- Carrying out regular calibration of all measuring and indicating/recording instruments to ensure accuracy in readings, essential for good process control
- Carrying out routine, preventive, and predictive maintenance
- Upgrade/revamp of the instruments and process control systems to enhance their life

Key Coverage aspects

- Field Instruments

- Control Panels
- UPS
- SCADA / DCS
- Calibration
- Statutory Compliances

NOVICE

- Understands the meaning and significance of all symbols and their use in conventional closed and open control loops, PID and PFD
- Understands the basic chemistry and P&I diagram of the processes in the plant
- Is aware of the location of all process equipment, essential pipe lines, instruments and controls
- Is aware of all test equipment in the instrumentation workshop for testing and calibrating sensors such as Pressure, Level and Temperature etc…
- Can identify and understand specification of instrumentation installation material, such as control valves, control panels, Gas and liquid analyzers, instrument tubing, piping, fittings, flanges, nuts, bolts, signal cable, extension cable, compensating cables for thermocouples, cable, glands, conduits, marshalling, Junction boxes, filters, traps etc.
- Is familiar with all installation tools and tackles and understands installation documentation including Drawings, Bill of Materials, Hook-up sketches, layout diagrams, P&I diagrams, flow sheet, interlocks etc.
- Understands the concepts of fail-safe, fail-danger positions of the instrumentation etc.
- Is aware of the basic maintenance practices such as preventive maintenance, routine maintenance, breakdown maintenance, annual maintenance, annual turnaround plan in terms of purpose and significance etc..
- Understands the material codification system followed in the company, part descriptions etc..
- Is familiar with the engineering drawing numbers and the procedure for carrying out revisions
- Is able to identify items which is repairable or replacement is required
- Is aware of the requirement of those instruments for which statutory compliances are involved
- Has knowledge of applicable legal / statutory rules and laws
- Is aware of the procurement, inventory management procedures and material inspection systems
- Is familiar with spares coding system and codes

- Is familiar with ERP concepts, procedures, their application and associated documentation
- Is able to differentiate on types of compliances, meterology compliance, wireless device compliance etc.

Field Instruments

- Is familiar with temperature transmitter, pressure transmitter, flow transmitter, pH transmitter, Level transmitter, Pressure gauges, pressure switches, Level switches, flow switches, RTD, TC. Level indicators weighing balance, load cells, Control valve, On/Off Valve etc.
- Is able to identify the range of each instruments installed in the field
- Is able to differentiate materials between MS, SS, GI, CS, CI, PP, HDPE, FRP, PVDF, PTFE, PPRC etc.
- Is aware about the primary measuring elements of the instrument like RTD, TC, Diaphragm, Load cells
- Is aware of the checklist, testing procedure of the instruments, types and range of the tools
- Is familiar about the glands, lugs, Copper tubes, Fittings etc.
- Is able to identify various sub-assemblies/major components and accessories using their manuals and drawings
- Is familiar with installation and connecting procedures of all types of field instruments
- Is aware of the procedure for workshop tests, such as body test, leak test and bench set
- Is familiar with the working principle & can identify pneumatic accessories such as air filter regulators, booster relays, air lock relay, trip valve, stay put valve, quick vent valve, all solenoid valves etc.
- Is familiar with the basic method of checking of control valve pneumatic accessories in the field & in the workshop
- Is familiar with various types of Thermocouples and their mv / Temperature tables, principle of working and constructional details etc.
- Is familiar with thermocouples such as mineral insulated and conventional, grounded and ungrounded and types like J, K etc…
- Is familiar with types and specification of cables used for Instrumentation
- Is aware of the principle of working and types of different type of level switches and procedure to line up level transmitter and specific gravity adjustment

- Is familiar with the important control loops and critical values of process trips

Control Panels, UPS

- Is able to differentiate between Relay card, Analog Input/ Output modules, Digital Input/output modules, SMPS, CUPs, Fuses, Communications switch, Lamps, Glands, MCB, Connectors, Batteries etc.
- Has knowledge about different voltages 24VDC, 240 Volt used
- Is able to differentiate between types of I/O modules, Relay boards, MCB, Battery etc.
- Is able to differentiate FLP/NFLP equipments
- Is aware about Fuses, I/O Modules, SMPS, Relay boards etc.
- Is aware about the checklist, Terminations, Cleaning Procedures, Testing Procedures of batteries
- Is aware about Fuses, MCB, Indication Lamps. Control Wires, Cleaners, Lugs, Relay board, Ferrules, PVC Tapes etc.
- Is aware of the principle of working and calibration requirements of indicators and recorders etc.
- Is aware of the principle of operation of pneumatic and electronic controllers and is able to identify various components/sub-assemblies/modules
- Is familiar with the technical specifications, operation and maintenance of UPS system
- Knows all the critical control systems connected to UPS Special instruments/Vendor Packaged-instrumentation
- Can identify various units/sub-assembly of the special equipment/vendor packages and the prescribed spares for these

SCADA/DCS

- Has basic knowledge of the computer system, Working of the SCADA system/ DCS system
- Is able to identify the range of each parameter of the SCADA and DCS system like scaling of the parameter
- Is aware about the software of the SCADA system, Run time dongle, Communication cable and connectors, Back-up devices etc.
- Is aware about the checklist, testing procedures, knowledge of the Software and programming of the system

- Is aware about the communication protocols and its hardware connectors

PRACTITIONER

- Is conversant with all instrumentation installation drawings and can interpret them
- Can conduct all tests as per SOP using test equipment
- Can carry out card repair of instruments and electronic components like ICs, timers etc…
- Can carry out repairs of pneumatic instruments and accessories by spares replacement during both normal and shut downs
- Is conversant with safety instrumentation installation in the plant and the specification of safety barriers, isolators and surge protection devices
- Is conversant with the basic sizing of flow devices and control valves for liquids, steam and gases
- Is conversant with standard troubleshooting and trip tests
- Is conversant with standard installation practices and safety methods
- Can generate standard documentation after carrying out any modification
- Is conversant with ERP concepts & procedures in day-to-day work
- Can identify the frequency of replacement
- Can plan and schedule maintenance in line with the OEM recommendation / predictive maintenance scheduled
- Is able to plan / arrange the appropriate tools for the maintenance process
- Can carry out the scheduled maintenance/Preventive and predictive maintenance/ break-down maintenance activities
- Can initiate modifications, prepare bill of material and plan the work
- Can carry out instrument installation work and monitor instrumentation installation done by contractors
- Can prepare & release work orders/maintenance orders etc.. through ERP
- Can generate the maintenance plans for the plant through the use of ERP

- Can collect and analyze maintenance data, failure patterns, Mean Time to Fail (MTBF), Mean Time To Repair (MTTR) etc. and initiate preventive and corrective actions
- Is conversant with the purchasing procedure, policies and can identify vendors, negotiate and ensure spare availability, as per the requirement
- Is able to continuously monitor the availability of spares and take appropriate steps to reduce the stock-outs
- Can give inputs and feedbacks to stores and vendors regarding technical specifications and can inspect incoming material and assess performance of spares
- Can optimize the consumption of spares and consumables
- Can inspect the quality of spares received and plan appropriate actions/strategies to improve the quality aspects with the vendors
- Is able to do vendor evaluation, set norms, parameters for evaluation and monitor the performance and take appropriate actions

Field Instruments

- Understands the basic principle of all field instruments
- Can identify need of a particular type of field instrument for a specific application
- Can interpret the vendor operating/maintenance/spare parts manuals and maintain the field instruments
- Is able to verify the range of the process parameter which will fall under the given specific range
- Is able to understand suitability of materials with the medium being handled and the external environment
- Understands the mechanical and chemical properties of the material of construction of instruments
- Is conversant with the specifications and working characteristics of different models of the above instruments
- Can carry out installation and lining up of the above instruments with the process
- Is conversant with proper documentation to carry out any activity in the field related to instrumentation

- Can interact with vendors on matters related to specification and performance of all these instruments and competent to inspect the new supply and certify the same
- Can plan and execute preventive checks on all the instruments and take necessary measures wherever necessary
- Can carry out calibration of these instruments by comparing to the standards
- Can attend routine field problems of control valves such as gland packing, valve positional problem etc…
- Can carry out preliminary control valve sizing such as Cv, flow rate computation using software or manual methods
- Can undertake normal overhaul including minor repair work such as plug/seat repair lapping etc.
- Is conversant with valve testing and leakage class tables

Control Panel / UPS

- Can read and interpret operating manual, service manual and part-list manual of pneumatic/electronic recorders, receivers, indicators and controllers, scanners etc..
- Can identify the capacity of the equipments like Relays, Modules channels, SMPS, CUPs, Fuses, communications switch, Lamps, Glands, MCB, Connectors, Batteries and recommend selection of appropriate instrument / component
- Is able to corelate module with Field instruments, its selection and suitability as per standard
- Is able to decide the rating of the battery as per the required power backup
- Can install, calibrate and line up the above instruments
- Is able to identify the frequency of replacement / recommend necessary changes in Switchgear based on failures observed
- Is fully conversant with all spares and can carry out basic troubleshooting adapting method of replacement of card/sub-assembly of the above instruments

- Is conversant with resolving problems on open and closed loops, alarms etc…
- Is fully conversant with all input/output wiring, routing, location of marshalling boxes, all DCS interfaces like gates, routers and network traffic etc…
- Is conversant with operating manual, service manual, interlock circuit manual, layout, equipment and parts drawing manual, interconnecting diagrams etc. of all vendor supplied package instrumentation system like -- vibration monitoring system, boiler instrumentation and trip logic in boiler controls, steam turbine controls, control drives, etc..
- Is conversant with all spares and can carry out replacement of card/sub-assembly and basic troubleshooting of the special instruments/vendor packages
- Can carry out troubleshooting and minor modification in the interlock circuitry

SCADA / DCS

- Can identify the network hierarchy and troubleshoot the same
- Is able to verify whether the range of the process parameter will fall under the given specific range

CALIBRATION & STATUTORY COMPLIANCE

- Can develop / update the SOP of the Calibration procedures
- Is able to maintain the Master calibration instruments
- Is able to understand compliance of Weighing balance, Wireless device, Outlet flow meters and carry out timely calibration of the same
- Can coordinate with Statutory Authorities for compliance and timely submission of required documents

