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The Fundamentals Based Problem Solving

REGISTERED HRD CORP TRAINING PROVIDER

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Course Objective

The objective of this course is to provide the participants the knowledge, ideas, and tools to apply the Fundamentals Based Problem Solving approach in their engineering work.

Targeted Group

- Engineers or managers who desire to improve and apply the problem-solving skills in their work.

Pre-requisite

Exposure in problem solving, including technical analysis, brainstorming, design, and development. The exposure allows the learners to appreciate the idea and methods taught in this course that would have addressed the situations they faced in the past in a better manner.

Delivery Mode

PowerPoint presentation, activities, and Q&A

Training Aids

Laptop and Zoom (or equivalent) presentation mode for online session.
Projector for face-to-face session.

Learning Outcome

At the end of this 2-day course, participants will be able to:

1.Have a new perspective in viewing engineering problems with more resolution options
2.Use the fundamentals of science, logical thinking and reasoning thinking to guide problem solving
3.Apply a set of tools to study and solve problem effectively and efficiently
4.Be more advanced in problem solving by being proactive

Course Schedule

TIME	CONTENT / ACTIVITY	TRAINING METHOD	TRAINING RESOURCES
5 mins	**Opening** A question to lead learners to the topic	Q&A	PowerPoint slide 1, 2
20 mins	**Introduction** • Introduction to get to know each other • Share the benefits of applying the knowhow learnt from the session • Prepare the learners to engage actively • Introduce the learning outcome	Q&A, lecture	PowerPoint slide 3-8
30 mins	**Icebreaker** Learners to relate their difficult problem- solving experience on what made it difficult and how they handled it	Group activity	PowerPoint slide 9
50 mins	**The Contents** • An overview of what a great process engineer should know • Introduce an overview to the learners about the Fundamentals Based Problem Solving method	Lecture, Q&A	PowerPoint slide 10-14
130 mins	**Key Learning 1:** **An overview of what make problems difficult and what capability the engineers need to learn up** People usually do not aware that problems exist in many forms than they could recognize. Problems range from some most simplistic ones to the extremely difficult ones. How well one deals with the problem has a lot to do with their mindset, habit, perceptions, of course most importantly their capability and skills in many perspectives beyond technical. Many are unaware the importance of other skills that are needed to complement their technical problem-solving skills. These are the blind spot making problem solving ineffective, inefficient, and off the course from achieving the desired outcome timely. Learners are enlightened to enhance their capability not limiting to the technical perspective but an all-rounder ability. It is also common that most people are not aware of being open-minded. Learners will learn how important to keep their mind open when they deal with a problem and seek for solutions. **Activity:** 1) Learners to list a complete list of skills needed to be a good problem solver. Learners will score themselves and be aware which area they should improvise. 2) A test of learner's open mind to allow learners to recognize room of improvement from their norm. 3) Break class into groups and let the groups to search online the usual problem-solving methods used and try to identify the weakness of the methods. Their finding allows them to appreciate the novelty of the problem-solving approach shared in this course.	Lecture, Q&A and activities	PowerPoint slide 15-28

450 mins	**Key Learning 2:** **The Fundamentals Based Problem Solving (FBPS) Method** The FBPS approach is introduced to learners. The 5 Pillars of FBPS are described briefly with the 5 Firsts. Learners shall learn to be free from following rigid flow of thoughts as usually emphasized by many problem-solving methods. The 5 pillars are illustrated in detail section by section. Pillar 1: Problem Statement(s) 1) How to recognize a problem. 2) How to define a problem clearly Pillar 2: Failure Modes & Commonality 1) How to identify and separate different failure modes 2) How to perform commonality study Pillar 3: Direct Observation + Fundamentals Questioning + Logical Analysis + Reasoning thinking 1) How to get started to investigate the problems, finding the root causes 2) How to use logical and reasoning thinking in this pillar. Pillar 4: Hypothesis and Validation 1) How to form good hypothesis 2) How to perform validation evaluation to identify the root cause(s) or margin improvement opportunity. Pillar 5: Containment 1) The immediate focus in containment 2) How to define project with the right scope 3) How to identify solutions that bring impact 4) How to deliver containment with strategic approach In the Pillar 1, learners are enlightened with the wisdom to have stronger senses to recognize problems they have been ignoring or are not usually aware of. With a clear problem statement defined, it will be followed by prompt ideas generation and fast resolution especially for simpler problems. A 5-min problem-solving method with Filtering, Funneling and Directing Approach is introduced for simpler problems. Hypothesis-driven resolution is introduced for more complex problems. Learners will learn how to form hypothesis more appropriately and use the What-When-How-Unknown approach to lead to more resolution options. In the Pillar 2, learners are enlightened that failure modes could be viewed in How, Where and When to separate them for possibly different root causes despite they may be named under one reject code but exhibiting subtle differences. A structured commonality study steps are recommended to start right into understanding the root cause(s) while identifying some factors for margin gain. In the Pillar 3, learners are reminded to perform direct observation carefully and thoroughly and be aware of misleading symptoms or irrelevant facts. Learners will learn to ask better questions, apply logical thinking and reasoning thinking in order to draw better conclusions. In the Pillar 4, learners are advised to properly define hypothesis and avoid misuse of fish bone and 5-whys methods, which are examples of tools with weaknesses if not used appropriately. Hypothesis if defined right with the What-When-How-Unknown approach could lead to more resolution options, allowing a problem be solved in a prompt manner while team may be searching for root cause understanding and fixes. The 6 Fundamentals-Based Investigation approaches are shared to learners for more effective and efficient investigation to identify dominant factors and best improvement options. 5 FBPS Validation Methods are introduced to the learners to perform evaluation to study low-DPM problems and lead to right resolution direction. Today Mindset is also introduced to enlighten learners to challenge themselves how to close a problem sooner (even within a day) than the time they usually set in mind, which could be days and weeks or longer. In the Pillar 5, learners are reminded to stop the bleeding of a problem when it occurs. Avoiding more rejects could be done if prompt actions are taken to stop the production, quarantine affected materials, shut down problematic tools etc. Learners are also enlightened to solve problems by spending energy and resources just right considering the optimum outcome. Learners will also learn a 5-Prong Strategy which is best used for more complex and higher impact issues, to arrive to a resolution with certainty unless it is a showstopper issue due to fundamental science limitation. **Activity:** 1) Break class into groups and let the groups to practice the learning of the Fundamentals Based Problem Solving method. 2) Learners are asked to share how they usually do evaluation and validation for any problem solving. The exercise will allow them to appreciate the 6 Fundamentals Based Investigation approaches shared in the course that they are not aware of or not commonly done. 3) Learners to exercise with a template to apply the Today Mindset approach. 4) Discussion on being strategic vs being tactical is conducted to allow learners to learn to solve problems with comprehensive plans in place.	Lecture, Q&A and activities	Power Point slide 29-76

