CEEAMA™
Consulting Electrical Engineers Association of Maharashtra

CEEAMA LiveWire

E-NEWSLETTER

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Topic for August 2026

CHANGE MANAGEMENT

Turn the Pages… Then Take the Challenge! Explore this month's theme and check your knowledge skills by solving the quiz inside.

Electrical Consultants Newsletter
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From the Editors Desk,

As we present the August 2026 edition of CEEAMA LiveWire, it is difficult to ignore the reality that change has become the defining characteristic of our times. Across the globe, industries are navigating geopolitical uncertainties, evolving trade policies, supply chain realignments, accelerating energy transition programs, growing demands on infrastructure, and the rapid infusion of digital technologies and artificial intelligence into engineering processes. Recent global assessments highlight that resilience, energy security, and execution excellence have become as important as growth itself. Our previous months' topics covered important articles on "Monsoon Preparedness" and "Force Majeure" alongwith brief discussions on "AI in Industries". These are all disruptions which make "Change" inevitable.

For engineers, however, change is not merely a global phenomenon. It is a daily project reality.

Whether in Oil & Gas, Chemicals, Petrochemicals, Pharmaceuticals, FMCG, Metals, Infrastructure, Renewable Energy, Data Centers, or Manufacturing facilities, we frequently encounter one constant during detailed engineering: the client wants a change.

What begins as a seemingly simple request can have far-reaching technical and commercial consequences.

A process modification may alter equipment ratings. A revised vendor drawing can affect foundations, cable routing, and piping layouts. A request to relocate a substation may cascade into changes across civil, structural, electrical, instrumentation, safety, and construction disciplines. New regulatory requirements may necessitate design revisions long after engineering has commenced. Market pressures may demand future expansion provisions that were never part of the original scope.

Therefore, the question is not whether changes will occur.

The real question is:

How effectively do we manage them?

Historically, engineering organizations often viewed changes as disruptions. Today's leading engineering companies increasingly recognize that change management is a strategic capability. A well-managed change process protects safety, quality, schedule, budget, and customer confidence simultaneously. Conversely, poorly controlled changes frequently result in rework, delays, cost escalation, document inconsistencies, procurement challenges, and site execution problems.

Continued on next page...



Subhash L. Bahulekar
Chief Editor – CEEAMA

Engineering professionals know that every modification carries multiple dimensions of impact:

- Technical feasibility
- Interdisciplinary coordination
- Cost implications
- Schedule impact
- Regulatory compliance
- Construction and commissioning risks
- Future maintainability and operability

In complex projects, the cost of implementing a change is often much lower than the cost of implementing it incorrectly. This makes structured Engineering Change Management (ECM) an essential project discipline rather than an administrative exercise. Formal Change Requests, multidisciplinary reviews, impact assessments, revision control, stakeholder approvals, and effective communication are the mechanisms that convert uncertainty into controlled execution. The objective is not to resist change, but to ensure that every change improves the project rather than compromises it. Many engineering companies look at it as New/additional business opportunities provided the client recognizes that in the running project!!!

Successful change management ultimately depends upon engineering judgement, communication, discipline, and leadership.

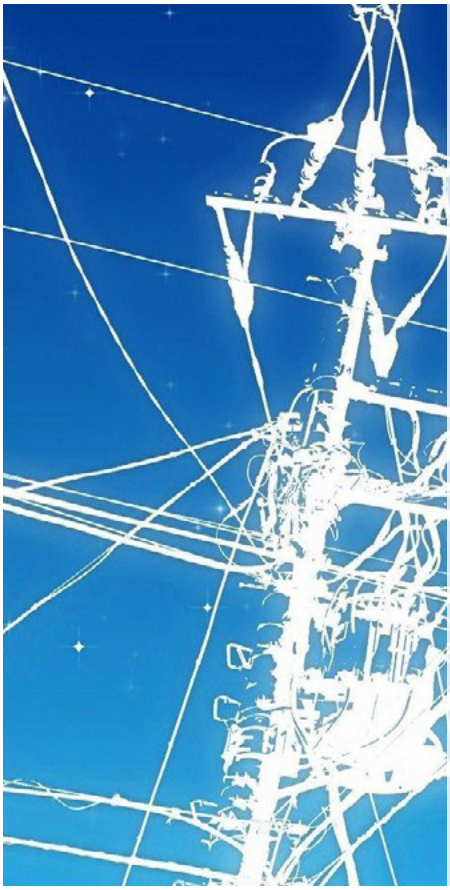
For electrical consultants, equipment manufacturers, EPC contractors, and plant engineering professionals, this mindset is becoming a competitive necessity. Flexibility without discipline leads to chaos. Discipline without flexibility leads to stagnation. The real excellence lies in achieving the right balance.

This month's LiveWire explores various dimensions of Change Management from both organizational and project perspectives. Through practical case studies, engineering experiences, and industry insights, we hope to highlight best practices that help professionals manage change proactively rather than reactively.

As engineers, we design systems that transform energy, materials, and information into value. Yet perhaps our greatest professional responsibility is managing transformation itself. After all, engineering is not merely about building facilities and infrastructure; it is fundamentally about enabling progress in a world that never stands still.

Let us therefore view change not as an obstacle, but as an opportunity to demonstrate the very qualities that define our profession: technical competence, structured thinking, collaboration, adaptability, and leadership.

Wishing all our readers a productive, resilient, and SAFE month ahead.



CEEAMA *LiveWire*

About the publication

The Consulting Electrical Engineers Association of Maharashtra (CEEAMA) is a professional organisation that brings together consulting electrical engineers, manufacturers, industry experts, and allied professionals on a common platform to exchange knowledge, share experiences, discuss emerging developments, and collectively contribute to the growth of the electrical engineering fraternity. As part of this vision, CEEAMA publishes its monthly E-Newsletter, CEEAMA LiveWire, which serves as a dedicated platform for professionals to present technical articles, professional studies, research, opinions, innovations, case studies, and industry perspectives. Through the collective contribution of experts and practitioners, LiveWire aims to encourage meaningful dialogue, inspire continuous learning, promote professional collaboration, and strengthen the exchange of ideas that drive progress in the field of electrical engineering.

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From the President's desk:

Hope you are coping well this year's monsoon. The current weather pattern is so uneven that the Konkan coast is busy building Noah's Ark while Marathwada farmers are looking at the sky asking if the rain cloud got stuck in traffic near Lonavala. Getting dressed in Pune or Thane requires an outfit that can simultaneously handle a 35°C humid heatwave, a sudden cyclonic thunderstorm and wading through knee-deep waters.

This month we focus on Change Management. Change management is that critical bridge which prevents an engineering design from failing when it encounters real-world conditions.

When an architect or landscape designer changes their plans, it triggers a massive domino effect across the electrical engineering design. Since the electrical systems are entirely dependent on physical layouts, structural boundaries, and aesthetic choices, a formal change management process is the only thing standing between a successful project and a major field disaster. Changing a space from an open-office layout to individual cabins completely disrupts the lux level calculations, lighting control zoning and egress lighting paths. Shifting from drywall to glass panels or concrete walls eliminates planned cable routing pathways, requiring a redesign of conduit runs and switchboard placements. A shift from a standard suspended grid ceiling to an exposed or gypsum ceiling forces a complete re-evaluation of fixture mounting types, HVAC coordination and containment routing. A good consultant factors in a finite number of changes in his design estimation during quoting stage to avoid project over-runs.

Without a formal process to manage changes at site, unexpected field realities quickly turn into catastrophic budget overruns, safety hazards, and project delays. What looks perfect in a 3D CAD model or a digital twin rarely matches the actual physical site, especially in brownfield expansions or complex terrains. Change Management provides a structured workflow (such as a Change Order or Request for Information) to safely evaluate and approve modifications when field teams discover unmapped underground utilities, structural obstructions or unexpected soil conditions.

Change Management during execution phase involves updating procurement management team for holding procurement till resolution of the change, a revision impact assessment, load re-calculations, cables resizing, reissuing of deliverables and formalising budget implications. Savvy organisations create an Engineering Change Note (ECN) to log these variations which go into lessons learnt file depending on the seriousness of the change.

On the humorous side, I recollect that during project changes, a design team wasted energy arguing over drawing tolerances which could had easily power a small manufacturing plant for a week. As file revisions rose like sea levels, the server room could have created enough heat to accelerate global warming by itself. In software projects, finding the single engineer who actually understands the original source code is like looking for an extinct bird.

Moving on, we have the Annual General Body Meeting (AGM) next month at Navi Mumbai. A formal communication regarding the exact dates will be communicated to all of you. Do participate in this and share your valuable experience during the same. We are also planning for 3 nos. CEAAMATECH events this financial year, one in October 26, one in January 27 and one in March 27. The exact dates will be communicated to all of you in due course.

On 15th August 2026, India will celebrate its 80th Independence Day, which marks the 79th anniversary of freedom. Parsi New Year (Nowroz) falls on 16th Aug., Nag Panchmi on 17th Aug., Onam on 26th Aug. and Raksha Bandhan on 28th Aug. Have a joyful festive season.
Jai Hind!