DEVELOPED

- Can design new instrumentation systems to enhance process efficiency by converting the manual operations to auto operations wherever possible
- Can monitor and manage execution of an instrumentation project – new or upgradation in a process plant
- Can prepare detailed specifications for equipments and spares
- Is fully conversant with standards and practices related to instrumentation installation and can develop installation diagram, assess and prepare bill of material for instrumentation installation work
- Can plan and execute major shutdown works in co-ordination with other departments
- Can analyze failures such as repetitiveness, number of failures etc. of instruments based on maintenance history and recommend appropriate actions to enhance effectiveness
- Can interact with vendors on problems related to chronic cases of instruments and spares
- Can recommend the optimum order quantity of material
- Can develop basic instrumentation list to develop P&I diagram
- Can give technical inputs to prepare basic engineering package for an instrumentation project
- Can review and monitor all modifications with the completion of hazard study/safety clearance, vendor approvals etc…
- Is fully conversant with techno-commercial evaluation of bids and spares
- Can carry out audit on trip logic circuit and monitor trip bypass status
- Can analyze trips and decide to change trip settings in consultation with the operation, mechanical and electrical departments to protect the equipment from major damage
- Can prepare operation and maintenance manuals of all instruments and can conduct awareness programs of DCS to all plant personnel
- Is fully conversant with instrumentation standards and associated reports and documentation related to safety

- Can constantly monitor the performance of the test and calibration equipment and their capability to do accurate calibration
- Understands the trade-off between repair and replacement and frames guideline for the department in the above context
- Can assess and take opportunistic decision to phase-out obsolete instruments
- Can identify the tools & techniques for carrying out the predictive maintenance and other activities
- Is able to plan the monthly, half yearly, Annual Turnarounds etc.. taking into consideration the priority, backlogs and the resource requirements
- Can prepare the detailed estimation sheet (including the time and manpower details) for annual shutdown work
- Can execute large maintenance works such as annual turn-around, commissioning, projects, modifications etc. and meet the time and cost objectives of the project through the use of PERT, CPM etc..
- Can shortlist and select contractors, vendors and suppliers through past performance data, vendor evaluation techniques etc.. and monitor their performance
- Can identify processes and procedures which can be mapped to ERP system to enhance the performance
- Can develop adequate performance measurement and management system for the maintenance function and benchmark the indicators such as (Mean Time To Fail) MTBF, Mean Time To Repair (MTTR) etc..
- Can carry out a FMEA (Failure Mode and Effects Analysis) for critical spares and plan corrective and control actions
- Can guide in building an indigenous supplier network to reduce the overall costs and also provide critical inputs and support to vendors in indigenising the spares
- Is able to formulate service-level agreements with key suppliers and monitor their performance on a regular basis
- Can review the frequency of the calibration / its adherence
- Can provide inputs to certification authorities-both national and international
- Can interact with statutory bodies / approving bodies for periodic checks (e.g. Annual checks to ratify accuracy and other parameters)

- Can keep track / coordinate with statutory authorities for the latest development in compliance or law

Field Instruments / Control Panel / UPS

- Develops the specification sheets of the field instruments and Control Panel based on the process requirement to get the maximum life of the instruments / system
- Can decide on the compatibility level of an instrument /system for a particular application
- Can review the system and recommend preventive and predictive methods to avoid failure of the instruments / enhance reliability and maintenance efficiency
- Is able to recommend the suitable materials understanding the usage in similar industry across the world
- Is able to recommend any treatment materials like - lining, coating, spraying to improve the suitability of the existing material, without going for replacement
- Can analyze the effectiveness of the existing maintenance schedule/practices and recommend appropriate measures to enhance maintenance efficiency
- Can carry out review of the equipments and protection system to safeguard the other equipments and recommend advanced version
- Can analyze the consumption of the critical components and provide suitable recommendations for any new or improved version available in global market

SCADA / DCS

- Review the system and recommend the any preventive and predictive methods to avoid failure of the system /instruments

ORGANIZATIONAL STEWARD

- Has thorough knowledge about the changing trends worldwide in process plant instrumentation comprising various types of Field Instruments, Control Panel systems, DCS, Testing & Calibrating Equipments etc.
- Is able to select the right type of instrumentation and test equipments considering capital cost, ease of operation and maintenance, reliability, operating cost etc.
- Can decide on the suitability of a new or improved version of instrumentation available in global market
- Can conceptualize and design central process control systems for better process efficiency and minimize manual handling of operation
- Can evolve preventive maintenance systems to minimize breakdowns
- Has thorough knowledge on ISO and ERP related matters concerning instrumentation
- Can guide in the preparation of Detailed Project Report (DPR) for an instrumentation project
- Can scan, map and correlate maintenance best practices, including establishment of benchmark metrics for various key performance indices
- Can make comprehensive evaluation based on economic, technological, proprietary information etc. for purpose of partial or in-toto outsourcing options of maintenance
- Can negotiate/form alliance and partnerships with key vendors and identify methods to reduce the overall spares costs for the plant
- Can recommend methods to streamline Spare parts Management and also eliminate inconsistencies in the system

PROCESS IMPROVEMENT

This competency may be defined as the combination of knowledge and skills required for identifying, planning and executing the improvement projects on the characteristics of existing products/packaging and also scaling up to plant level, the studies related to new product or process development done by R&D, which are technically and economically feasible and viable

Key Indicators

This competency is demonstrated through the following-

- Understanding the processes at stabilised and smooth operating conditions
- Determine and sustain the parameters for safe and economic operation
- Understanding how to bring about improvement in current processes to enhance productivity norms
- Introduce process changes to improve quality, reduce costs or accelerate schedules
- Understanding raw material sourcing and handling / storage methods
- Plan and execute the initiatives of Improving the characteristics of existing products/packaging Scale up the studies related to new product or process development, made by R&D
- Scale-up development of new products based on studies by R&D

Key Coverage aspects

- Raw Materials, Solvents and other chemicals

- Plant Performance
- Capital & Improvement Projects
- Management of Change
- MIS/PIS (Production information System)

NOVICE

- Is familiar with the process flow sheet, equipment layout, plant layout, Process and Instrumentation Diagram etc. related to the products manufactured
- Is aware of the various equipment, process controls, utilities that are used in the plant
- Is aware of the SOPs that are laid down for the manufacture of products
- Understands the design features to be considered for the selection of the technology and equipment
- Is familiar with the sourcing and storage of raw materials, intermediates, solvents etc. for producing different products
- Understands the consumption norms of utilities and the yields for specific products as per rated capacity
- Is aware of the quantity and quality of all effluent/ by products stream
- Is familiar with the safety precautions to be taken at the plant
- Is able to work in coordination with R&D to study the plant performance in terms of productivity, quality, yield and safety
- Understand and identify the areas or sections where process can be improved
- Has broad understanding of various improvement tools, such as 7 QC tools, for data capture and analysis
- Understands the organizational needs of improvement from small improvement projects to large scale capacity change projects
- Is aware of the CAPEX requisition and approval process
- Has a broad understanding of the process of creating business case along with required financial information (computation of ROI)
- Is aware of the interface management required for improvement / CAPEX projects between R&D, projects and production
- Understands typical parameters that need to be monitored for any large-scale project
- Knows the importance of working in Cross Functional Teams for any improvement / development projects
- Is able to understand the findings of R&D studies at plant
- Is aware of the need for transferring the findings of R&D as identified as feasible for scaling up to plant level projects

- Is aware of the basic process / methodology for managing change (MOC) - change request / initiation to change audit
- Understands and recognizes change situations
- Is aware of the method of evaluation of hazards
- Knows about the importance and the nature of training to be provided to manage change
- Is aware of the various aspects of Production Information System and the sources for the same (process control instruments)
- Prepares the required MIS based on the PIS data and highlights variations / deviation and other concerns to help trigger the process improvement process

PRACTITIONER

- Is conversant with the best process conditions to be maintained with respect to pressure, temperature, pH etc. for achieving high productivity
- Understands the principle of operation of different types of equipment and process instrumentation
- Is conversant with the hazardous nature of the chemicals and precautions to be taken to ensure safety
- Ensures capture of information about the plant performance along all parameters, especially those that are critical to performance
- Has a thorough understanding of the various process control equipment, DCS, PLC and the information that can be generated from them
- Understands the limitations of the existing equipment / instrumentation in terms of data that can be captured and analyzed
- Can put up for required material / instruments / products etc. from purchase, with clear specifications and requirements and works in conjunction with Purchase for the same
- Identifies appropriate services vendors for mechanical, electrical and civil projects based on project requirements and service delivery capability
- Is able to consider various options to remove the bottlenecks in processes, products packaging and offsites
- Is able to prepare the technical proposals for modifications related to process layout, piping and equipment design etc.
- Can contribute inputs for evaluating the proposals for cost management
- Is able to review operating data, utility consumption details and quality parameters relating to other similar plants along with Plant and R&D teams
- Carries out analysis of plant performance based on real time / historical information, compare them with standards and identify areas of improvement / rectification
- Can either independently or along with others develop solutions to address issues or gaps in plant performance (based on data collected and analyzed)

- Is able to review performance of the plant periodically with the production, maintenance and R&D teams
- Carries out analysis of plant performance based on real time / historical information, compare them with standards and identify areas of improvement / rectification
- Can either independently or along with others develop solutions to address issues or gaps in plant performance (based on data collected and analyzed)
- Can prepare the trend analysis of operational parameters in the plant
- Works with other internal stakeholders such as R&D, production and maintenance to ensure that the improvement issues are addressed effectively
- Can initiate the (smaller) improvement projects based on monitoring of various process parameters and identify the various elements involved therein
- Is able to submit proposals for management's approval for taking up process improvement works
- Is able to scale-up basic process data derived by R&D, to pilot / commercial plant levels
- Can perform evaluation of any changes proposed in the plant in terms of production of different products for resulting in yield increase, operational and maintenance convenience, IRR, ROI, hazards reduction etc. in the long run
- Is conversant with application and documentation related to SAP
- Can, based on the organizational business plan prepare the improvement projects, requiring large scale layouts; including the business case and Return on Investment
- Works with internal project and /or external service providers to execute the project (large scale and small changes)
- Provides feedback to internal stakeholders (projects, purchase, R&D) on various pre-identified dimensions
- Monitors the project for time, cost and quality and ensures that the ROI is per plan
- Works in close conjunction with R&D for ensuring that the projects

- Can initiate the Management of Change (MOC) process based on the change in process inputs / process parameters or others
- Prepares the necessary Risk assessment document to evaluate the risks involved and the mitigation methods for the same
- Factors the local /operational aspects when drawing up the MOC process
- Trains and educates people involved in the Change process, especially with Safety aspects
- Carries out the audit of the change process Based on pre-defined process and metrics
- Collects and collates the production information system - extracting data from Instruments, DCS / PLC and others
- Prepares the MIS from PIS data and enables trigger of improvement / change initiatives based on variations / deviations
- Is fully conversant with training and developing production team members during scale up operations with SOP and EHS norms

DEVELOPED

- Is aware of the latest development in equipment designs to perform a given unit operation or process with much ease in operation and less motive power
- Is conversant with process simulation software for process development
- Can identify based on historical trends, the areas upstream and downstream to the process, to R&D for bringing about improvements
- Is able to suggest based on the product, alternate for MOC, PLC, DCS which will help in process management as well as capturing information about process
- Works with vendors of equipment, machinery etc. and R&D to explore implementation of emerging methods in the process - both existing and intended

