Presentation on

Technical and Financial Proposal for the Problem Statement "Simplified OHE Cantilever Design"

Presented to Indian Railways

Presented by

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Introduction

- Government of India, through its initiatives like Start-up India, Atal Innovation Mission, Make in India, Innovations for Defense Excellence etc., encourages Indian entrepreneurs and innovators to participate in the development of innovative solutions to address technological problems of various sectors in the country including Indian Railways.

- Indian Railways through its innovation policy, E&R no. 01/2022, intends to engage with the entrepreneurs, technology developers and innovators, through Startups, to get low cost user friendly reliable products and solutions for use on Indian Railways network.

Problem Statement

- One of the problem statement posted in the Indian Railways Innovation Portal is “Simplified OHE Cantilever Design”.

Technical Requirement

- ✓ Suitable for train speed of 250kmph.
- ✓ Number of components should be less.
- ✓ Life of Cantilever should be longer than the existing Cantilever in polluted, coastal, hills and industrial area.
- ✓ Negligible mechanical and electrical failures.
- ✓ Suitable for Overlap, Turnout, under restricted clearance over-line structures locations.

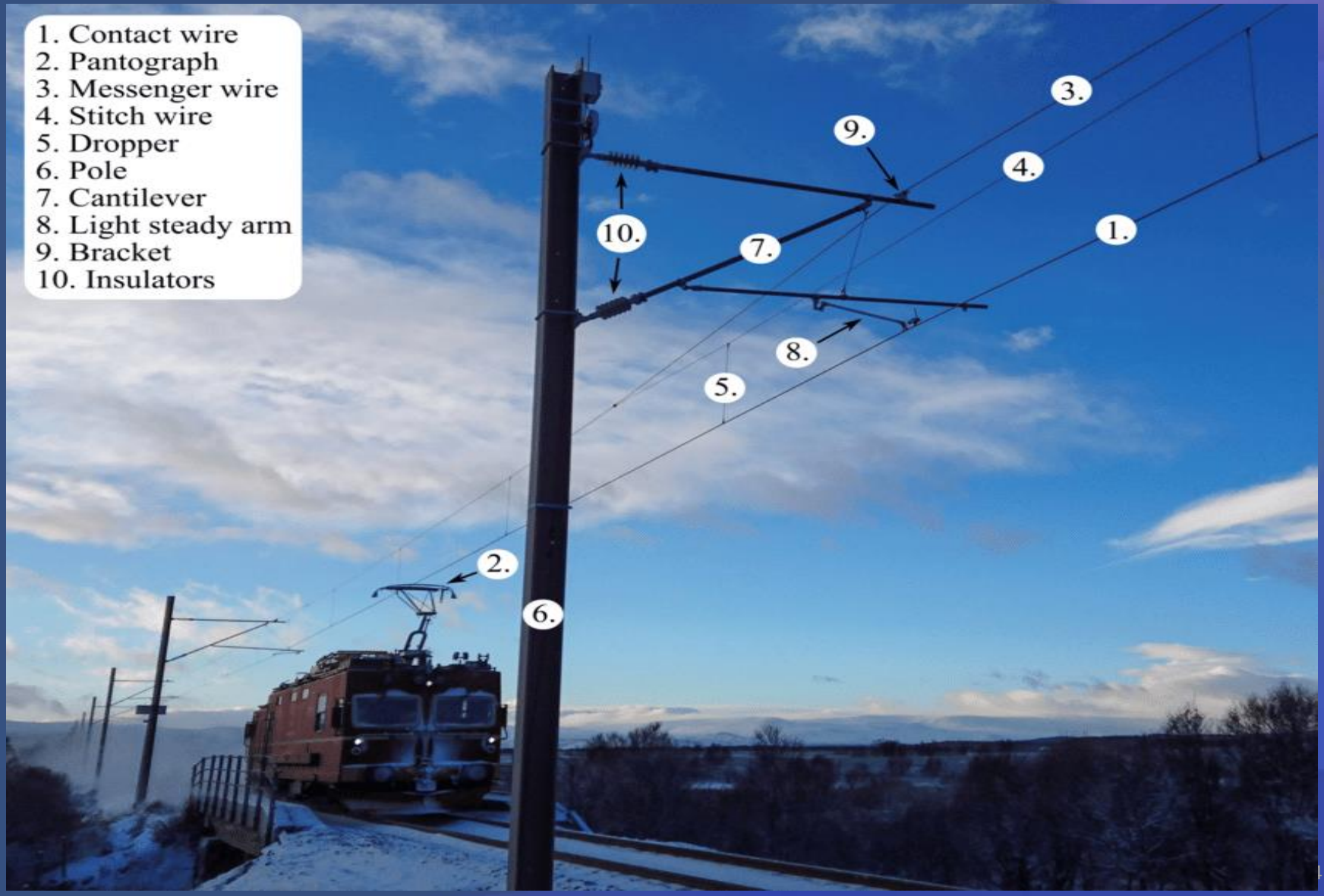
Functional Requirement

- ✓ Easy Installation, handling, interchangeability & transportation.
- ✓ Maintenance free.
- ✓ Light in weight.