Mr. Chidambar Joshi
Hon. President

From the Secretary's desk:

Dear Members,
Welcome to the August 2026 edition of our monthly association note. As we navigate the peak of monsoon season, our infrastructure faces its annual resilience test. This month, we focus heavily on shifting global and local market dynamics, updating our engineering toolkits, and tracking critical standard compliance updates to keep your consulting practices sharp and competitive.

Key Energy & Infrastructure Updates

- **Grid Storage Scaling:** Grid-scale Battery Energy Storage Systems (BESS) are seeing massive deployment to stabilize renewable power injection into the state grid.
- **Green Hydrogen Infrastructure:** Industrial zones across Maharashtra are starting to pilot localized hydrogen distribution networks, opening up new design paradigms for industrial electrical consultants.
- **Monsoon Power Resilience:** State distribution utilities are prioritizing automated microgrids to quickly isolate faults caused by heavy rains and localized flooding.

Electrical Products & Services Trends

Next-Generation Switchgear & Protection

- **Solid-Insulated Switchgear (SIS):** Industry adoption is shifting away from SF6 gas toward eco-efficient solid insulation to comply with tightening environmental mandates.
- **IoT-Enabled Breakers:** Circuit breakers with integrated edge analytics are now standard for predicting contact wear and continuous thermal monitoring.

Advanced Smart Metering & Edge Monitoring

- **Smart Meter Rollouts:** Smart prepayment meter deployments are accelerating across commercial and industrial (C&I) sectors, requiring consultants to integrate advanced energy management software (EMS) into building designs.
- **AI-Driven PQ Analysers:** Real-time Power Quality (PQ) analysers now feature machine learning capabilities to automatically detect, classify, and pinpoint transient voltage anomalies.

EV Charging Infrastructure (EVCI) V2G Integration

- **Bidirectional Charging:** Vehicle-to-Grid (V2G) standard compliance is becoming a core requirement for commercial real estate electrical layouts.
- **Megawatt Charging Systems (MCS):** Heavy commercial vehicle corridors are introducing high-capacity charging designs, introducing massive localized loads that demand precise substation planning.

Association Announcements

- **Medium Voltage Switchgear Factory Visit :**

Register next week for our Knowledge gaining Factory Visit

Let us continue to champion safety, sustainability, and unparalleled engineering excellence across Maharashtra. Happy Independence Day, 15th August to all the fellow members.

Warm regards



Ulhas Vajre
Honorary Secretary

PESO Updates:

The Explosives (Amendment) Rules, 2026

The Ministry of Commerce and Industry (MoC&I), on March 05, 2026, issued the Explosives (Amendment) Rules, 2026, to further amend the Explosives Rules, 2008.

The following has been stated namely:

In rule 83, sub-rule (4): for clause (a), the following clause have been substituted, "(a) be located on the ground floor of a single-storeyed building with independent or standalone activity, having an independent entrance and emergency exit opening directly to open space and having doors opening outwards;"; after clause (f), the following clause has been inserted, namely:- "(g) have not less than two or more fire extinguishers of Dry Chemical Powder (DCP) type and Carbon dioxide (CO_2) type be placed at strategic points.".

In rule 86, after sub-rule (3), the following sub-rules has been inserted, namely:

(4) Independent fireworks.- The independent fireworks shop shall maintain a minimum clearance of three meters to open sky from any adjacent structure or building.

(5) Fireworks shop.- The fireworks shop shall maintain a minimum clear distance of fifty meters from educational institution, hospital, medical diagnostic centre and religious place.

(6) Exceptions.- The provisions of sub-rules (4) and (5) shall not apply to existing fireworks shops covered under licensed FORM LE-5.

(7) Safety requirements.- Subject to the provisions of rule 112, the existing fireworks shops shall comply with the following safety requirements, namely:-

1. the shop shall be equipped with two automatic fire detection and alarm system using conventional dual type detectors having combination of smoke and heat with an auto-dialler facility to alert the shop owner and to the nearest fire station, in the event of fire;
2. the existing fireworks shop must install a standalone automatic portable or gravity fed water sprinkler system for fire suppression, with minimum water storage capacity of 300 liters connected to a pump of minimum rating 2 Horsepower (HP);
3. an alternate power supply or battery backup shall be provided for the standalone systems and in the case of existing fixed hydrant system, one tapping or extension should be taken from such system;
4. the centralised large electric panel shall be protected by an automatic tubing system used with gas based clean agent, with a detection tube capable of fast sensing at 80-90 degree Celsius and instant activation;
5. the walls, ceiling and doors of the shop shall be coated with fire-retardant paint or flameproofing material to achieve a fire rating of thirty minutes;
6. the shop must have concealed electrical wiring using spark-or-flame proof either fire survival cables or fire retardant low smoke type;
7. the fireworks shop shall undergo an electrical audit annually, to be conducted by a certified qualified person or electrical inspector recognised by the Energy or Electrical Department of the concerned State;
8. all the equipment referred to in clauses (i) to (vii) shall conform to the relevant standards of the Bureau of Indian Standard.

In rule 112, in sub-rule (3), after the second provision, the following provision has been inserted, namely:

"Provided also that the licencing authority, before renewing the licence, shall call upon the licence holder by notice in writing to furnish an undertaking for compliance of additional safety measures specified in sub-rule (7) of rule 86 and the licence holder shall furnish such undertaking within a three months of the date of receipt of the notice or as may be specified therein, whichever is earlier.". The amendment has come into force on 5th March, 2026 vide Notification No G.S.R. 154(E).

The Gas Cylinders (Amendment) Rules, 2026

The Ministry of Commerce and Industry (MoCI), on April 27, 2026, issued Gas Cylinders (Amendment) Rules, 2026, to further amend the Gas Cylinders Rules, 2016.

The following has been stated namely:

- In rule 3, in sub-rule (5), after the words, “touching Indian port” the words, “or cylinders and valves imported by establishments of the Ministry of Defence, Department of Space and its Public Sector Undertakings for their own use” has been inserted.
- In rule 32, to sub-rule (1), the following proviso has been inserted, namely:-
  “Provided that the permission shall not be required in respect of,
  (a) empty cylinders without valves;
  (b) valves and LPG regulators, imported from the foreign manufacturing plants approved by the Chief Controller and having valid import licence in Form-D.”
- In rule 48, in sub-rule (3), in clause (b), after the words, “Liquified Petroleum Gas”, the words, “or other flammable gases” has been inserted.

The amendment has come into force on 27th April, 2026 vide Notification G.S.R. 315(E).

Ulhas Vajre
Honorary Secretary

DISCLAIMER

The information in all the articles of CEEAMA LiveWire is compiled using references from various sources. Although every attempt has been made to ensure the accuracy of this material, neither CEEAMA nor any of its contributors to this publication assumes responsibility for any inaccuracies or omissions in the data presented. For use in practice, we strongly advise that, information utilized from this publication should be verified from the relevant sources and to use document of actual standard published by respective institution.

CHANGE MANAGEMENT
(A Structured Approach to Engineering Changes in Plant Engineering Projects)

Introduction

Engineering projects often require modifications during execution, especially in plant engineering where multiple disciplines work together. Engineering Change Management (ECM) is a structured process for identifying, evaluating, approving, implementing, and documenting these changes in a controlled manner.

Since disciplines such as CSA, Process, Mechanical, Piping, Electrical, and Instrumentation are highly interconnected, a change in one area can impact several others. Effective ECM helps prevent design conflicts, delays, cost overruns, and operational issues by ensuring proper coordination and communication among stakeholders.

A well-managed change process improves collaboration, maintains document accuracy, reduces project risks, and ensures consistent implementation of engineering decisions, making it a critical part of successful project execution.





Why Engineering Changes Occur in Plant Engineering

Engineering changes are a natural part of industrial projects as requirements evolve during engineering and execution. Effective management of these changes helps minimize impacts on cost, schedule, quality, and safety.

- **Client Requirement Modifications**

  Clients may request changes to improve plant operations, optimize layouts, increase capacity, or support future expansion. These changes often require updates to engineering designs and documentation.

- **Site Condition Variations**

  Actual site conditions may differ from initial assumptions due to variations in soil, underground utilities, existing structures, or construction constraints. Such findings often necessitate design revisions.

- **Vendor Data Revisions**

  Equipment vendors may provide updated dimensions, loads, or installation requirements during detailed engineering. These updates can affect foundations, structural supports, and utility connections.

- **Regulatory and Code Compliance**

  Changes in design codes, safety standards, environmental regulations, or client specifications may require modifications to ensure compliance and project safety.

- **Interdisciplinary Coordination**

  Plant projects involve multiple disciplines working together. Design reviews often identify clashes between structures, piping, electrical systems, and equipment, requiring coordinated engineering changes to avoid rework and improve constructability.