- Designs frameworks and / or identifies technologies which would help in capturing information and integration with other enterprise system for generating macro-level decision parameters
- Is able to scale-up plant and equipment for increased capacity
- Provides critical inputs for CAPEX layouts for process improvement, by creating the detailed business case for the same
- Suggests / recommends process equipment / instrumentation which are contemporary and can meet the current and future business requirements
- Helps identify complete technology solution providers who will be able to design and implement the change / improvement requirements identified by the organization
- Can develop new SOP/PFD as per the new process layout / design and stabilize plant with revised capacity & consumption norms
- Monitors and ensures that the ROI for projects is in line with the requirement / plan
- Works with Toll Manufacturers to help them in their Capex and other improvement projects - which will help the organization to minimize its outflow (physical and monetary) while maximizing returns (throughputs and profits)
- Is conversant with types and availability of advanced technology/equipment world-wide
- Can interact with technology consultants on technical matters
- Is able to lead both temporary and permanent changes
- Prepares the Management of Change guidelines for the organization - both temporary and permanent
- Maps probable risks, otherwise not factored into the MOC process along with risk mitigation methods
- Is able to develop more effective ways of training and handholding people to effectively manage change
- Is able to ensure that the MOC frameworks ensure highest level of Safety compliance
- Can review audit process and suggest methods of improvement of audit - based on previous NCRs and emerging MOC requirements

- Can recommend and introduce new process control / DCS / PLC or other systems which will help capture more relevant and also accurate data
- Is able to initiate methods which help trigger the process changes in a more proactive way
- Is able to manage complete process to transfer process technology from lab / pilot plant to full scale production

ORGANIZATIONAL STEWARD

- Is familiar with the changes in related technologies worldwide
- Creates enterprise-wide framework with respect to processes which help in improvement of plant performance
- Can evaluate the feasibility and viability of a project in association with R&D and identify the most appropriate technology
- Understands environmental constraints and can incorporate these into technological changes planned for execution
- Can give inputs to develop financial and strategic plans for new product concepts
- Scans global best practices for equipment and process monitoring and maps scope for their implementation in the organization
- Uses and recommends best practices of management of change across areas and functions to strengthen process-related MOC
- Creates enterprise-level data integration process - which seamlessly integrates all relevant information in a real-time scenario

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RESEARCH & DEVELOPMENT

This competency may be defined as the combination of knowledge and skills required for determining the best equipment and process conditions in which the yields can be maximized and to increase the profitability of existing products (herbicides, insecticides, fungicides and other related products / key intermediaries) / develop new products

Key Indicators

This competency is demonstrated through the following-

- Understanding the various parameters like - concentrations, volumes, pressures, temperatures, pH, type and size of the vessel / internals, energy transfer methods, presence of a catalyst and contacting patterns etc. and determine the parameters for safe and economic operation
- Understanding how to monitor and evaluate operating plant performance to bring about improvement based on operational, economic and environmental criteria
- Understanding raw material sourcing and handling / storage methods
- Improving the characteristics of existing products/packaging to satisfy changing customer needs
- Undertaking studies related to new product or process development
- Developing new products to enhance the business of the company

Key Coverage aspects

- Raw Materials, Solvents and other chemicals
- Plant Performance

- Process Changes (existing products)
- New Product Development
- MIS/PIS (Production information System)
- Effluent Cost Reduction

NOVICE

- Can read and understand process flow sheet, equipment layout, plant layout, Process and Instrumentation Diagram etc.
- Is familiar with the principles, limitations and advantages of different unit operations
- Is aware of the design specifications to be considered for a chemical processing flow-path/stream in the selection of the technology and required equipments/components etc.
- Is familiar with the physical and chemical characteristics of raw materials, in-process materials, finished goods, effluents and emissions of each production unit
- Is familiar with the sourcing and storage of raw materials, intermediates, solvents etc. for producing different products
- Is familiar with the chemistry and production processes of various products
- Is aware of the requirement and availability of utility systems such as water, power, steam, cooling water etc.. for producing various products
- Is familiar with the consumption norms of utilities and the yields for specific products as per design and rated capacity
- Knows the quantity and quality of all effluent/ by products stream
- Is aware of the safety precautions as stipulated for each chemical used in the plant
- Is aware of the visual aids like colour codes and markings on pipelines, vessels indicating the mediums being handled in them
- Is aware of the types of instrumentation used to measure process parameters
- Is familiar with the documentation related to the process of producing various products and the analytical reports generated at laboratory
- Is aware of the key process parameters used in the trend analysis of process
- Can identify the areas where process can be improved

PRACTITIONER

- Understands detailed physical and chemical specifications and properties of all the chemicals handled at the plant according to the standard MSDS (Material Safety and Data Sheets)
- Understands the exothermic/endothermic properties of the reactions at given stoichiometric ratios and can calculate the total energy transfer for a given volume and its rate of transfer
- Is conversant with the best conditions to be maintained with respect to pressure, temperature, pH etc. for optimum yields
- Is conversant with the conditions like rate of feeding, rate of cooling/heating and vacuum conditions which may affect a particular reaction and can suggest steps to prevent them
- Understands the principle of operation of different types of equipments
- Is able to decide on the process selection/application for different processes
- Is acquainted with the hazardous nature of the chemicals and the mixtures to take necessary precautions while charging, discharging, pumping and transfer
- Can suggest changes in design specifications to be considered for a chemical processing flow-path/stream for the selection of equipments
- Can specify types of instrumentation needed to measure chemical process parameters
- Is familiar with the nature, purpose and usage of catalysts used, if any
- Can co-relate the operating data in determining optimum process conditions
- Can identify the bottlenecks in processes, products packing and other services and suggest solutions for troubleshooting
- Can provide value-added inputs received from different sources to operating personnel
- Can prepare proposals of energy savings and its optimal use together with their economic evaluation

- Is able to review the proposals technically for modifications related to process layout, piping and equipment design etc. prepared by plant personnel
- Is able to collect, collate, compute and analyze operating data, utility consumption details and quality parameters relating to other similar plants
- Can calculate water and energy balance of the plant daily / monthly / annual basis and suggest measures for improvements in plant operation
- Is able to review performance of the plant periodically with the production and maintenance teams
- Is able to carry out process and energy audits and provide technical assistance to production and maintenance personnel
- Can carry out the trend analysis of operations in the plant
- Is able to carry out bench-level experiment to confirm that improvement can be done and submits proposals for management's approval
- Is able to guide the operation department to implement the change proposed and taken up for implementation
- Can monitor 5 batches, as required to confirm the improvement benefits
- Can provide inputs to scale-up basic process data to commercial plant level
- Can perform evaluation of any changes proposed in the plant in terms of production of different products for resulting in yield increase, operational and maintenance convenience, IRR, ROI, hazards reduction etc. in the long run
- Is conversant with application and documentation related to SAP

DEVELOPED

- Knows the comparative quality of raw materials being used with the best available in the market and tries to analyze the benefits of using alternative sources
- Can identify the potential areas of improvement to optimize the product cost or improve quality or throughput to get the better market share for the product
- Knows the best quality parameters being achieved internationally and thrives to continuously research improvement to increase the value of the product
- Carries out experiment by varying raw material quality / quantity and process condition to either reduce the effluent or increase value of the effluent
- Can compare the results of operating the process at various conditions of temperature, pressure, concentrations, catalysts, equipment configurations, contacting patterns etc. to assess the performance of various equipment and improve them
- Can incorporate newer processes employing lesser number of steps of reaction, low energy volumes and cheaper/environment-friendly energy sources
- Can bring back into normality any abnormal reaction observed in the plant
- Can progressively evolve usage of non-hazardous materials and processes
- Is aware of the latest development in equipment designs to perform a given unit operation or process with much ease in operation and less motive power
- Is fully conversant with the factors governing the design of particular equipment to modulate the operating parameters to achieve the same/improved yields at different capacity utilization
- Is fully conversant with the various spent streams of vapours, liquids and solids to suggest recovery methods to optimize the raw material consumption

- Is fully conversant with the hazardous nature of various chemicals / intermediates used in the plant to design improved safety precautions for operation, handling, spillage, leakage etc.
- Is able to suggest improvements in process operations by optimizing them with respect to economics
- Is able to use commercial process simulation software for process development
- Is able to scale-up plant and equipment for increased capacity
- Is able to use statistical tools for carrying out trend analysis
- Can plan and arrange market research for new products and for existing major product re-launch or development
- Can undertake market analysis of potential gaps and identify new areas for growth for the business
- Can undertake pricing research on new initiatives in line with market and customer data to ensure that maximum revenue is achieved
- Is able to identify sources of know-how for advanced technology/equipment
- Can evaluate new and modified process/equipment/layout etc. and recommend required changes
- Can prepare process design packages using appropriate technology
- Can interact with technology consultants on technical matters
- Is able to develop the knowledge bank with available resources

EXPERT

- Is aware of the changes in related technologies worldwide
- Can evaluate a project strategically and identify the most appropriate technology
- Can recommend suitable actions on any kind of reactions to achieve optimum conditions / desired objectives
- Is fully conversant with the rate controlling mechanisms of a reaction and can decide upon the process conditions / steps etc..
- Can use HAZOPS and fault-tree analyses in process design
- Understands environmental constraints and can incorporate these into process synthesis
- Can provide inputs to the management with respect to the trends, market share, growth potential and competitor performance and strategy
- Can give inputs to develop financial and strategic plans for new product concepts
- Scans global best practices for equipment and process monitoring and maps scope for their implementation in the organization
- Is fully conversant with the present end uses of the product and try to find more uses in other industries / product to increase the market share

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SAFETY

This competency may be defined as the set of knowledge elements which enables one to understand and adopt appropriate steps for adhering to / maintaining proper safety aspects during manufacture of the herbicides, insecticides, fungicides and other related products / key intermediaries

Key Indicators

This competency is demonstrated through the following -

- Understanding all aspects of safety related to the manufacture of various products
- Understanding implication of usage of various raw materials and deployment of different manufacturing methods on safety
- Understand, implement and improve upon various aspects of the Safety policy of the company
- Understand and improve on the documentation aspects of the Safety

Key Coverage aspects

- Handling and Storage of Raw Materials, Solvents and other chemicals
- Handling Chemical Reactions
- Safe Operation of Plant and Machinery
- Compliance of Check list & Safety Permits (Hot Work, Height Work, Confined Space / Vessel Entry, Excavation, chemical loading & unloading, pipeline opening, work notification, cold work permit, LOTO