Session 2

90 mins	**Key Learning 3:** **Preventing Problems and Being Proactive** Other than solving problems, learners are introduced a better concept. The better concept is all shall develop and improve their process via package design, materials, equipment and recipe optimization that could totally defect free. Prevention is better than problem solving. The concept of process robustness is shared with the introduction of FMEA tool and a stack-up analysis model which could be used for any geometrical related design and development. The best problem-solving concept is shared in this section. The best concept is to make no room for error and hence there will be no problem to arise later that need resolution. The idea about control by preventive and proactive is shared. Prevention is better than reactive problem solving. Engineers shall develop and improve their process via package design, materials, equipment and recipe optimization that could totally defect free. Mistakes are made clear to all learners that they are always detrimental, damaging, and harmful. Mistakes must be avoided by the 3 Rights approach. Technology robustness must be instilled upfront during development. FMEA tool and a stack-up analysis mathematical model to assess the robustness or chances of failure are taught in this section so good solutions can be thought of ahead of time. Activity: 1) Learners to discuss the types of issues they usually face and how they usually deal with them. This will let the learners to appreciate the concept of excursion and chronic issues, which shall be dealt with in different ways. 2) Learners to think harder to recognize “mistakes” are never a good thing to happen. Learning from mistakes are needed but that does not make mistakes are good to be embraced. 3) Learners to discuss how to deal with mistakes and how to prevent them from happening.	Lecture, Q&A and activities	Power Point slide 77-85
40 mins	**End the Session** 1) Summary: A recap of the training content. 2) Q&A: Allow learners to raise questions. 3) Review Learning Outcome: Check on learners their understanding of the topic 4) Closing: A few quotes from Sun Tzu	Lecture, Q&A, and assessment	Power Point slides 86-89

Session 2

	Activity: 1) Learners to research 40 TRIZ Inventive Principles and keep in mind to refer to them to generate more solution ideas. 2) Learners to research the typical problem-solving steps. This will allow the learners to appreciate a new problem-solving approach, a.k.a. Fundamentals Based Problem Solving (FBPS) better. 3) Learners to discuss their habit to solve problem by performing evaluation and validation, and the method they usually use. This will allow them to appreciate and remember the 6 Fundamentals Based Investigation approaches better. 4) Learners to exercise with a template to apply the Today Mindset approach. 5) Learners to describe the idea of being strategic and being tactical. This allows learners to appreciate and remember the 5-Prong Strategy		
60 mins	**Key Learning 4:** **Preventing Problems and Being Proactive** The best problem-solving concept is shared in this section. The best concept is make no room for error and hence there will be no problem to arise later that need resolution. The idea about control by preventive and proactive is shared. Mistakes are made clear to all learners that they are always detrimental, damaging, and harmful. Mistakes must be avoided by the 3 Rights approach. Technology robustness must be instilled upfront during development. A mathematical model to access the robustness or chances of failure is taught in this section so good solutions can be thought of ahead of time. Activity: 1) Learners to discuss the types of issues they usually face and how they usually deal with them. This will let the learners to appreciate the concept of excursion and chronic issues, which shall be dealt with in different ways. 2) Learners to think harder to recognize "mistakes" are never a good thing to happen. Learning from mistakes are needed but that does not make mistakes are good to be embraced. 3) Learners to discuss how to deal with mistakes and how to prevent them from happening.	Lecture, Q&A and activities	Power Point slide 198-206
10 mins	**End the Session 2** 1) Summary: A recap of the training content. 2) Q&A: Allow learners to raise questions. 3) Review Learning Outcome: Check on learners their understanding of the topic 4) Closing: A few quote from Sun Tzu	Lecture, Q&A, and assessment	Power Point slides 207-210

About Elite Indigo

Elite Indigo Consulting provides corporate training to the semiconductor and manufacturing industries. With a humble beginning of one founding member with passion and desire to share his 20 years of experiences in Smart Manufacturing for global manufacturing facilities, now, we have a strong and competent team of 20 members, all aligned with company mission, vision and core values.

Our Mission

"Transform Data into Insights - Leap Forward"

Our Vision

Be a Global Trusted Advisor in the Areas of Skills Development, Consultancy & Software Solutions specialising in Semiconductor & Manufacturing industries.

Our Core Values