Engineering Change Management Workflow

Engineering Change Management (ECM) follows a structured process to ensure that all changes are properly reviewed, approved, documented, and implemented. This helps maintain project quality, safety, and coordination across all disciplines.

Workflow:







- **Engineering Change Request (ECR)**

  Every change begins with a request from the client, engineering team, vendor, or site personnel. The need and purpose of the change are clearly defined before further evaluation.

- **Technical Evaluation**

  The relevant engineering discipline reviews the proposed change for technical feasibility, design requirements, standards compliance, and constructability.

- **Impact Assessment**

  The impact of the change on design, cost, schedule, safety, plant layout, and documentation is assessed to identify potential project implications.

- **Multidisciplinary Review**

  CSA, Process, Mechanical, Piping, Electrical, and Instrumentation teams review the change together to avoid design conflicts and ensure proper coordination.

- **Client Approval**

  Where required, the proposed change is submitted to the client for approval before any modifications are made to engineering deliverables.

- **Document Revision & Implementation**

  Approved changes are incorporated into affected drawings, calculations, BOQs, and other engineering documents. Revision records are updated, and the changes are implemented in a controlled manner.

Impact of Engineering Changes on Different Engineering Disciplines

In plant engineering, disciplines are closely interconnected. A change in one area often affects several others, making coordination essential for successful project execution.

- **Impact on Civil, Structural & Architectural (CSA)**

  Engineering changes may require updates to:

  - Foundations and structural supports
  - Equipment supporting structures
  - Drainage and grading systems

- Access roads and underground trenches
- BOQ quantities and construction drawings

Even a minor equipment relocation can lead to significant structural revisions.

- **Impact on Mechanical Engineering**

  Mechanical engineers assess changes related to:

  - Equipment locations
  - Maintenance access requirements
  - Installation clearances
  - Utility connections
  - Support arrangements

  Changes in equipment data often require redesign and re-evaluation.





- **Impact on Process Engineering**

  Process teams verify that changes do not adversely affect:

  - Process flow
  - Plant efficiency
  - Safety requirements
  - Utility consumption
  - Equipment performance

  Process requirements generally serve as the foundation for overall plant design.

- **Impact on Electrical & Instrumentation**

  Engineering changes may require revisions to:

  - Cable routing and cable trays
  - Cable trench layouts
  - Junction box locations
  - Instrumentation layouts
  - Earthing systems
  - Equipment accessibility

  Proper coordination helps avoid installation issues and site rework.





Risk Assessment Before Implementing Engineering Changes

Before implementing any engineering change, its potential risks must be evaluated to ensure safety, quality, schedule, and cost objectives are maintained.

- **Technical Risk**

  The impact of the change on structural stability, equipment performance, utility systems, and overall plant operation is assessed to ensure technical feasibility.

- **Schedule Risk**

  Engineering changes may require redesign, procurement updates, or additional construction work, which can affect project timelines.

- **Cost and Man-Hour Impact**

  Engineering changes affect both project cost and engineering man-hours. Design revisions require additional effort for calculations, drawing updates, reviews, and approvals. Early identification of changes helps reduce rework, optimize engineering effort, and improve productivity.

- **Safety and Compliance**

  All changes must comply with applicable codes, regulations, and safety standards to avoid introducing operational or construction risks.

- **Documentation Risk**

  Affected drawings, calculations, and engineering documents must be updated to the latest revision to prevent errors, rework, and delays.



Digital Tools Supporting Engineering Change Management

Modern plant engineering projects use digital tools to manage changes efficiently, improve coordination, and maintain accurate records.

- **AutoCAD** – Updates engineering drawings and layouts.
- **STAAD.Pro** – Revises structural analysis and design.

- **Revit/BIM & Navisworks** – Coordinates multidisciplinary models and detects clashes.
- **DMS** – Controls document revisions and history.
- **3D Review Platforms** – Visualizes changes before implementation.

These tools help reduce errors, enhance collaboration, and support faster decision-making.

Best Practices for Effective Engineering Change Management

Effective Engineering Change Management requires clear communication, proper documentation, and coordination among all stakeholders. Key best practices include:

- Follow a formal Engineering Change Request (ECR) process.
- Conduct technical and multidisciplinary reviews before approval.
- Maintain proper revision control of all engineering documents.
- Communicate approved changes to concerned teams promptly.
- Evaluate impacts on cost, schedule, quality, and safety.
- Keep accurate records of changes and revision history.
- Promote collaboration between CSA, Process, Mechanical, Electrical, and Instrumentation disciplines.

Practical Engineering Scenario

During a plant project, the client requested the relocation of an electrical substation to improve the plant layout. Although the change seemed minor, it impacted multiple engineering disciplines.

For the **CSA team**, revisions were required to the plot plan, foundation layout, grading, drainage system, access roads, and cable trenches. The **Electrical team** updated cable routings and equipment locations, while other disciplines reviewed clearances and constructability requirements.



A multidisciplinary review was conducted to assess the impact, update engineering documents, and obtain necessary approvals before implementation. Once approved, the revised drawings were issued for construction.

Conclusion

Engineering Change Management (ECM) is a vital part of plant engineering that ensures changes are handled in a structured, controlled, and efficient manner. As projects progress, modifications are often unavoidable, making it essential to evaluate their technical, cost, schedule, and safety impacts before implementation.

A well-defined ECM process promotes multidisciplinary coordination, maintains document accuracy, reduces project risks, and helps prevent costly rework. By ensuring that all changes are properly reviewed, approved, and

communicated, organizations can maintain design integrity and achieve smooth project execution.

Ultimately, effective Engineering Change Management enables engineering teams to deliver safe, high-quality, and reliable industrial facilities while meeting project objectives related to quality, cost, and schedule.



Contributed By:



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Aditi Nagare

L&T Technology Services

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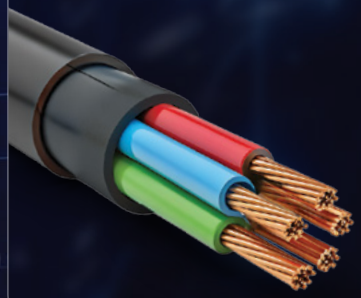
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PRODUCT FEATURES

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- TPE
- Aluminium
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Change Management in a Chemical Plant

Abstract

Change Management in Plant Engineering for a typical Chemical Plant is a systematic approach used to control and implement modifications in plant design, layout, equipment, piping, instrumentation, control systems, and operational procedures. It ensures that every change is properly reviewed for its technical, safety, cost, schedule, and operational impact before implementation. In multidisciplinary plant engineering projects, uncontrolled changes can lead to design errors, rework, safety risks, cost overruns, and documentation gaps. This article explains the importance of Change Management, its typical process, key challenges, and a practical example of Client's ask for reducing plant footprint by 10% while maintaining safety, operability, maintainability, and constructability.



Objectives

- To understand the concept and importance of Change Management in Plant Engineering projects.
- To identify how changes in plant design, layout, equipment, piping, instrumentation, and control systems affect overall project execution.
- To explain the systematic process required for reviewing, approving, implementing, and documenting engineering changes.
- To highlight the role of multidisciplinary coordination in managing plant modifications safely and effectively.
- To demonstrate the application of Change Management through a practical scenario of reducing plant footprint by 10%.

Scope

The scope of this article covers the need, process, and practical application of Change Management in Plant Engineering. It includes changes related to plant layout, equipment arrangement, piping routing, electrical systems, instrumentation, control systems, safety requirements, construction feasibility, and engineering documentation. The article also focuses on how proper Change Management supports safe design optimization, cost control, project coordination, maintainability, and reliable plant operation. However, the scope is limited to engineering and project execution aspects and does not cover detailed commercial, contractual, or organizational change management strategies.

Change Management is one of the most important practices in Plant Engineering because industrial plants continuously undergo modifications due to process improvement, safety requirements, equipment upgrades, regulatory compliance, cost optimization, and operational reliability. In a plant environment, even a small change in equipment, piping, layout, instrumentation, process parameters, or control logic can affect safety, production, quality, maintenance, and overall plant performance. Therefore, every change must be properly evaluated, approved, implemented, and documented through a systematically change management process.



Importance of Change Management

Plant Engineering involves multidisciplinary coordination among Process, Mechanical, Piping, Electrical, Instrumentation and Control, Civil, and Safety teams. A change proposed by one discipline may directly or indirectly impact other disciplines. For example, reducing the size of equipment may change

piping routing, maintenance access, structural loading, instrument locations, electrical cable routing, and safety clearances. Change Management ensures that all technical impacts are reviewed before implementation so that the modification does not create new risks or operational difficulties.

The main objective of Change Management is to control modifications in a safe, structured, and traceable manner. It helps prevent design errors, rework, cost overruns, schedule delays, and safety incidents. It also ensures that plant documentation such as P&IDs, layouts, equipment lists, line lists, instrument indexes, cable schedules, interlock logic, and operating procedures remain updated after any approved change.