- PPEs - Full Body Harness, Pressure Shoots, Cartridge mask, safety shoes, goggles, dust mask, helmet, chemical splash goggles, hand gloves (Rubber, PVC, leather), SCBA set, gas monitor Instruments, Fire suit
- Safety Equipments - Fire & Safety Equipments (Fire Extinguishers, Fire Hydrant Pumps, Fire Monitors, Sprinklers, Safety Showers, Manual Call Points, Gas Monitoring Equipments - LEL meter, Oxygen Meter, PID meter, H2S meter, Bromine meter)
- Statutory Documentation
  (PSMS, IMS, BBS, TQM, safety & environment, Fire)
- Mock Drill, Fire Drill, Table Top Drill

NOVICE

- Is aware of the organizational policy on Safety
- Understands the various critical aspects in the manufacture of various products which have a bearing on safety
- Is aware of various aspects which impact the health of the worker, including chemical properties of raw materials, in-process materials and finished products, their handling methods, pollutants and hazardous material/gases generated etc.
- Is aware of the safety objectives of the plant in terms of the statutory regulation (eg., storage of hazardous chemicals), enforcement methods, precautionary steps and emergency procedures
- Is aware of the hazards & risks associated with handling of hazardous materials used in the plant
- Understands the points of Inspection as per checklist
- Is aware of precautions / permit systems to be used in the plant while attending to any maintenance work on the equipment handling hazardous material

- Is aware of the importance in maintaining a safe working place
- Is aware of the routine documentation and also special documentation to be prepared in aspects pertaining to safety, its enforcement and reporting
- Is aware of safe practices initiative such as 5 S
- Is aware of the various legal matters pertaining to worker health and safety
- Is aware of the available PPEs and their application / SOPs in various operations
- Is aware of all the fire and safety equipment, checklist for their upkeep & their usage for specific activities
- Is familiar with the Disaster Management Plan prepared for the storage facility/handling of various chemicals and solvents
- Knows about the need and types of Mock Drill, Fire Drill, Table Top Drill &
- Is aware of the requirement of stipulated mandays training per person, training material and the schedule

practitioner

- Is able to adhere to the organizational policy on the Safety
- Is conversant with the critical aspects during production of various products and utilities which have a bearing on Safety
- Is conversant with the safety objectives of the company - in terms of the statutory regulation (eg., storage of hazardous chemicals), enforcement methods, precautionary steps and emergency procedures
- Is conversant with the hazards & risks associated with handling / storage of hazardous materials and can attend to emergencies
- Can initiate steps and procedures including creating necessary documentation before attending to any maintenance work on the equipment handling the hazardous material especially when a hot job is to be carried out or a person has to enter a vessel from which the hazardous material has been emptied
- Plans and conducts mock drills / exercises to check the preparedness of all the concerned staff as well as to check the effectiveness of the safety alarm and other appliances / ensures compulsory attendance of all the employees by keeping an attendance register
- Can assist in framing the educational and training needs for employees to maintain and ensure a safe working place
- Is conversant with the routine documentation and also special documentation to be prepared in aspects pertaining to safety, its enforcement and reporting
- Can implement safe practices initiatives such as 5 S
- Has wide knowledge of the various aspects which impact the health of the worker, including chemical properties of raw materials, in-process goods and finished products, their handling methods, hazardous emissions and effluents
- Is conversant with the various statutes pertaining to worker health and safety

- Is able to implement and monitor the Safety systems & Procedures
- Is able to communicate the hazards properly to all concerned personnel
- Visits all points in the plant to inspect and ensure the compliance as per the checklist to ensure all the safety systems are ready
- Issues the necessary permits after ensuring the compliances
- Ensures quality / availability and replacement of PPEs as per the schedule
- Monitors the availability of PPEs in the store and ensure minimum stock
- Ensures safety-related documents are completed & updated
- Ensures compliances and responds to queries raised by the regulatory authorities
- Is able to initiate legal proceedings in case of any conflict
- Is conversant with the Disaster Management Plan of the organization and the steps to be taken in case of any eventuality
- Is familiar with the concepts of risk management, identification of the risks and the mitigation methods
- Participates in process safety audits

DEVELOPED

- Is conversant with national and international safety norms so as to get the plant prepared for these so that product sale is not affected due to non-compliance of any of these norms
- Is able to guide the personnel in the compliance of current statutory standards and procedures related to Safety
- Can guide the production and maintenance teams in setting up safety systems for handling and storage of hazardous chemicals
- Can guide in the hazard analysis documentation
- Can conduct risk rating for any activity planned in the plant
- Can determine severity levels for various activities
- Is able to develop and update the Safety guidelines, systems and procedures
- Can conduct safety audits and recommend appropriate measures for enhanced safety standards
- Can give technical inputs in risk identification and suggest mitigation methods
- Can formulate training programs to achieve best safety norms in the related sector
- Can interact with the statutory bodies and guide in complying with necessary documentation and norms
- Suggests and Implements the improved safety system to reduce incidents
- Keeps track of the latest developments / new PPEs availabilities and accordingly budget for them
- Keeps track of the latest developments of Fire and Safety equipment availabilities and accordingly plans budget for them
- Keeps track of new methods and programmes to keep all the employees ready for any incidents with respect to the hazardous chemicals / reactions
- Keeps track of new methods and more effective ways of imparting training on Safety
- Can guide in preparation of Disaster Management Plan for the plant

EXPERT

- Is able to develop new techniques in measuring Safety standards and performance
- Can design Safety systems and procedures for a process plant
- Can recommend measures to ensure Safety norms at selection of technology stage / design of equipment itself
- Can suggest the need to make changes in statutory regulation
- Can impart knowledge on Safety to various stakeholders in the industry

QUALITY MANAGEMENT

This competency may be defined as the combination of knowledge and skills required for carrying out physical and chemical analysis to monitor the quality parameters so as to ensure production of different products (herbicides, insecticides, fungicides and other related products / key intermediaries) as per desired specifications and customer's requirement and to monitor the quality parameters of effluents and emissions generated

Key Indicators

This competency is demonstrated through the following-

- Understanding the quality parameters of raw materials, work-in-process materials, finished products, consumables and packaging materials
- Analyzing the physical and chemical nature and make-up of above materials and effluents / emissions using a variety of modern analytical techniques, methods and high technology instrumentation
- Operating and maintaining the testing equipments and instruments
- Understanding customer's requirement / increasing the level of customer satisfaction
- Undertaking studies related to new product or process development

Key Coverage aspects

- Raw Materials, Solvents and other chemicals
- Packaging Material (corrugated boxes, drums, LDP, Metallic, LDP/HDPE satchets, yellow bags, jumbo bags)
- Effluents / Emissions

- Testing Equipments / Instruments
- Documentation
- Customer Care Matters

NOVICE

- Is familiar with different analytical methods based on solution equilibria, complexometry, gravimetry, spectrophotometry, separations and Instrumental Analysis etc.
- Is familiar with the types and uses of laboratory apparatus and glassware
- Is familiar with the chemistry related to analytical methods for determining various parameters
- Is familiar with the operation of common lab equipments such as pH meter, conductivity meter, balances, spectrophotometer, oven, furnace, tensile tester, moisture meter etc..
- Is familiar with labware cleaning procedures and purpose of sterilization of the glassware
- Is aware of the methods of weighing and the required accuracies
- Is familiar with standards and types of laboratory reagents, common acids and alkali solutions etc..
- Is familiar with Material Safety Data Sheets (MSDS)
- Is familiar with the characteristics of raw materials, in-process materials, finished goods, packing material, effluents and emissions of each production facility
- Is familiar with the manufacturing processes of all the products manufactured
- Is aware of the standard norms set by the Government with respect to parameters such as pH, TDS, COD, TSS, TS, Ammoniacal Nitrogen, Percentage of Phenol, MLSS, MLVSS, Dissolved Oxygen etc. in the effluents and allowed parameters in ambient air and stack etc.
- Is aware of the sample locations for raw materials, in-process material, effluents and emissions
- Is familiar with the sampling techniques and equipment used for the same

- Is aware of the quality standards, testing methods (SOPs) of the all the material used in the packing of Finished Goods (corrugated boxes, drums, LDP, Metallic, LDP/HDPE sachets, yellow bags, jumbo bags)
- Understands the 'square root +1' principle
- Knows how to check the quality of palletization
- Knows the inspection parameters depending on the Finished Goods being shipped –
  - ✓ Liquid - SPG,
  - ✓ for powder - weight and moisture content
  - ✓ wrapping labels
  - ✓ strapping belt
  - ✓ palletization requirements
- Is aware of the requirement to provide approvals for the material to Stores for it to issue the same to production for use
- Understands the methods to store and handle chemicals safely
- Is aware of theallowable quality standards and testing methods (SOPs)
- Is aware of the sources which may contaminate the samples
- Is familiar with procedures for safekeeping of samples
- Is aware of the need to preserve the samples for the desired period
- Is familiar with personal protective equipment to be used while collecting samples at locations
- Understands sample identification and labelling procedures
- Is aware of the Toller Quality standards and SOPs to be followed
- Knows the various requirements of registration of products in international markets
- Is familiar with the documentation work related to lab using the ERP system of the company

- Is aware of organizational policies, procedures, regulatory standards and guidelines as they pertain to the laboratory

PRACTITIONER

- Is conversant with analytical chemistry and the process standards laid out for raw material, in-process material, finished products, packaging products, effluents, emissions etc..
- Is conversant with analytical testing and inspection of solid and liquid effluents and emissions at stacks
- Is able to operate lab equipment/instruments and attend to the preventive maintenance and troubleshooting
- Is conversant with BIS standards relevant to the industry
- Is conversant with the process standards laid out
- Can perform calculations related to the analysis carried out
- Is conversant with standards of reagent purity and can prepare them for use in analytical works
- Is conversant with analytical testing and inspection of the following -
  i) Raw materials
  ii) Packaging materials
  iii) In-process material including DM water, cooling water etc., and
  iv) Finished products
- Is able to carry out the testing of the packaging materials, such as -
  ✓ Corrugated boxes, breasting strength equipment
  ✓ Crash test for HDPE drums

- ✓ Jumbo bags for length, width and height and breasting strength
- ✓ Visual inspection of the printing on the sachets / crash test for the same
- ✓ Quality of palletization

- Is able to prepare and approve the COA
- Knows the method and process to be followed for storing of FG samples
- Can prepare accurately the dispatch audit list - by ensuring that the signatures/approvals of the required internal stakeholders
- Can carry out the first level of diagnosis of customer complaint - by analysing the complaint, and mapping it to the batch details
- Is conversant with the theoretical product yield and theoretical waste stream(s) of each process
- Is conversant with the impact of parameters such pH, TDS, COD, TSS, TS, Ammoniacal Nitrogen, Percentage of Phenol, MLSS, MLVSS, Dissolved Oxygen etc. in the effluents and allowed parameters in ambient air and stack etc.
- Can select appropriate method for testing different parameters
- Is conversant with analytical method limitations, wherever applicable
- Is able to prepare samples for analysis, analyze them and interpret results
- Maintains proper records (LTR) and issue necessary certificate, wherever necessary
- Is conversant with documentation of all the analysis carried out
- Maintain all the documents relating to ISO 9001: 2015, 14001: 2015, BS OHSAS 18001:2007
- Can calibrate and check lab instruments internally and also get the same done through external agencies, wherever required
- Is able to optimize utilization of resources - lab equipment / instruments and consumption of lab chemicals and reagents
- Can carry out diagnosis and performance analysis from the data compiled and provide inputs to production
- Is able to assist production for process improvements in case of final product falling below the required standard or some abnormalities occurring in the process

- Can carry out the quality audit of the third party (toll) manufacturers
- Can carry out the registration of the product in new markets, both regulated (GLP) and non-regulated (non-GLP) markets
- Is conversant with the procedures to store and handle chemicals, labelling containers etc..
- Is able to co-ordinate with external testing agencies for carrying out tests, as per requirement
- Is able to take appropriate action for disposal of expired and excess chemicals and reagents
- Is able to maintain Material Safety Data Sheet (MSDS) documents
- Is conversant with segregation of chemicals and effluents based on their compatibility
- Is able to recognize abnormal analytical results or large variance and take appropriate corrective action
- Identifies the problem in analysis results if it is due to testing instrument or reagents etc.
- Can prepare management information reports through available ERP on process and product quality control mechanism
- Is conversant with the procurement procedure for lab items
- Can participate in new product or process development
- Can interpret the norms laid by the Government for effluents and emissions and can suggest improvements in the process and product characteristics
- Can interact with the customers at frequent intervals to ensure the early feedback of any discrepancy
- Is able to resolve customer complaints in association with Production and Marketing

DEVELOPED

- Has thorough understanding of the specifications of lab equipments and instruments
- Identifies latest methods practices, testing equipments to improve the accuracy of the measurement
- Can train staff on lab techniques, analytical methods and use of advanced equipments and instruments
- Can interact with vendors of special lab equipments and instruments
- Is able to develop Standard Operating Procedures (SOPs) for the analytical lab
- Can organize and plan analytical activities related to different production units
- Is able to identify and decide on the sampling locations for carrying out ambient air survey
- Can establish documentation norms and procedures related to analytical works for a process plant
- Can evaluate and interpret data related to analysis and provide recommendations to production
- Is able to suggest remedial actions to production in case of final product falling below the required standard
- Is able to check deviations in the quality control activities for all the plants and guide to set them right
- Is able to suggest improvements in equipment / layout / technology related to production / treatment of effluents and emissions
- Can evaluate laboratory performance with respect to the resources and work
- Is fully conversant with the safety regulations, procedures and emergency plan related to chemical lab
- Can select appropriate personal protective equipment and other safety equipments for the lab
- Compares the internal results with those of concerned State Pollution Control Board and identify the cause of variance, if any and takes necessary corrective actions
- Can develop maintenance contracts for advanced lab equipments/instruments
- Can develop and update specification norms for raw materials, in-process material, packaging material, finished products etc..
- Can provide remedial measures to customer complaints on finished products / packaging

- Is able to develop simulations that replicate actual field conditions
- Is able to identify and develop automation in laboratory
- Is able to monitor the availability of labware and chemicals at lab and take appropriate steps to avoid the stock-outs
- Is conversant with the purchasing procedures, policies and is able to identify suppliers, negotiate and ensure availability of lab items as per the requirement/plan
- Can conduct laboratory investigations for detailed troubleshooting of chemical applications
- Can recommend remedial actions based on the diagnosis and performance analysis from the data compiled from plant and lab
- Can identify the bottlenecks in processes, products packing and other services / suggest improvements
- Can interact with technology consultants on technical matters
- Can coordinate with marketing regarding product development and interventions with customer
- Understands the customer's grievances and recommend improvement with internal stake- holders
- Is able to optimise the cost of testing
- Identifies latest methods, testing equipments to improve the accuracy of the analytic work
- Can develop, demonstrate and deploy operational practices and new technologies to address environmental challenges
- Is able to maintain regulatory compliance related to processes carried out

ORGANIZATIONAL STEWARD

- Is aware of the changes worldwide in technologies related to the manufacturing of different products, the treatment of effluents and emissions and the analytical procedures and instruments
- Is aware of the changing requirements of the customer and recommends improvements in the process and product characteristics
- Is able to set up and develop analytical lab for a new plant or expand facilities at the existing lab
- Can scan information about lab equipments / instruments and recommend for use in the lab
- Can interpret the norms laid by the Government for effluents and emissions and can suggest improvements in the process and product characteristics and processes

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SUPPORT COMPETENCIES

SUPPLY CHAIN MANAGEMENT

This competency is defined as a combination of the knowledge and skills which enable the individual to map, manage, monitor and review all aspects of SCM value chain – from procurement and inbound logistics to outbound transportation.

Key Indicators

This competency is demonstrated through the following-

- Understanding of the import and domestic procurement of material – Raw and Packing
- Managing stores – from receipt to storage to issue
- Planning, and managing all aspects of logistics (domestic and export) and warehousing
- Arranging of toll manufacturing – identification, planning, coordinating, auditing and reviewing

Key Coverage aspects

- Raw Materials, Solvents, engineering material, packing materials and other chemicals
- Documentation with regards storing and material movement (export)
- Statutory aspects with regards movement of hazardous material
- Processes with regards to third party manufacturing

NOVICE

SCM (General)

- Understands the basic of the Supply Chain Management process, especially in the context of operations in the plants and the role of Commercial department in Mumbai.
- Is aware of the capacity of all the plants and the quantity of off take that needs to be moved out, both with reference to the bulk as well as the formulations in Dahej
- Is aware of broad process / methodology deployed in the process of PPC – ie linkages with marketing & dispatch plan, manufacturing plan, raw material planning, outsourcing / contract manufacturing etc.
- Has a broad understanding of the various cost elements involved in procurement of items
- Is aware of the linkages between PPC and MRP (Material Resources Planning) and the various sub-elements thereof – work in process inventory, finished goods inventory, warehouse & distributor stocks, goods in transit etc.
- Is aware of the types of inventories such as (raw material), work-in-process, finished goods; classes of inventory stock such as working(cycle) stock, safety(buffer) stock, seasonal stock, etc.
- Is aware of the importance of inventory in various cases (raw materials, packing materials, production related)
- Is aware of the safety health and environment rules and regulation to be followed in the packing and loading area – allowable dust levels, personal safety equipment to be used, hazardous material handling processes etc.
- Has a broad understanding of SAP MM and Production modules

Purchase

- Understand the basics of procurement cycle from indenting to payment.
- Knows the RM & PM that are purchased by the plant and the source of the same; in terms of domestic / imported and the costs for the same

- Should know the basic Engineering spares that are purchased by the plant, including that from OEM, fabricators, local suppliers
- Should know the difference between the CAPEX and OPEX.
- Should understand the basic aspects of CAPEX procurement process, including capital indenting, CAPEX budgeting, CAPEX amortization
- Should have a broad idea on the various services procured by the company and the vendors for the same, including the costs structures for each of the same.
- Understands the importance of Economic Order Quantity (EOQ) and its relevance in inventory management
- Should know the basics of the vendor rating process
-

Stores

- Understands that that space planning and its importance, especially in the context of large volume/bulk product handling process
- Should know about the basic record/information that needs to be maintained in stores- Inwards, outwards, issues, material issued on returnable gate pass and non-returnable gate pass
- Is aware of the physical and chemical properties of the various products and intermediates produced in the factory and the associated issues in handling the same – effect of humidity, temperature, etc
- Is aware of some of the material handling equipment used in the factory and various other dispatch/redistribution points
- Is aware of the importance of inventory in various cases (raw materials, packing materials, production related)
- Should know about the basic record/information that needs to be maintained - Inwards, outwards, issues, excerizable gate pass
- Is aware of the various costs involved in procurement of items - especially those pertaining to inventory such as inventory carrying costs, out-of-stock costs,etc
- Understands that that space planning and its importance, especially in the context of large volume/bulk product handling process

- Is aware of the need and requirements of the various weighing machines required at various points of movement/distribution
- Is aware of the various by-products that are generated in the manufacturing process and the buyers of the same, including the rates offered

Dispatch, Logistics and Warehouse

- Is aware of the storing, packing and movement/transport requirements of the materials manufactured
- Is aware of the various material that are used for packing of the material
- Has a broad understanding of the various documents required for movement of goods through various modes of transport eg. Commercial invoice, Excise gate pass (if required), packing list, weight list, LR/RR (Lorry receipt/railway receipt) etc.
- Is aware of the various documentation, process and other requirements of movement of goods by sea – commercial invoice, export order, export license where necessary, central exercise clearance GP-1, etc.
- Is aware of the demurrages, damages, pilferages, losses and other commonly encountered problems in transport of goods and methods of dealing with the same
- Is aware of the concepts of multi modal transport
- Is aware of DRP or distribution requirement planning process (labor, material handling equipment and warehouse space requirements)
- Has a broad understanding of the various laws, regulations, acts related to the export of goods
  - ✓ Excise Act
  - ✓ Customs Act
  - ✓ Carriage of Goods by Sea/Air Act
  - ✓ Schedule of charges of goods in respect of the port of shipment
  - ✓ Foreign Trade (Development and Regulations) Act
  - ✓ Foreign Exchange Management Act (FEMA)

- Handbook of Export Promotion
- Export-Import Policy and Handbook of Procedures

- Is aware of the various documents that need to be filled in the process of export of goods from the country ie commercial documents such as invoice, bill of lading/airway bill, bill of exchange/draft; regulatory documents such as GR form, shipping bill, preshipment/third party inspection certificate, certificate of origin; documents pertaining to export assistance such as advance licence/DEPB, drawback, preshipment or packing credit, GSP certifcate of origin bank, bank certificate, etc.
- Is aware of the need for third party inspection in the case of export (based on the need of clients) and the agencies which are certified or nominated to undertake the same
- Is aware of the channel intermediaries (distributors, C&F agents, transporters) and the role played by each of them in the entire logistics process, esp. outbound

Toll Manufacturing

- Is aware of the annual/monthly plan of the company in terms of production as well as marketing – in the context of the capacity of the plant and that which needs to be outsourced (ie toll manufactured)
- Knows who the toll vendors for the company are what are their existing capacities
- Based on the production and the marketing plan is aware of the toll manufacturing order - quantity, and delivery schedule
- Is aware of the SOP that the toll vendor has to follow with regards the process – including material issue and reconciliation, ways of handling end-product rejection, variance handling etc.
- Has a broad understanding of the basic template/steps to be taken for identifying the toll manufacturers - in terms of capacity, licenses, equipment, quality, manufacturing practices, quality processes, people & their capabilities, safety etc.
- Is aware of the documentary requirements with reference to material issue and receipt from Toll manufactures

PRACTITIONER

SCM (General)

- Is fully aware of the company' annual business plan in terms of production /manufacturing, contract or third party manufacturing, sales, and other cost and customer related parameters connected to the PPC and demand/dispatch planning process
- Has a thorough understanding of the various product lines – equipment's used, capacities of the equipment, process times involved, batch sizes, throughput of the lines, etc
- Can help in production planning process taking into consideration demand forecast, forecast errors, work in progress/process, finished goods inventory, goods in transit, warehouse/distribution channel stocks etc.
- Has a through understanding of Master Production Plan, Rough Cut Capacity Plan, Aggregate Production Plan, Capacity Plan, etc.
- Understands the importance of the variances in market requirements in drawing up the production plan
- Has thorough understanding of various planning time horizons, ie weekly, monthly and yearly in the production planning process
- Is fully conversant with the marketing vagaries of various products ie the demand fluctuation of various products
- Is fully conversant with the various issues and constraints to be taken into consideration when drawing up the dispatch plan – material handling (loading unloading), times taken, costs involved, customer satisfaction, etc.
- Is fully conversant with various features of SAP PP and MM module and can use the same for optimization (optimizer), increased delivery responsiveness, reduced inventory etc.