Typical Change Management Process



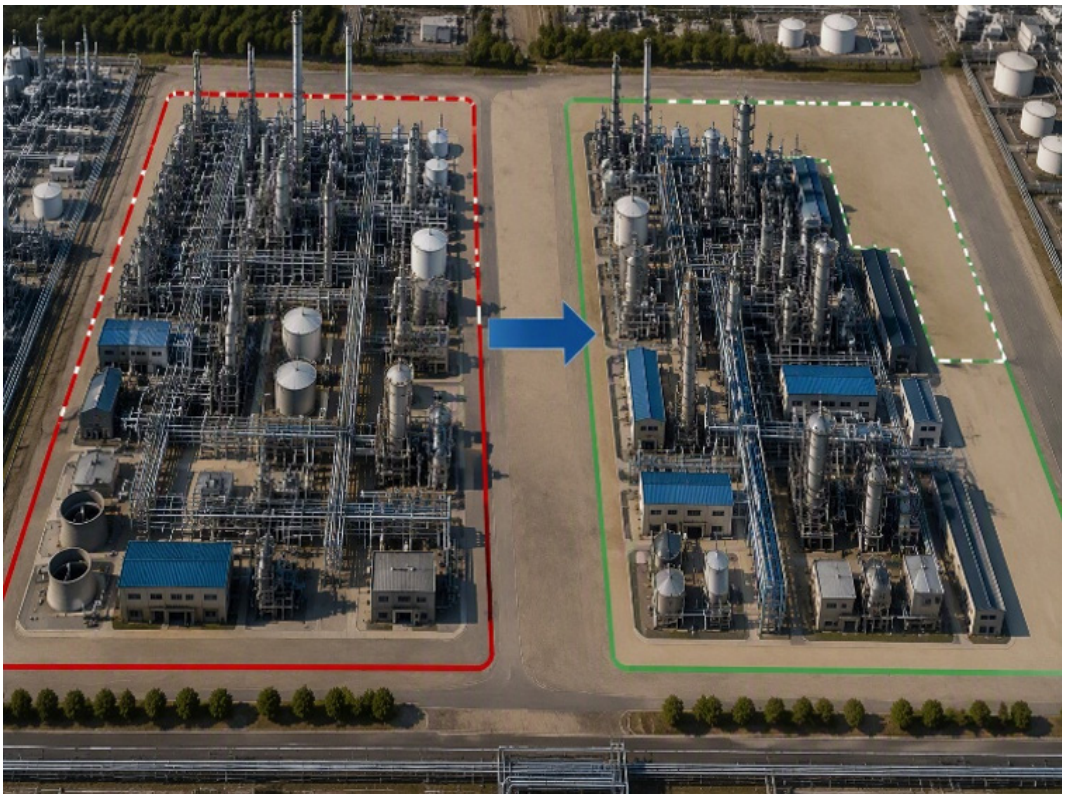
1. **Identification of Change:** The need for change is identified due to technical improvement, client requirement, site constraint, safety concern, cost reduction, or operational feedback.
2. **Change Request Preparation:** A formal change request is prepared with details such as reason for change, affected documents, impacted disciplines, expected benefits, and possible risks.
3. **Technical Review:** All concerned engineering disciplines review the change to identify impacts on design, safety, construction, operation, and maintenance.
4. **Risk Assessment:** Safety studies such as HAZOP review, design review, or management of risk assessment are performed if required.
5. **Approval:** The change is approved by authorized stakeholders such as project management, engineering leads, client representatives, and safety teams.
6. **Implementation:** The approved change is incorporated into drawings, calculations, specifications, procurement documents, and site execution plans.
7. **Documentation and Communication:** Updated documents are issued to all stakeholders, and the change is communicated clearly to construction, commissioning, operation, and maintenance teams.

CASE STUDY

Example Scenario: Reducing 10% Footprint in Plant Engineering

Consider a case where a project team is asked to reduce the overall plant footprint by 10% to optimize land usage and reduce project cost. At first, this may appear to be a layout-related change, but it affects several engineering areas. The Piping team must check pipe routing, accessibility, pipe rack loading, and maintenance clearance. The Mechanical team must verify equipment spacing, lifting requirements, and service access. The Electrical team must review cable tray routes, substation location, and safe clearance requirements. The Instrumentation team must check instrument accessibility, junction box locations, and control cable routing. The Civil and Structural team must evaluate foundation layout, structure spacing, and load transfer. The Safety team must ensure that emergency access, fire-fighting clearance, escape routes, and hazardous area classification are not compromised.

Through proper Change Management, the 10% footprint reduction can be implemented without affecting plant safety, operability, maintainability, and constructability. The change must be supported by revised layouts, updated 3D models, clash checks, safety reviews, updated engineering deliverables, and formal approval from all stakeholders. This systematic approach ensures that cost optimization does not create hidden risks during construction or plant operation.



Challenges in Change Management

Some common challenges in Change Management include delayed communication, incomplete impact assessment, poor documentation, lack of coordination between disciplines, frequent design revisions, and implementation of changes without proper approval. In fast-track projects, these challenges can lead to engineering rework, procurement delays, site execution issues, and safety concerns. To avoid these problems, every change should be logged, tracked, reviewed, and closed in a controlled manner.

Key Learning Points

- Change Management helps control plant modifications in a safe, structured, and traceable manner.
- Every engineering change should be reviewed for multidisciplinary impact before implementation.
- Proper documentation and communication are essential to avoid design mismatch, rework, and site execution issues.
- Risk assessment is necessary when changes affect safety, operability, maintainability, process conditions, or plant layout.
- Cost optimization, such as reducing plant footprint, must not compromise safety clearances, maintenance access, emergency routes, or constructability.
- Successful Change Management improves project quality, coordination, reliability, and overall plant performance.



Conclusion

Change Management in Plant Engineering is not only a documentation activity but also a critical engineering control process. It ensures that every modification is technically justified, safely reviewed, properly approved, and accurately reflected in all project deliverables. A strong Change Management system improves safety, quality,

coordination, cost control, and project reliability. In modern plant engineering projects, where design optimization and fast execution are essential, effective Change Management plays a key role in achieving successful project outcomes.



"Successful Change Management transforms engineering modifications into opportunities for improved safety, efficiency, reliability, and sustainable plant growth."

Contributed by:



Jayraj Godhani
Associate Engineer (Process)

L&T Technology Services







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Engineering Change Management: A Case Study on Substation Relocation in an FMCG Manufacturing Facility

Introduction

Engineering designs are developed through extensive technical analysis, load studies, reliability assessments, and multidisciplinary coordination to achieve the most efficient and economical solution. However, during project execution, stakeholders may request modifications to accommodate operational, commercial, or site-specific preferences. Such changes, even when appearing minor, can significantly affect electrical performance, constructability, project cost, and future plant operation.

Engineering Change Management (ECM) provides a structured framework for evaluating proposed design modifications before implementation. It ensures that technical decisions are based on engineering merit rather than isolated benefits, thereby protecting system reliability, safety, and long-term operational efficiency.

This article presents a real-world case study involving a proposed relocation of an electrical substation in a Fast-Moving Consumer Goods (FMCG) manufacturing facility and demonstrates how systematic engineering evaluation guided the final decision.

Project Background

The project involved the design of an integrated electrical distribution system comprising an 11 kV utility supply, transformers up to 3.15 MVA, PCCs, MCCs, UPS systems, and plant-wide LV/MV distribution networks. The substation was originally positioned strategically near both the utility source and process plant to minimize cable lengths, reduce voltage drop and power losses, optimize installation costs, facilitate maintenance access, and ensure efficient utilization of available space. This location was selected after detailed engineering evaluation and represented the most technically optimized and operationally efficient solution for the facility's power distribution requirements.

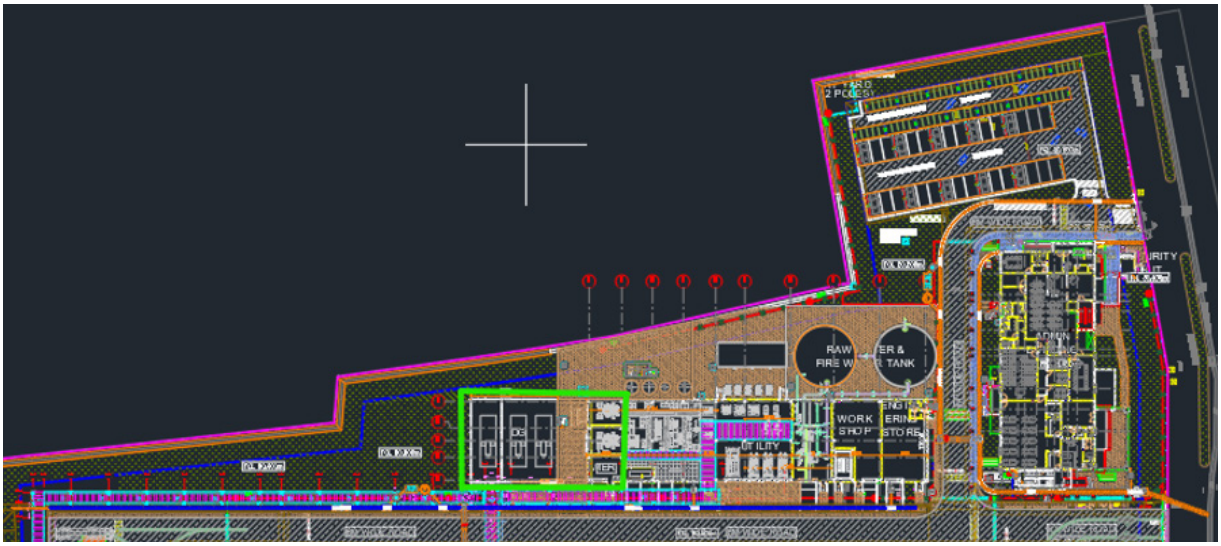


Fig 1. Original Layout

Proposed Change Request

During project execution, the client requested relocation of the substation from its original location to the North-East corner of the facility near the parking area and main entry gate.