Purchase

- Has a thorough understanding of the various RM& PM procured by the company, the sources, basic costs, landed costs; and is also aware of the alternate suppliers for the same both in the domestic as well as the international markets
- In case of identification of new domestic locations, float enquiry, negotiate with the party and contract on a Yearly basis
- Can carry out raw material planning taking into consideration all relevant information including material in stock, material in pipe line, WIP, change (if any) in consumption coefficients, lead times, reorder levels substitute material etc.
- Knows the RFP RFQ process and how to float the same – specifying the commercial, technical and legal requirements
- Prepares the comparative statements, conducts negotiations along with internal stakeholders and ensures competitive pricing for all supplies; and that they are within budgeted limits
- Ensure the coordination with the store and maintain the min max level of the Engineering materials.
- In case of CAPEX procurement ensures all the required aspects – erection, commission, trial runs, and warranties are taken care off per PO/contract
- Carries out vendor rating process, and initiates appropriate action in terms of rationalizing, penalizing and rewarding
- Can understand and ensure cost effective and high quality service procurement incorporating the required SLA parameters
- Able to enforce the penalty clauses of the service agreement when there is a case of non-compliance to either statutory and/or service level delivery
- Should coordinate with the internal service recipient to ensure that the delivery is as per the requirement
- Coordinate the procurement of the packing material & excipients from the BBY office after checking the inventory levels in the factory store.
- Should negotiate the rate of the byproducts on a monthly basis, based on market trends

Stores

- Is fully conversant with the production planning process and inventory levels (in terms of RM, WIP, and FG) to be maintained at different points to ensure servicing customer/market requirements to company specified levels and the physical space required for the same.
- Is aware of some of the new/emerging concepts such as VMI or Vendor Managed Inventory , CMI (Customer Managed Inventory) and its importance as strategic tool for competitive advantage
- Is able to determine the total inventory costs for each product/SKU based on the order size, set up costs, holding costs etc
- Generates the report about the by-product stored and sold
- Carries out reconciliation of the physical stock with the system (perpetual) and coordinate with accounts for the year end basis
- Maintains the records in the SAP system (Transaction code for receiving, issue to plant, reservation, stock transfer)
- Knows the various forms that should be submitted to the narcotics and prohibition dept.
- Should maintain the manual record of the Chloride material issued by the State govt of the prohibition
- Can map and compute all the costs involved in the inventory process – cost of obsolescence, cost of disposal, holding costs, shortage costs, etc
- Is fully conversant with the methods to be used for computing space requirements for stocking of (especially) finished goods at various points based on off take from that given point
- Put up to unit head all the Red tag items and based on decision / approval the initaite the appropriate action - including liquidation, after taking required internal approvals
- By coordinating with the external / statutory auditors carry out the required stores audit

Dispatch, Logistics and Warehouse

- Undertakes the palletisation process for the export customer - based on the density/weight of the material
- Capture the information about the dispatch orders in the SAP system - dispatch instruction (transaction code for pending orders, blocked,)
- Arrange for logistics for the movement of goods -domestic movement
- Carry out on a case to basis the negotiation with FF (Freight forwarders) for sea /air movement, after taking the due approval of the purchase committee
- Knows all the legal forms that need to be taken care off and can prepare the same without any errors and in case of any issue with any of the forms/documentation is able to resolve the same, without monetary or credibility loss
- Is aware of the formalities and procedures in movement/transport of hazardous material, and the legal implications in non-compliance of the same
- Should know all the required documentation of domestic movement of the goods manufactured by the company (custom invoice, packing list, excerise invoice, ARE1, MSDS, COA, Form 403, trump card)
- Has adequate knowledge and filling up Commercial documents such as commercial invoice, bill of lading, airway bill, letter of credit, bill of exchange/drafts, etc., Regulatory documents such as GR form, shipping bill (free or drawback), consular or legalized invoice, third party pre shipment inspection certificate, certificate of origin. Export assistance documents such as claiming DEPB, Drawback, packing credit facilities.
- Has a thorough understanding of the total documentation required for the purpose of ensuring a complete export cycle (documents related to goods – invoice, packing list and certificate of origin,; documents related to shipment – mate bill./airway bill, bill of handing; documents for the quality of the goods – MSDS, Toxity ceritifcates/HACCP certificate; documents related to foreign exchange GR form; any other country specific document)

- Is fully conversant with the procedure for obtaining GSP (Generalized System of Preference) certificate of origin – concessional duty extended by developed countries to imports from developing country
- Understands different types of letters of credit and terms such as revocable, irrevocable without recourse, confirmed, transferable, back-to-back, revolving, etc.
- Understanding different types of bill of lading such as “Shipped on board”, “Received for shipment”, “clean “, “Claused“ or “Dirty” bill of lading
- Takes the help of Clearing and Forwarding (C&F) agents shipping agents, and organizations such as Director General of Foreign Trade (DGFT), Export Inspection Agency (EIA), third party inspection agencies like SGS, local chamber of commerce, drug controller, consular offices or embassies in completing some documentary formalities
- Understanding the facilities and services rendered by Export Credit Guarantee Corporation (ECGC) of India and its implications in covering risks in export contracts
- Understands combined transport document in case of multi modal transport
- Has a through understanding of the various shipping bills used in the process of exports – free shipping bill, draw-back shipping bill, DEPB shipping bill, DEEC shipping bill, bond shipping bill etc) and the benefits associated with each of them
- Knows the various third party inspection agencies, such as Ecocert International, Skal International, SGS India Pvt.Ltd and others who are internationally recognized

Toll Manufacturing

- Based on the production plan of captive units (Dahej) and the marketing plan, prepares the toll manufacturing plan and allocates the production targets based on their individual capacities

- Can check and understand the sales order and the specifications of the customer and map the requirement to the specific toller
- Get visibility of the material arrival and plan the schedule of the toller based on this information and coordinates with toller for the manufacture and correspondingly inform the logistics for material despatch
- Follows up and ensures that delivery from the toll manufactures happens as per plan and in case of any contingency, initiates alternate plans (alternate tollers) to meet marketing commitments
- In case of rejection of the batches coordinates with the internal stakeholder to provide the recipe for rectification and the ensures that the rectification has to be carried at the toller cost
- Carries out the toll audit process on parameters such as physical stocks, safety, manpower; and in case of discrepancy regarding stocks ensures that appropriate debit note is raised on the toller
- Educates/ensures that the toll manufacturer is bought to speed with respect to the toll SOP
- In case of any issue/mishap at the toller end (such as theft, loss, damage etc) can initiate the insurance process by collecting the required documents/evidence
-

DEVELOPED

SCM General

- Can identity/rationalize strategic raw material and/or equipments based on organizational strategies, product life cycle, competitive scenario, new product development etc.
- Can analyses materials from a combination of both strategic importance and financial impact to define the necessary sourcing arrangement
- Can develop long term contracting frameworks for the purpose of enrolling and sustaining mutually beneficial supplier-buyer relationships
- Evaluates the complexity of the supply market in combination with impact of the purchase and identifies the appropriate purchasing strategies, time horizon, items mix and the key performance criteria
- Evaluates suppliers in terms of future development capacity, innovation, quality and lead time accuracy
- Can design and develop vendor development strategies – nature of agreement, vendor integration in product development / R&D participation process, vendor system development methodologies, SCM partnerships etc.
- Can carry out the evaluation of supply side of any product/raw material/capital goods and the probable impact and develop accordingly counter strategies
- Has a through understanding of all the emerging practices and globally available platforms which enable better sourcing strategies for the organization

Purchase

- Can coordinate with the domestic marketing about off-specification material; and can also coordinate with other internal stakeholders to ensure appropriate steps are taken to use the off-specification material
- Should able to identify both domestic and global vendors for better quality, effective pricing and reliable supplies
- Works with the internal stakeholders to improve that the vendor rating method
- Should know the new and emerging methods of procurement such as reverse Auctions.
- Closely work with the user department to have the alternative materials especially packing material.
- Work on the indigenisation of the important spares and should work with existing vendors and provide required inputs (from org. requirement perspective) which will help them to design and supply better machinery
- Should able to work with the OEM provider and develop alternate spares so as to reduce the overall cost of the maintenance.
- Should be able to work with internal stakeholders, external design firms and Vendors to explore (more) cost effective, energy efficient and high efficiency equipment
-

Stores

- Is aware of some various terms used in the inventory management process ABC analysis, economic reorder quantity/point (ERQ/ERP), SSQ (Safety Stock Quantity), QUD (Quantity Used Daily), ALD (Average Lead Time) etc
- Is able to identify the inventory related costs and also quantify the same for a particular situation – and is aware of some of the costing methods used in the valuation of inventory
- Is aware of the relationship between customer service, inventory levels and the impact on supply chain cost and efficiency
- Review the methods of establishing the Inventory Norms and new inventory norms.