The primary reason for the request was compliance with Vastu considerations.

At first glance, the proposal appeared simple because the Medium Voltage (MV) supply route would become shorter. However, engineering experience suggests that even seemingly minor location changes can have significant project-wide implications.

Consequently, a comprehensive Change Management assessment was initiated involving Electrical and Civil & Structural (CSA) disciplines.

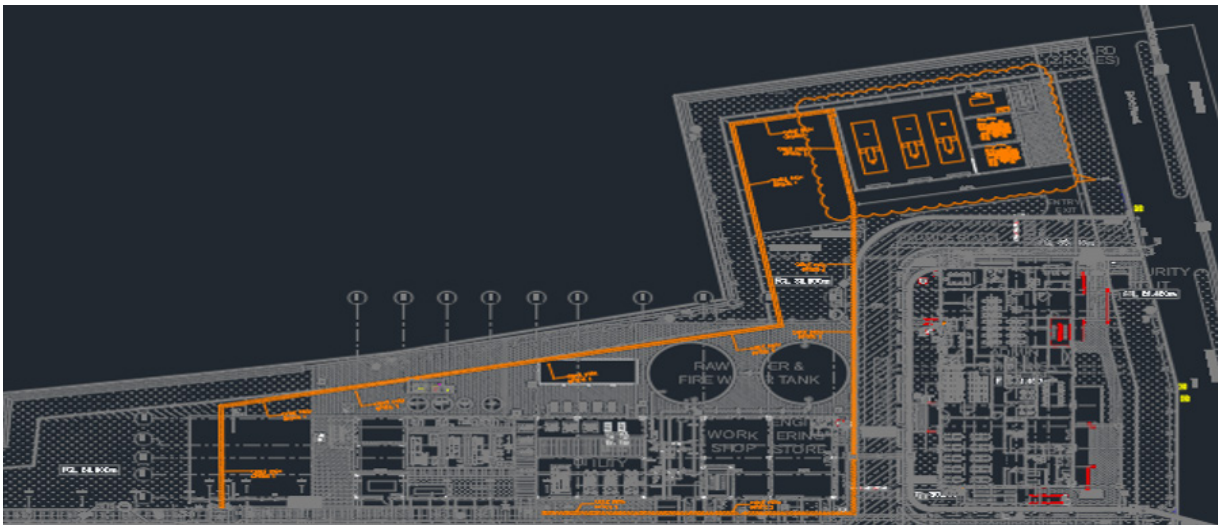


Fig 2. Proposed Location

Change Impact Assessment Methodology

The proposed substation relocation was evaluated through a multidisciplinary engineering assessment covering electrical, civil, structural, cost, schedule, and operational aspects. Key factors such as cable routing, voltage drop, infrastructure requirements, constructability, plant layout optimization, and future expansion provisions were reviewed to determine the overall feasibility and impact of the proposed change.

Technical Findings:

1. Electrical Distribution Optimization

- MV cable reduction (~100 m) was offset by LV cable increase (~150 m).
- Higher LV current levels make LV routing more critical than MV routing.
- Overall network efficiency deteriorated despite reduced MV cable length.

Engineering Observation: Electrical layout optimization should consider total system losses, cable quantity, and distribution efficiency rather than individual cable savings. No wonder the earlier consideration followed Industry standard practice of LV Substation near Load center!

2. Voltage Drop & System Performance

- Increased LV feeder lengths result in higher impedance and voltage drop.
- Greater power losses and reduced energy efficiency.
- Potential adverse impact on motor starting and load performance.
- May require larger cable cross-sections to meet design limits.

Engineering Observation: Feeder extensions must satisfy allowable voltage drop criteria and maintain acceptable load terminal voltage under normal and starting conditions.

3. Cable Infrastructure Impact

- Relocation required ~270 m of additional cable tray routing.
- Increased tray support, routing interfaces, and utility corridor occupancy.
- Additional engineering design and installation effort.

Engineering Observation: Extended cable management infrastructure increases CAPEX, installation effort, and route congestion.

4. Civil & Structural Impact

- Additional tray loading increased structural steel requirements.
- New supports required civil foundations and fabrication works.
- Higher structural loading affected multidisciplinary design scope.

Engineering Observation: Cable routing modifications have cascading impacts on structural analysis, steel tonnage, and foundation design.

5. Constructability & Installation

- Longer cable routes introduced additional bends and crossing points.
- Increased interfaces with process utilities.
- Higher probability of field clashes and installation constraints.

Engineering Observation: Direct routing enhances constructability, minimizes rework, and reduces site coordination risks.

6. Cost Impact

- Additional LV cables, trays, supports, steelwork, and civil works required.
- Increased engineering, installation, testing, and commissioning effort.
- MV cable savings were insufficient to offset additional scope.

Engineering Observation: The proposed modification resulted in a net project cost escalation.

7. Schedule Impact

- Required redesign of electrical, civil, and structural deliverables.
- Procurement revisions and construction modifications were necessary.
- Increased risk to project execution and commissioning timelines.

Engineering Observation: Late-stage layout changes generate disproportionate schedule impacts through re-engineering and procurement delays.

8. Plant Layout & Expandability

- Increased overall plant footprint and utility corridor utilization.
- Reduced flexibility for future expansion and maintenance access.
- Less efficient utilization of valuable plant space.

Engineering Observation: Substation locations should minimize distribution distances while preserving maintainability and future growth provisions.

9. CSA Review Outcome

- Existing plant zoning principles did not support relocation.
- Parking relocation options were not available.
- Process areas and utility zones could not be modified without major implications.
- Maintenance and future expansion space around the substation would be compromised.

Engineering Observation: The proposed relocation was technically infeasible from plant layout, civil, and structural planning perspectives.

Parameter	Existing Location (Near utility & plant)	New Location (NE Shifted Location)	Technical Impact / Remark
Approx MV Cable Length	135m	35m	100m less MV Cable Required
Approx LV Cable Length	120m	270m	150m more LV Cable Required
Cable Tray / Cable Rack Requirement	NA	270m	Additional Cable Rack Infrastructure Required
Voltage Drop	Low	High	Longer cable increases resistance and voltage drop, which results in poor equipment performance
Structural Support requirement	Less	High	Additional structural steel support required. Additional cable racks and supports increase structural loading
Installation Complexity	Low	High	More bends, routing coordination and supports
Aesthetic view / Plant appearance	Better integrated with utility area	Additional visible cable routing structures	Long cable racks / trays may affect overall plant aesthetics and layout cleanliness
Project Cost	Optimised	Increase	Increased cable length, tray, rack and support cost
Space Optimisation	Optimised	Less optimised	Long routing consumes more plant space
Execution Time	Less	More	Additional fabrication and installation work required
Manhours Requirement	Less	More	Additional cable routing, tray/rack installation, support fabrication and coordination activities increase engineering and construction manhours

Fig 3: Comparison Chart of Existing vs Proposed Substation

Substation Relocation Assessment and Final Recommendation

The proposed substation relocation was thoroughly evaluated from technical, commercial, engineering, and constructability perspectives. While it offered the benefit of reducing MV cable length and associated losses, it would have required extensive rework across electrical, civil & structural, BIM/3D modelling, and project documentation disciplines, including updates to SLDs, cable routing and sizing, protection studies, foundations, structural supports, 3D models, MTOs, and client-approved documents. The change would also increase LV cable length, voltage drop, cable infrastructure, installation complexity, engineering man-hours, project cost, and execution schedule, while creating space utilization and CSA feasibility concerns. Since late-stage EPCM design changes impact multiple interconnected deliverables and consume significant engineering effort, the overall disadvantages outweighed the benefits. Therefore, the proposed relocation was not approved, and the existing substation location was retained as the most technically feasible, cost-effective, and operationally optimized solution.

Final Decision

- Proposed relocation was not approved.
- Existing substation location retained as the most technically feasible, cost-effective, and operationally optimized solution.

Conclusion

This case study highlights the importance of a structured Change Management process in industrial engineering projects. The client's proposal to relocate the substation for Vastu compliance initially appeared simple; however, a detailed engineering assessment revealed substantial impacts on electrical performance, voltage drop, infrastructure requirements, project cost, execution schedule, and plant layout efficiency.

Through a systematic technical evaluation and collaboration between Electrical and Civil & Structural teams, it was determined that the proposed relocation would increase complexity without delivering significant engineering benefits. While the reduction in MV cable length offered a minor advantage, it was outweighed by increased LV distribution requirements, higher costs, additional infrastructure, and reduced operational efficiency. Consequently, the change was rejected, and the original substation location was retained as the most optimized solution.

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Change Management: Driving Safe, Efficient and Sustainable Project Delivery

Introduction: Why Change Management is Critical

In today's fast-changing business environment, engineering projects are influenced by evolving technologies, changing client requirements, regulatory updates, sustainability goals, and market dynamics. For EPC and EPCM organizations, change is an inevitable part of every project lifecycle.

Even small changes can significantly impact project scope, cost, schedule, quality, safety, and stakeholder expectations. Without a structured approach, these changes can lead to rework, delays, increased costs, and operational risks.

Change Management provides a systematic framework to identify, assess, approve, communicate, and implement changes effectively. It promotes collaboration, informed decision-making, risk reduction, and alignment among all stakeholders.

More than a project control process, Change Management is a strategic capability that enables organizations to adapt to evolving requirements, drive innovation, improve project outcomes, and achieve sustainable long-term success. Ultimately, it transforms change from a potential risk into an opportunity for growth and value creation.



What is Change Management in Plant Engineering?

Change Management is a structured process for identifying, evaluating, approving, implementing, and tracking changes throughout a project lifecycle. It ensures that any change is properly assessed before implementation to avoid negative impacts on the project.

- Common Sources of Change
  - Client requirement modifications
  - Design optimization
  - Technology upgrades
  - Regulatory and code updates
  - Safety improvements
  - Vendor data revisions
  - Construction constraints



- Supply chain challenges
- Environmental and sustainability requirements

➢ It helps evaluate the impact of changes on:
- Scope
- Cost
- Schedule
- Quality
- Safety
- Contracts and compliance

➢ Ensures all stakeholders are informed and aligned before executing changes.
➢ Reduces risks, rework, delays, and budget overruns.
➢ Improves coordination among engineering, procurement, construction, and operations teams.
➢ Supports informed decision-making and better project control.
➢ Enables organizations to adapt to changing requirements while maintaining project objectives.

Changes are common in EPC/EPCM projects and can occur throughout the project lifecycle due to technical, commercial, operational, or external factors.

Why Changes Occur in Plant Projects?

Plant projects operate in a dynamic environment where changes arise from technical, commercial, regulatory, safety, construction, and operational factors. Effective Change Management ensures these changes are assessed and implemented in a controlled manner while maintaining project safety, quality, cost, and schedule objectives.

Common Reasons for Changes

➢ Client Requirement Changes
- Scope modifications
- Capacity enhancements
- New operational requirements
- Budget-driven decisions

➢ Design Optimization
- Engineering improvements
- Efficiency and reliability enhancements
- Value engineering initiatives
- Constructability improvements

➢ Process and Technology Changes
- Process modifications
- Technology upgrades
- Advanced equipment selection
- Automation and digitalization requirements

➢ Vendor and Procurement Issues
- Vendor deviations
- Equipment availability constraints
- Material substitutions
- Long lead item challenges

➢ Site and Construction Conditions
- Unexpected site conditions
- Geotechnical findings
- Space constraints
- Construction challenges identified during execution

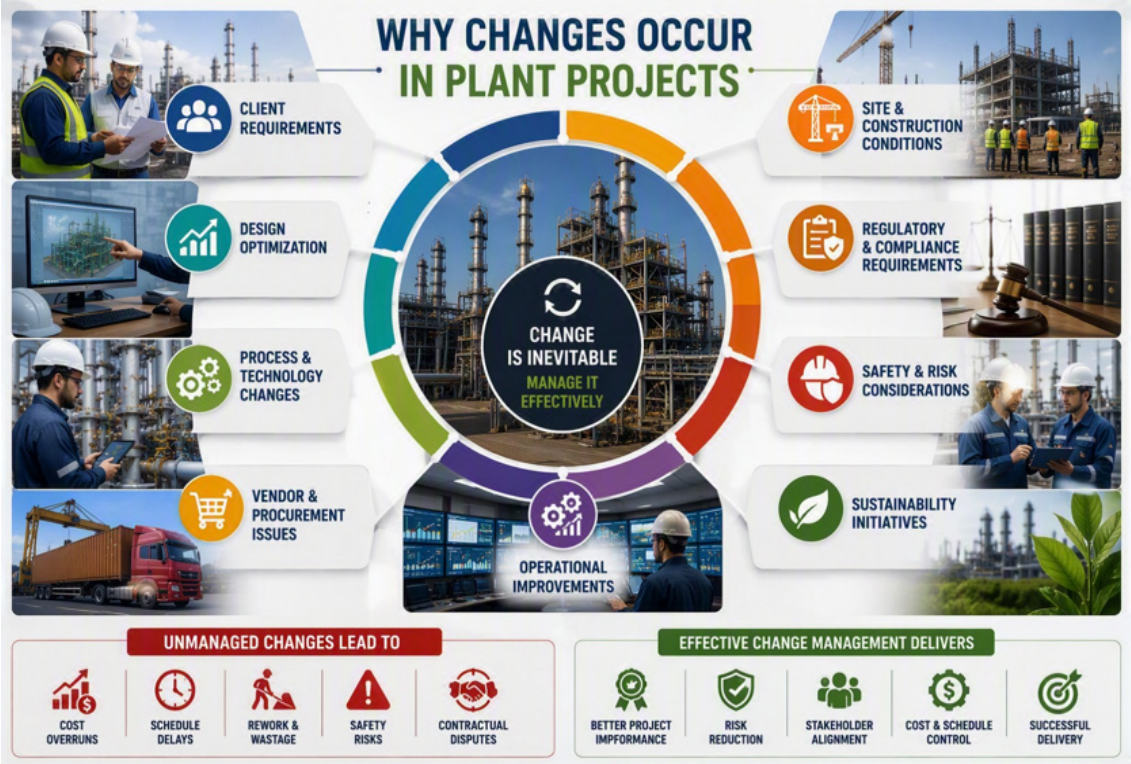
➢ Regulatory and Compliance Requirements
- New codes and standards
- Environmental regulations
- Safety requirements

- Statutory authority comments

➢ Safety and Risk Mitigation
- HAZOP recommendations
- Process safety reviews
- Risk reduction measures
- Reliability improvements

➢ Schedule and Cost Considerations
- Project acceleration requirements
- Budget adjustments
- Resource constraints
- Market fluctuations

➢ Sustainability Initiatives
- Energy efficiency improvements
- Emission reduction goals
- Water conservation measures
- ESG compliance requirements

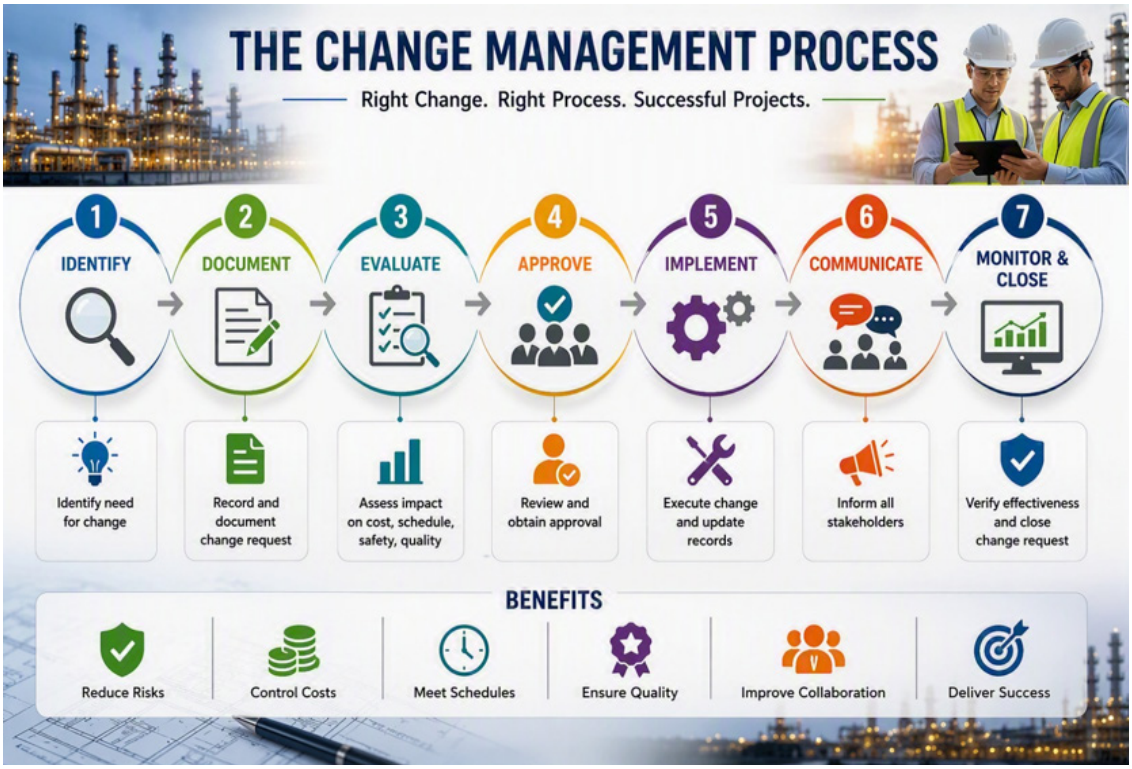


Change Management Process

Change Management is a structured and systematic process used to control modifications in project scope, design, equipment, processes, systems, or execution strategies. Its primary objective is to ensure that changes are properly identified, documented, evaluated, approved, communicated, and implemented without adversely affecting project safety, quality, cost, schedule, or operational performance.