- Improve on the packing processes so as to optimize the packing and storing costs
- Integrate the stores information system with other plants (of the group) so as to optimize the inventory and also improve on service levels
- Should be able initiate the process for liquidation of project/capital equipment based on interactions with the internal stakeholders (write off of capital equipment)
- Manage the issues which may araise because of the record keeping - by intimating the required authorities about the changes/errors
- Should be able to optimize the storage space so as to ensure that the compatible materials can be stored more efficiently

Distribution, Logistics & Warehouse

- Based on the free material can coordinate with domestic marketing team to find out if the free material can be moved for any other requirement (domestic order/stock transfer)
- Can carry out logistics cost minimization process through multi modal transport system
- Can draw out/establish various cost optimization processes including that pertaining to containerization, demand aggregation, points of disaggregating and forward movement,
- Can help in establishing the information flow, material flow, finance flow guidelines for the organization (in conjunction with other members of the SCM team)
- Can establish metrics of performance and carry out evaluation of various transporters and other intermediaries in the logistics operations and initiate rationalization process
- Can work in close partnership/coordination with various channel partners and ensure that the inventory across the supply chain is rationalized through logistics planning process

- Can ensure SCM optimization through appropriate changes in logistics management
- Can design methods and processes involved in the entire export procedure and documentation administration so as to ensure that the cycle times involved, error levels, quality of documentation, customer responsiveness, statutory compliance level can be improved upon
- Critically evaluate some of the processes or activities can suggest new simplified procedures such as centralized export warehouse instead of bond rooms in each manufacturing facility
- Can work out cost benefit analysis or weigh the pros and cons of centralized operations or improved methods in export procedures
- Can evaluate the performance of the CHA and make recommendations on improving/ terminating services
- Can identify and evaluate suitable software packages for export documentation which can be integrated with SAP
- Can set performance standards and metrics for measuring the efficiency and effectiveness of administering export procedures and documentation

Toll Manufacturing

- Should enable establishing new process for toll vendor identification taking into consideration emerging requirements such as information integration, enhanced quality mgmt system
- Along with internal stakeholders provides support for debottlenecking of the toll manufacture plans and helps release capacity
- Managing the legal aspects of the contract and ensuring that the problem is not blown out of proportion
- Helps in streamlining processes at the toll manufacturer end, so as to improve the quality and efficiency of the vendor - reducing costs, improving quality and enhancing deliveries
- Works proactively along with the toll vendors in their capacity augmentation process, factoring in the future requirements of the organization

- Creates farmeworks and systems for toll audit by including measures and parameters which enhance the audit process, outcome and consequence management
- Terms for creating the responsibilities for non-delivery due to controllolable or non-controllable events (who bears the cost of movement, lost order etc)

ORGANIZATIONAL STEWARD

SCM

- Helps create the enterprise framework which allows for seamless integration of information between various internal stakeholders across the SCM value chain
- Identifies and evaluates the information technology requirements for enabling more effective sourcing, better management decision making and meet organizational needs more effectively
-

Purchase

- Map and understand the global best practices especially the procurement of the bulk raw materials.
- Develops enterprise wide or business wide frame work for sourcing process – markets to be tapped, vendors to collaborate, new partnerships to be entered etc.
- Maps and suggest methods of incorporation of best practices into the system to leverage on supplier networks
- Identifies and evaluates the information technology requirements for enabling more effective sourcing, better management decision making and meet organizational needs more effectively
- Sets up processes for reverse auctioning, demand aggregation, TCO to establish input cost competitiveness and overhaul differentiation

Stores

- Can drawup or help draw up organization wide strategy for inventory management process
- Can establish stocking and inventory policies for various products based on organizational needs of cost, customer satisfaction, market share, etc
- Can scan, map and identify best practices, process related and technology related, in the inventory management process which can provide competitive advantage
-

Logistics, Distribution & Warehouse

- Can develop a transportation strategy for the organization/business unit based on the current needs and emerging requirements
- Can map global best practices in the areas of distribution and warehousing based on industry and cross industry practices
- Can scan, analyse, suggest and ensure incorporation of best practices (cross industry and global), in transportation models
- Establishes enterprise wide/ business level process and process metrics for distribution and warehousing to enable company gain competitive advantage in the market place
- Benchmarks the best in class packing practices which help to reduce logistics costs

Toll manufacturing

- Creates the over strategy for the toll / third party manufacturing process, based on the organization strategy in general and production strategy in particular
- Works along with internal and external (customers, third party consultants, OEM etc) to ensure that the toll manufacturers are able to upgrade their capability table so as to meet organizational present and future requirements
- Ensures that the toll manufacturer capacity planning is integrated with the org. Production planning process so as to improve efficiencies and reduce fail points

PROJECT MANAGEMENT

This competency may be defined as the combination of knowledge and skills required for conceptualizing, planning, basic and detailed engineering, procurement, inspection, erection, testing and commissioning to achieve successful project completion of installation of facilities required within the resources available

Key Indicators

This competency is demonstrated through the following-

- Preparation of PFDs, PIDs, layout plans and basic and detailed engineering
- Preparing specifications, identify suppliers, contractors, place orders/contracts and execute the same
- Planning, executing, monitoring and supervising the erection activities through own resources or through contractors
- Dealing with experts and consultants
- Carrying out on-site coordination, quality control of the work and all aspects of contract management
- Trial runs, Commissioning, hand-over the projects to the operations and close the projects through formal protocol
- Interaction with other departments like Finance, SCM, Safety, etc.
- Statutory Compliance matters

Key Coverage aspects

- Basic Engineering / Feasibility Studies
- Planning / Detail Engineering
- Estimation of Cost
- Procurement
- Execution

- Monitoring & Control
- Project Inventory Management
- Liaison with statutory bodies
- Documentation

NOVICE

- Is familiar with the basic content of feasibility study and basic engineering package
- Knows the overall schedule and budget allocated for the project
- Is aware of the requirement and features of the Detailed Project Report prepared for a project
- Is aware of the principles, methods or tools for developing, scheduling, coordinating and managing projects and resources, including monitoring and inspecting costs, work and contractor performance
- Is familiar with the project management tools such as PERT and CPM, Gantt chart, MS Project etc.. used for scheduling and monitoring
- Is aware of the process technologies involved in the project
- Is able to understand level 2 (WBS) / level 3 (Activities) schedules and the contents of bill of materials
- Can read and interpret engineering diagrams such as process flow diagram, fabrication and construction, piping and instrument drawings, electrical diagrams and schematics etc..
- Is familiar with the approximate cost of each equipment, materials & services required for the project
- Is familiar with the capability of vendors, contractors etc., available for the project execution work
- Knows the contents of GCC and SCC
- Is familiar with the procurement rules, regulations and procedures of the organization
- Is aware of the resources available at site and those required to take up erection
- Knows the tools and techniques used in the erection work
- Is aware of the characteristics, material strength properties and service applications for the construction materials used
- Is aware of oxy-acetylene/arc/plasma cutting etc. and the use of various types of welding appliances like – arc and gas welding
- Is familiar with inspection methods to be carried out like stage inspection and final inspection for both equipments and materials supplied and work executed at site

- Is able to understand the quality control parameters required for the projects
- Is conversant with the relevant national and international standards for engineering items
- Is aware of coordination activities to be carried out with internal departments like Purchase, Stores, QC, operations, maintenance etc.
- Is aware of the no-load and on-load trials to assess the performance of each item and project as a whole
- Is familiar with the safety measures and design features commonly used as safeguards against natural hazards
- Is familiar with the fire protection requirements for a construction site
- Is able to read the schedule and monitor any variation in time and cost
- Is familiar with statutory compliances related to different agencies of the Government
- Knows the documentation to be maintained related to procurement, execution, monetary control and quality
- Is familiar with the inventory management at project site
- Is aware of the documentation required in execution and closure of a project
- Is familiar with the concepts of risk management including identification of risks, opportunities, analysis and mitigation methods

PRACTITIONER

- Is conversant with the site conditions for executing projects
- Can interpret PFD and PID drawings related to existing facilities and incorporate the changes that are necessary for the addition of new projects initiatives like modification, improvement / capacity augmentation, CSR initiatives etc.
- Is conversant with the battery limits of the project and how to integrate the new project with the existing facility, as required
- Is conversant with the basic engineering design documents
- Is able to get the detailed engineering design document prepared internally or with some external support
- Can prepare the specification of various engineering material that needs to be procured and the contracts for executing the job
- Is conversant with the norms of the organization for carrying out feasibility studies of installations of new facilities
- Can specify the auxiliary items required along with the main item like:- connecting parts to match with the existing plant parts, installation instructions and procedures, commissioning procedures, operation manuals, trouble shooting charts, list of spare parts and their available locations, minimum spares etc.
- Can estimate the detailed cost of each equipment/work by breaking it up into various components to help arrive at the total cost of the project considering the budgetary offers, time schedules and the manpower requirements
- Can prepare a detailed list of equipments, piping, civil, electricals, mechanicals, instruments required for the project
- Is conversant with the requirements and methodology of preparation of Techno-Economic Feasibility Report and Detailed Project Report
- Is able to accurately estimate the cost of each item/package by getting budgetary offers and fine-tune it to suit the present situation
- Is able to provide inputs on safety in design
- Should be able to perform the HAZOP and related QRAs
- Is conversant with the organizational procedures for getting approval/sanction for the project
- Is able to differentiate between various MOC and other critical specification to choose the right vendor

- Is able to negotiate and finalise the terms of the contract
- Is able to prepare the vendor evaluation sheet
- Is conversant with contractual terms, scrutiny of offers, preparing comparative statements, technical negotiations, warranty and guarantee clauses and final recommendations etc.
- Is able to prepare the General contract condition and Specific contract condition, if any
- Is able to identify the material to be procured from outside suppliers and get certain activities performed through contractors
- Knows the commercial aspects of procurement within India and imports
- Can prepare as well as scrutinize the detailed engineering drawings being received from consultants, contractors and suppliers
- Understands the capabilities of departmental workshop to decide if certain tasks can be performed departmentally
- Is aware of the capabilities of various suppliers for project materials
- Can provide inputs to purchase department regarding performance of equipments and contractors based on prior experience
- Is conversant with procedures of procurement, award of contracts etc., and legalities related to project items
- Is able to follow up with the vendors and organize the inspection wherever necessary for timely delivery
- Is aware of the legal conditions of the contract to protect the organizational interest
- Is able to take advantage of various Schemes and Incentives available in the capital goods procurements
- Is able to manage the execution team / contractors to complete the erection within the approved time and cost and quality
- Is able to create as-built drawing
- Can track the receipts of various items and amend the execution schedule accordingly
- Is conversant with project planning and monitoring tools and can operate independently
- Understands all the documentation related to project, which are necessary for erection, trial runs, commissioning, operation and maintenance as well as for proper follow-up with the suppliers, contractors etc..

- Is conversant with procedures of stage-wise/final inspection for equipments, engineering materials, site works and final test procedures like no-load trial/load trial etc.
- Understands the procedures of appointing and coordinating for third party inspection of the equipment/parts at vendor's works
- Can coordinate with the operation team, power system team, utilities and safety and conduct trial run and commissioning of the new installation, as per the schedule.
- Takes corrective / rectification measures wherever any discrepancies is observed
- Creates documents for each testing for future reference of operation
- Is able to liaison with the statutory bodies and ensure the timely compliances
- Can prepare all the concerned equipments / facility for inspection by the regulatory authorities for smooth approval
- Is conversant with procedures related to clearance of payments to vendors/contractors
- Manages all capital goods receipt
- Arranges inspection, supervise safe unloading and storage & complete necessary documentation to close the procurement activities properly
- Understands safe storage practices for every material and coordinate with stores department till these are installed
- Is able to raise the discrepancy note in the Bill of Material of each purchase
- Is familiar with the safety norms to be followed in project execution / commissioning
- Can provide technical support to the Production department during trial runs and commissioning the project, till it gives desired results
- Is conversant with the procedures related to the closure of the project such as upgrading PFD, PID, Layout drawings, getting approval from Govt. regulatory authorities etc., handing over necessary documents to Production and record learning from the project for organization's future reference
- Is able to introduce new integrated quality system for more comprehensive quality control of various documents

DEVELOPED

- Can formulate the specifications of a project and spell out the major components
- Is able to conduct feasibility studies/cost-benefit analysis of the project proposals and recommend projects to the management
- Can formulate the specifications of a project and spell out the major components
- Can develop time, material and labour estimates for a project
- Can establish the objectives of a project, translate them into targets and goals
- Can consider alternatives possible in executing a project to suggest the best option, which will enable the project to be completed within the cost, time and quality
- Can prepare the Techno-Economic Feasibility Report / basic engineering document for any project
- Knows and evaluates the basic engineering vendors and their capabilities related to company's product ranges
- Is able to improve on the planning schedule and modify the design documents to match the prevailing situation and carry out the troubleshooting to see that the project schedule & cost are achieved / under control
- Can participate in developing Detailed Project Report
- Is aware of the effect of escalation and inflation factors on cost estimates and can take remedial actions in case of any variance in time, cost and quality
- Is conversant with various types of equipments and manufacturers available so as to choose the most appropriate equipments and components
- Is able to know the different methods of procurement like reverse auctioning and prepare contract documents for the benefit of the company

- Is fully conversant with the commercial aspects of domestic purchase and import.
- Is able to choose a vendor at optimum cost and better quality in line with project requirement
- Is able to successfully implement contracts and recommend / take penal actions on contractors, wherever necessary
- Is able to review and modify the HAZOP, QRAs and design safety
- Is able to reduce cost and enhance life of equipment / facilities
- Is able to take on-the-spot decision to avoid delays in project execution
- Is able to arrange the alternative materials, tools, techniques to enable the execution without interruption
- Is able to foresee any deviation in the schedule in cost and time and take preventive and corrective steps to complete the project schedule within time
- Is able to communicate with the management through MIS / Project Progress Report regularly
- Is able to create goodwill with all the statutory bodies/ surrounding industries to keep the harmonious relation in the interest of project work
- Can identify user friendly / more advanced and sophisticated documentation system / software for the project
- Can plan pre-commissioning & Commissioning schedule for quickly putting the plant into operation
- Is able to suggest methods for proper storage and retrieval of goods for minimum damage during storage
- Is familiar with possibilities of directly unloading of larger equipment at required place with appropriate heavy machinery and tools
- Is able to finalize contracts related to erection works
- Can take appropriate actions in case of variances in scope, time, quality and cost
- Is able to visualize and communicate full effects of the project, both inside and outside the organization
- Is able to identify key constraints and establish success criteria for the project
- Can identify the sub-projects and the major tasks involved in them and the detailed planning for allocation of tasks to individuals

- Has wide knowledge of the project management techniques to schedule, monitor and control large and complex projects
- Is conversant with the national and international standards for construction and operation of various equipments and components
- Can monitor and control the project activities like-preparation of basic engineering, detailed engineering, procurement, erection and commissioning
- Is able to define the management systems for tracking and control of the project management
- Can verify and approve the quantity and quality of work completed
- Can monitor and guide the trial run /commissioning of the project and suggest improvements wherever required to get desired end results

EXPERT

- Can identify possibilities of improvement in the project already conceptualized and suggest improvements
- Can conceptualize a project and carry out feasibility study
- Is aware of the latest developments in project management tools and techniques
- Can identify competent vendors, contractors, consultants etc.. for projects
- Can guide in the preparation of Detailed Project Report
- Can select most suitable site from the options available and recommend it for execution of a project
- Is able to coordinate with the technology provider and prepare PID & the basic engineering document
- Is familiar with the global standard of Project Management comprising design and execution
- Is familiar with development in various capital goods including the material of construction and technologies/ system

CIVIL INFRATRUCTRE

This competency may be defined as the combination of knowledge and skills required for planning, estimating, initiating procurement, site management of civil infrastructure construction / maintenance work at the plant sites

Key Indicators

This competency is demonstrated through the following-

- Preparation of plans and estimates
- Preparing specifications of civil/structural materials, identify suppliers, contractors / sub-contractors, place orders/contracts
- Planning, executing, monitoring and supervising the civil/structural erection work through own resources or through contractors
- Dealing with experts / consultants
- Carrying site work management, quality control of the civil work
- Handing over the completed site to other functions for subsequent project work, if any
- Coordination with other departments like Finance, SCM, Safety, etc.

Key Coverage aspects

- Planning
- Plant Building Maintenance
- Road construction & Maintenance
- Painting of Plant & Buildings

- Site work Management
- Documentation
- Statutory Compliances

NOVICE

- Is familiar with the basic content of feasibility study and basic engineering package
- Is aware of the need to prepare the monthly Plan related to civil maintenance works at plant & buildings, roads based on the requirement projected by the plants
- Is familiar with the process of getting the budget approvals from the management
- Understands the quantum of work to plan the work in a detailed manner
- Is aware of the overall schedule and budget allocated for the civil / structural works
- Is aware of the principles, methods or tools for developing, scheduling, coordinating and managing projects and resources, including monitoring and inspecting costs, work and contractor performance
- Is familiar with the project management tools such as PERT and CPM, Gantt chart, MS Project etc.. used for scheduling and monitoring work at site
- Is aware of the utilizations of the infrastructure work when finished and also the civil maintenance work
- Is able to understand the bill of materials and the sources of supply
- Can read and interpret engineering diagrams
- Is familiar with the approximate cost of each heavy machinery / equipment used for site work, materials & services required for execution
- Is familiar with the capability of vendors, contractors etc., available for the construction / maintenance work
- Is familiar with the procurement rules, regulations and procedures of the organization
- Is aware of the resources available at site and those required to take up site work
- Knows the tools and techniques used in the erection work
- Is aware of the characteristics, material strength properties and service applications for the construction materials used

- Is familiar with inspection methods to be carried out like stage inspection and final inspection for both equipments and materials supplied and work executed at site
- Is able to understand the quality norms for the work
- Is conversant with the relevant national and international standards for engineering items
- Is aware of coordination activities to be carried out with internal departments like production, maintenance, Purchase, Stores, QC, etc.
- Is aware of the requirement of review and monitoring of the time and cost for the work
- Is familiar with statutory compliances related to different agencies of the Government
- Knows the documentation to be maintained related to procurement, execution, funds control and quality
- Is familiar with the stores management at construction site
- Is familiar with the safety procedures to be followed during the civil works at site

PRACTITIONER

- Is conversant with the site conditions for executing projects / taking up civil maintenance work
- Is able to incorporate the civil infrastructure works that are necessary for modification, improvement / capacity augmentation, CSR initiatives etc.
- Can prepare the specification of various engineering material that needs to be procured and the contracts for executing the job
- Can estimate the cost of each work by breaking it up into various components to help arrive at the total cost considering the budgetary offers, time schedules and the manpower requirements
- Can review and monitor the Cost, Time and Quality - Plan Vs Budget
- Can plan the civil works on a monthly basis
- Is able to supervise and implement the civil work as per plan
- Can identify the contractors, access the quantity of materials like steel and cement required, initiate procurement, supervise quality, test and approve the work
- Can educate all the contract workmen, ensure safety items are used and closely supervise to avoid any accident / incident
- Is conversant with the basic engineering design documents
- Is able to get the detailed engineering design document prepared internally or with some external support
- Is conversant with the requirements and methodology of preparation of Techno-Economic Feasibility Report and Detailed Project Report for new projects / addition of new facilities
- Is able to prepare the vendor evaluation sheet
- Is conversant with contractual terms, scrutiny of offers, preparing comparative statements, technical negotiations, warranty clauses and final recommendations etc.
- Can award contracts on approval by the management

- Is able to follow up with the vendors and organize the inspection wherever necessary for timely delivery
- Is able to manage the execution team / contractors to complete the erection or maintenance within the approved time and cost and quality
- Is able to create as-built drawing for records wherever construction is involved
- Is conversant with project planning and monitoring tools and can operate independently
- Is conversant with procedures of stage-wise/final inspection for construction materials, site works
- Is able to ensure that the contractor is following all the statutory compliances
- Is conversant with site work verification, billing and procedures related to clearance of payments to vendors/contractors
- Is familiar with the safety norms to be followed in project work / maintenance

DEVELOPED

- Can develop time, material and labour estimates for a civil construction project / maintenance work at plant and buildings, roads etc.
- Can prepare proposals to the management for approval
- Is able to finalize contracts related to erection / maintenance works
- Is able to foresee any deviation in the schedule in cost and time and take preventive and corrective steps to complete the work within time
- Can take appropriate actions in case of variances in scope and quality
- Can prepare the Techno-Economic Feasibility Report / basic engineering document for any development project
- Is able to improve on the planning schedule and modify the design documents to match the prevailing situation and carry out the troubleshooting to see that the project schedule & cost are achieved / under control
- Can give inputs for developing Detailed Project Report
- Is able to choose a vendor at optimum cost and better quality in line with project requirement
- Is able to successfully implement contracts and recommend / take penal actions on contractors, wherever necessary
- Is able to review and modify the HAZOP, QRAs and design safety
- Is able to reduce cost and enhance life of equipment / facilities
- Is able to take on-the-spot decision to avoid delays in work execution
- Can verify and approve the quantity and quality of work completed
- Is able to plan and decide on the alternative materials, tools, techniques to enable the execution without interruption
- Can submit MIS reports to the management
- Is able to suggest methods for proper storage of construction / maintenance material and retrieval of goods with minimum damage during storage
- Has wide knowledge of the project management techniques to schedule, monitor and control large and complex projects

- Is able to analyze expenditure for civil maintenance works in last few years and depending on present condition of the plant, recommended annual budget requirements
- Can review the overall performance of different contractors and quality of the work done
- Can recommended any changes to the method of carrying out the work
- Can identify and recommend new materials for durability of the repair work done
- Is fully conversant with different materials, the basic design and welding methods to reduce the material consumption for the same load / use

ORGANIZATIONAL STEWRD

- Can identify possibilities of improvement in the civil maintenance works routinely done
- Can conceptualize a civil / structural project and carry out feasibility study
- Is aware of the latest developments in project management tools and techniques
- Can identify and recommend competent vendors, contractors for projects / maintenance works
- Can guide in the preparation of Basic Engg. / Detailed Project Report
- Is familiar with the global standard of civil maintenance works in similar chemical plants
- Is familiar with development in various material used for construction / maintenance works