Since plant projects involve multiple disciplines, stakeholders, and interconnected systems, even a small change can have far-reaching consequences. Effective Change Management provides a formal framework to assess these impacts, maintain project alignment, and ensure that decisions are made in a controlled and transparent manner.

Process Stages:



Digital Transformation in Change Management

Digital transformation is revolutionizing how engineering and plant projects manage change by replacing traditional manual processes with integrated digital platforms, automation, and data-driven decision-making. Modern organizations are leveraging technologies such as Digital Twins, AI, cloud collaboration, 3D models, and smart engineering platforms to identify, assess, approve, track, and implement changes more efficiently and accurately.

Within your organization, the Plant Engineering digital strategy emphasizes AI-enabled solutions, digital collaboration, and structured change management to improve operational efficiency, quality, and project outcomes. The AI & Solutions team was specifically established to support solution adoption and change management across engineering functions.

- Key Digital Technologies Enabling Change Management
  - Digital Twins for virtual simulation and impact assessment before implementing changes.
  - BIM and 3D Engineering Models for multidisciplinary design coordination and clash detection.
  - Cloud Collaboration Platforms for real-time stakeholder communication and document control.
  - AI-Assisted Engineering Reviews for faster change evaluation and decision support.
  - Data Analytics Dashboards for monitoring change impacts on cost, schedule, quality, risk.
  - Engineering Information Management (EIM) Systems for maintaining document traceability and version control.
- Benefits of Digital Transformation in Change Management
  - Faster change identification and approvals
  - Improved traceability and auditability
  - Reduced documentation errors and rework
  - Enhanced cross-functional collaboration
  - Better risk assessment and decision-making
  - Real-time visibility of project status
  - Improved compliance and governance
  - Reduced project delays and cost overruns

These benefits align with broader industry findings that digital transformation improves efficiency, data-driven decision-making, collaboration, and organizational agility

Conclusion:

A structured Change Management process enables organizations to evaluate, control, and implement changes while maintaining safety, quality, cost, and schedule objectives. By fostering collaboration, reducing risks, and supporting informed decision-making, effective change management transforms challenges into opportunities and serves as a key driver of successful and sustainable project delivery.

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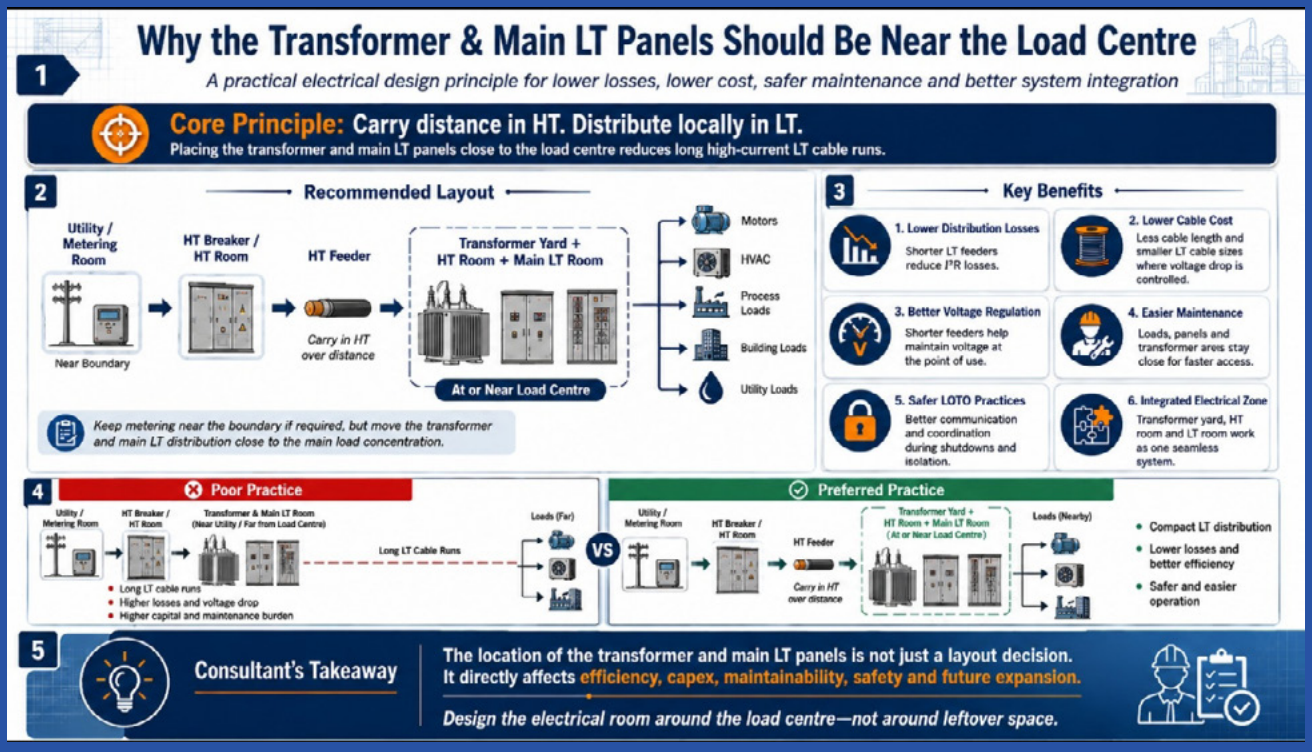


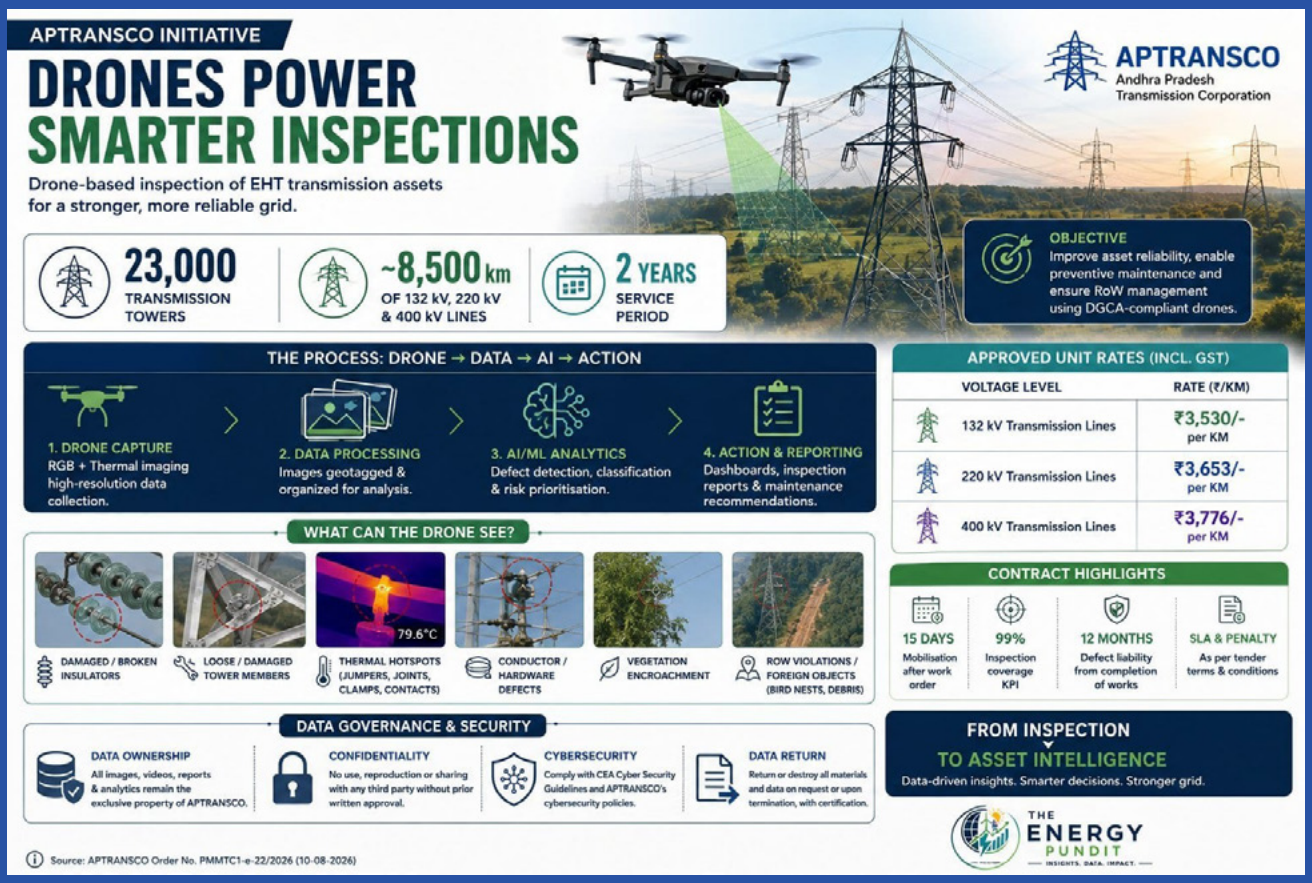
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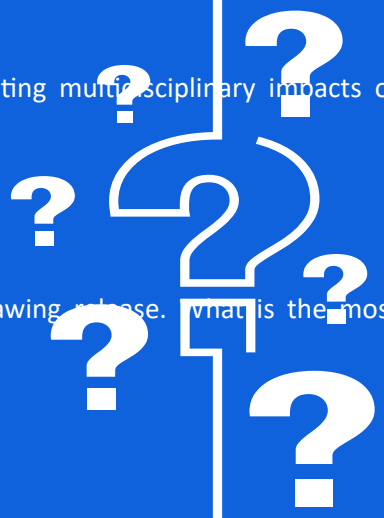
QUIZ - AUGUST 2026

1. During detailed engineering, a process licensor increases plant capacity by 15%. Which electrical engineering activity should be reviewed first to assess the overall impact?
A. Preparation of cable drum schedule
B. Verification of connected load and power system study assumptions
C. Lighting lux calculations
D. Electrical equipment painting specification

2. Which of the following best describes an effective Engineering Change Management (ECM) process?
A. Implement changes immediately to save project schedule
B. Client approval alone is sufficient
C. Impact assessment across all disciplines before implementation
D. Update drawings after commissioning

3. A client requests relocation of a 33/11 kV substation during detailed engineering. Which discipline is LEAST likely to be impacted?
A. Civil & Structural
B. Instrumentation
C. Electrical
D. Process Simulation Software Licensing

4. Which modern digital engineering tool provides the most value in evaluating multidisciplinary impacts of engineering changes?
A. Microsoft Excel
B. BIM / Revit-based 3D Model
C. Word Processor
D. PDF Reader



5. A major transformer supplier revises transformer dimensions after IFC drawing release. What is the most significant project risk if this change is not controlled properly?
A. Increased drawing print cost
B. Reduced document storage space
C. Construction rework and schedule delay
D. Additional office stationery consumption

6. According to modern energy transition trends, which factor is increasingly becoming as important as sustainability?
A. Decorative architecture
B. Energy security and resilience
C. Office aesthetics
D. Paper documentation

7. Which of the following would generally qualify as a Force Majeure event affecting electrical projects?
A. Poor engineering calculations
B. Failure to review drawings
C. Flooding affecting substation construction
D. Incorrect cable sizing

8. An AI-powered electrical design review tool identifies a cable tray clash that was missed during manual review. What is the principal project benefit?
A. Increased transformer losses
B. Reduced engineering productivity
C. Early detection of rework risks
D. Increased project documentation volume

9. For Management of Change (MoC), which document is most likely to require revision following modification of a motor control center location?
A. Attendance sheet
B. Travel request form
C. Earthing layout drawing
D. Employee ID card register

10. Which statement best reflects the mindset required for successful engineers in today's global environment?
A. Avoid all project changes
B. Accept every client request without evaluation
C. Balance flexibility with engineering discipline
D. Focus only on one's own discipline

Bonus Challenge Question (Open Category)
A 10 MW process plant under detailed engineering receives a late-stage client request to add future provision for an additional production train. List at least five electrical engineering documents/studies that may require review or modification.
Suggested Answers:

- Load List
- Transformer Sizing Calculation
- Short Circuit Study
- Cable Schedule
- Cable Tray Layout
- SLDs
- Earthing Design
- UPS Sizing
- DG Sizing
- Relay Coordination Study
- Substation Layout
- Lighting System Calculations

- The quiz will be open for the following month.
- Each question carries 10 marks.
- Please use following google form link to participate in this month's QUIZ- https://forms.gle/ZwTBGQbPbKfPmXuQ6

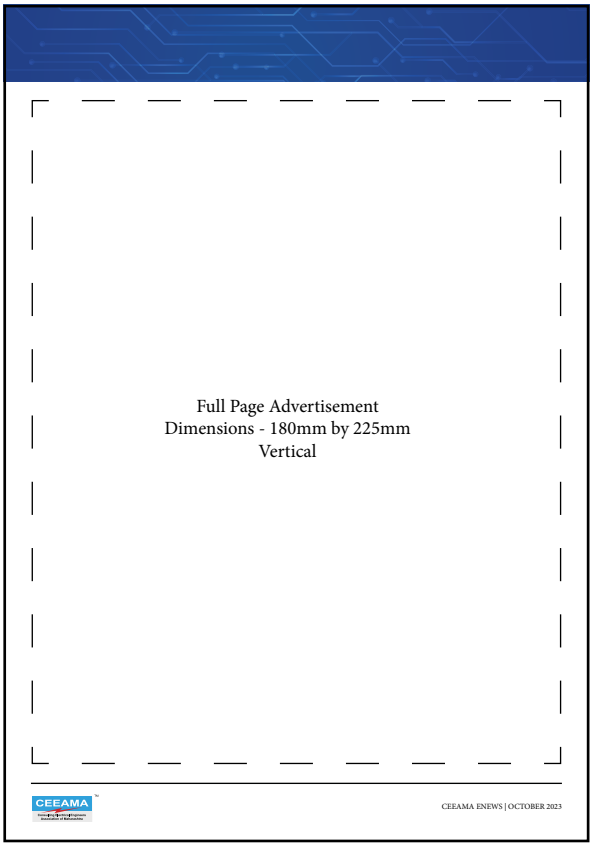
Thank you for the overwhelming response to the E-NEWS, especially the E-Quiz. MCQ-based quizzes often challenge our understanding and encourage us to think more deeply about technical concepts. Our aim is to spark curiosity, help you assess your technical awareness, and identify topics that deserve greater discussion and learning.

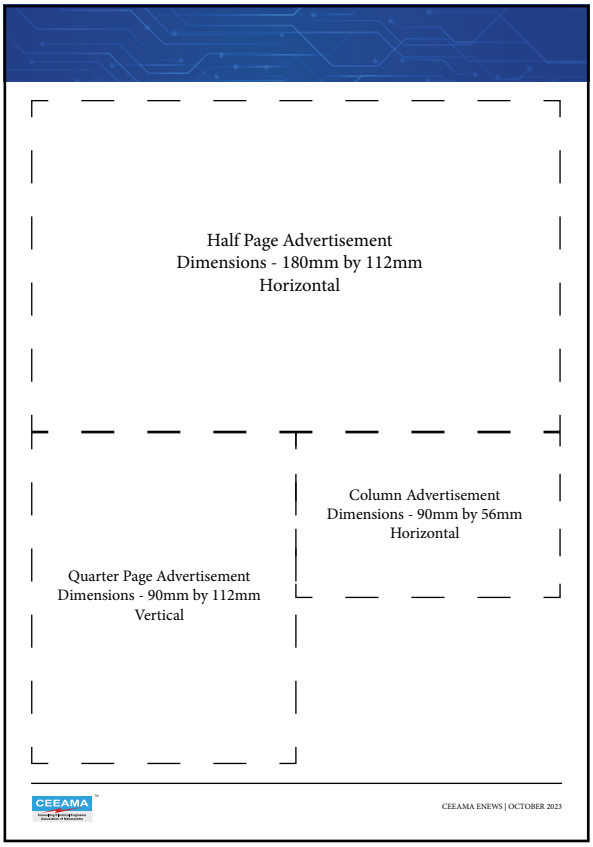
Wishing you the very best for this round — keep participating and spread the word!

July 2026 Quiz Answers

1. b) Floods disrupting supply of switchgear
2. a) Lightning strike damaging transmission lines
3. b) Electrical projects often depend on global supply chains
4. b) Unauthorized access to control systems
5. c) Contractor's poor cable management
6. a) Extension of commissioning timelines
7. a) Civil unrest halting site access
8. b) Wind farms depend on stable climate conditions
9. a) Delivery of imported circuit breakers
10. a) COVID-19 pandemic disrupting transformer imports

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