Categorization & Scalability

- ✓ Categorization of intended use: Vital
- ✓ Safety critical or non-safety critical: Safety Critical
- ✓ Scalable Qty & unit: 50 Number

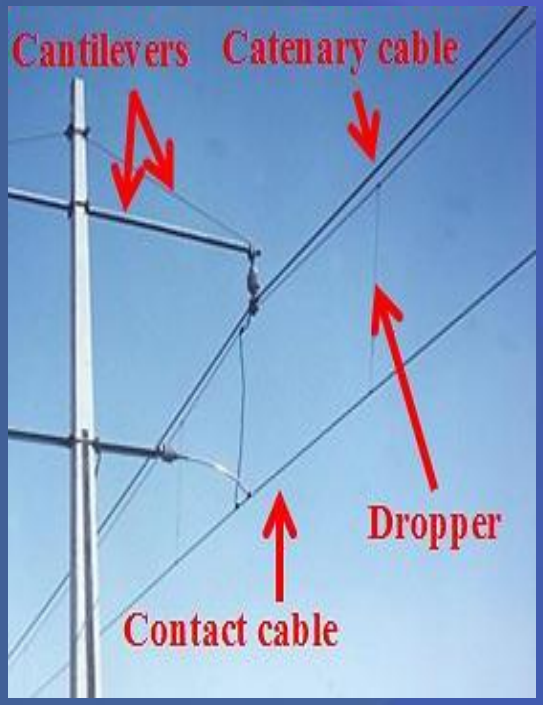
Present OHE System in Indian Railways



Some of the options studied

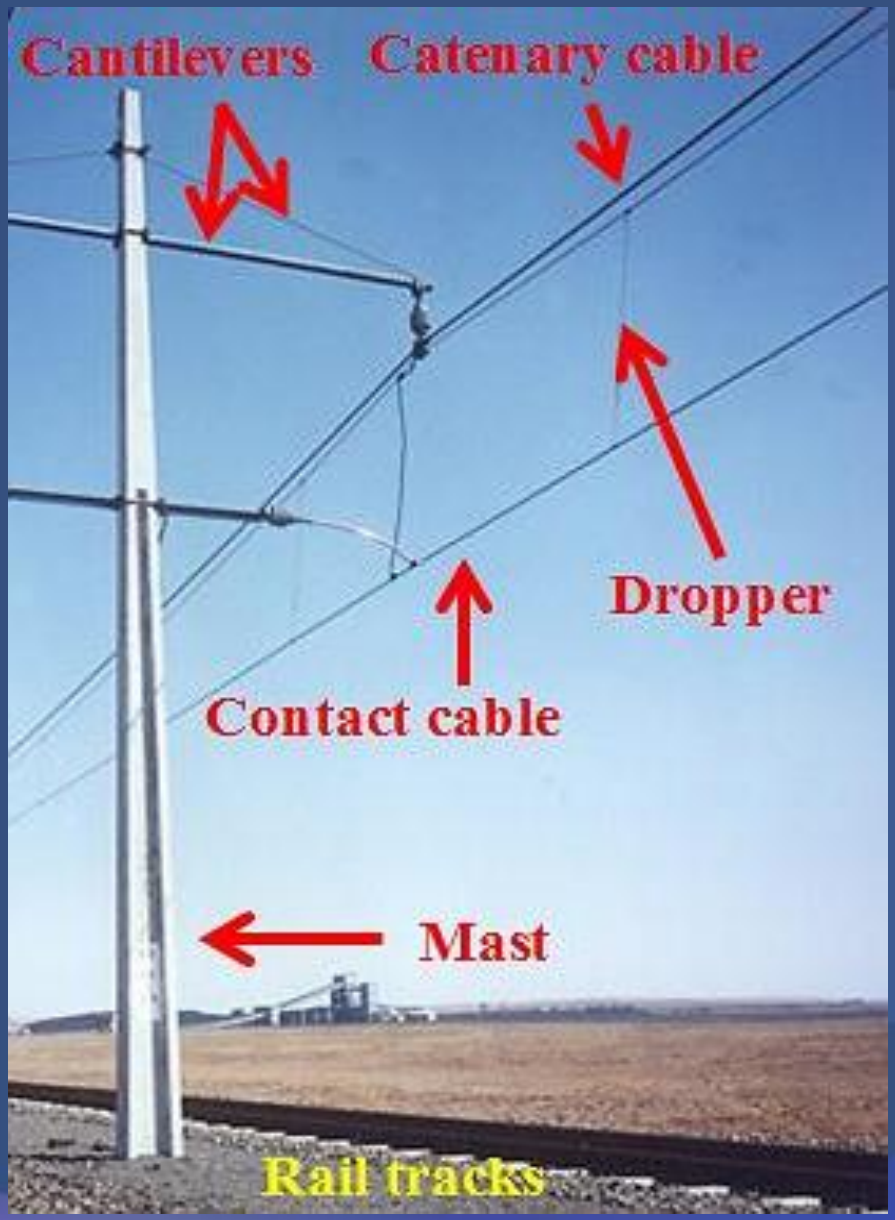
Option-1

Option-2



Option-3

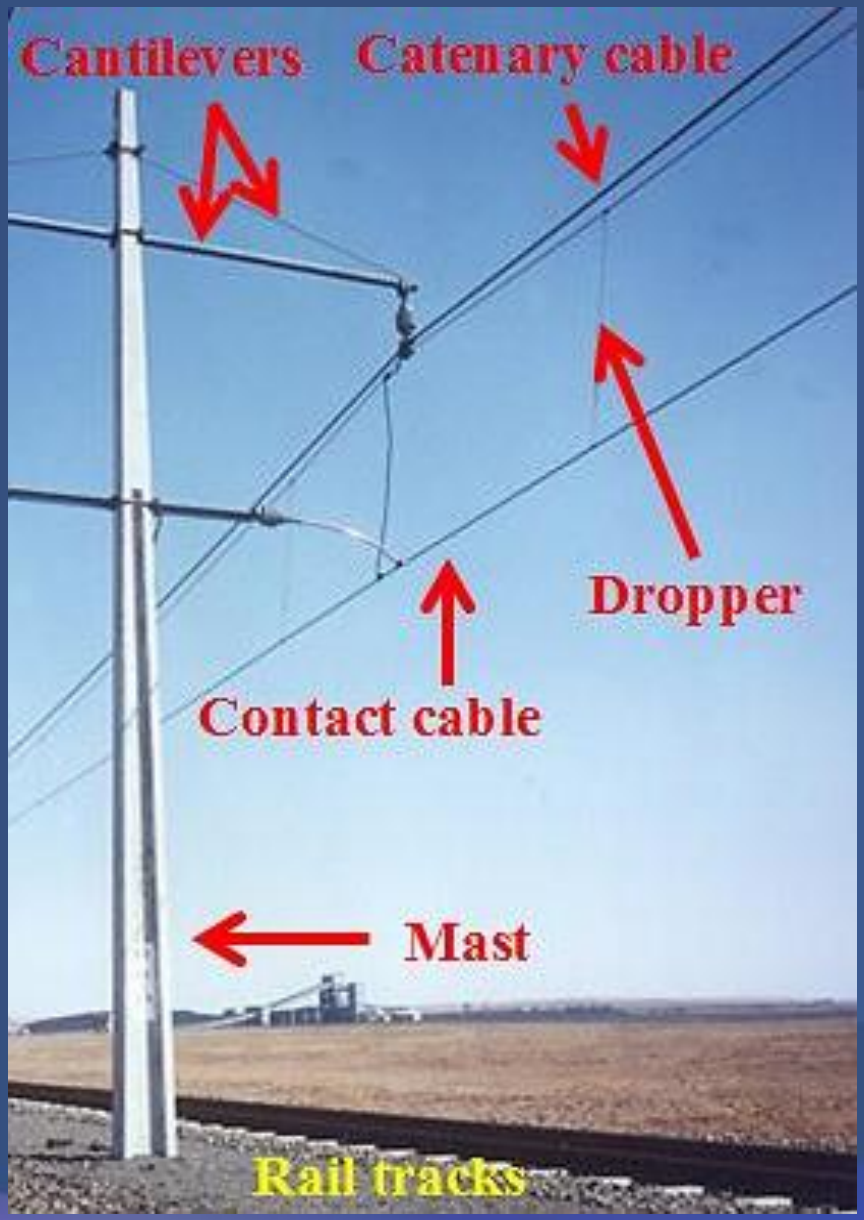
Proposed OHE System for Indian Railways



Salient Features:

- ✓ Number of components is less.
- ✓ Easy Installation, handling, interchangeability & transportation.
- ✓ Maintenance free.
- ✓ Light in weight.
- ✓ Expected to be suitable for train speed of 250kmph as it is used in Railroad Corridors of Austria
- ✓ If Fibre Reinforced Plastic (FRP) or 2DPA-1 or Aluminium material is used instead of mild steel then life of Cantilever will be longer than the existing Cantilever in polluted, coastal, hills and industrial area.
- ✓ Negligible mechanical and electrical failures are expected.
- ✓ Expected to be suitable for Overlap, Turnout, under restricted clearance over-line structures locations.

Product Competitors



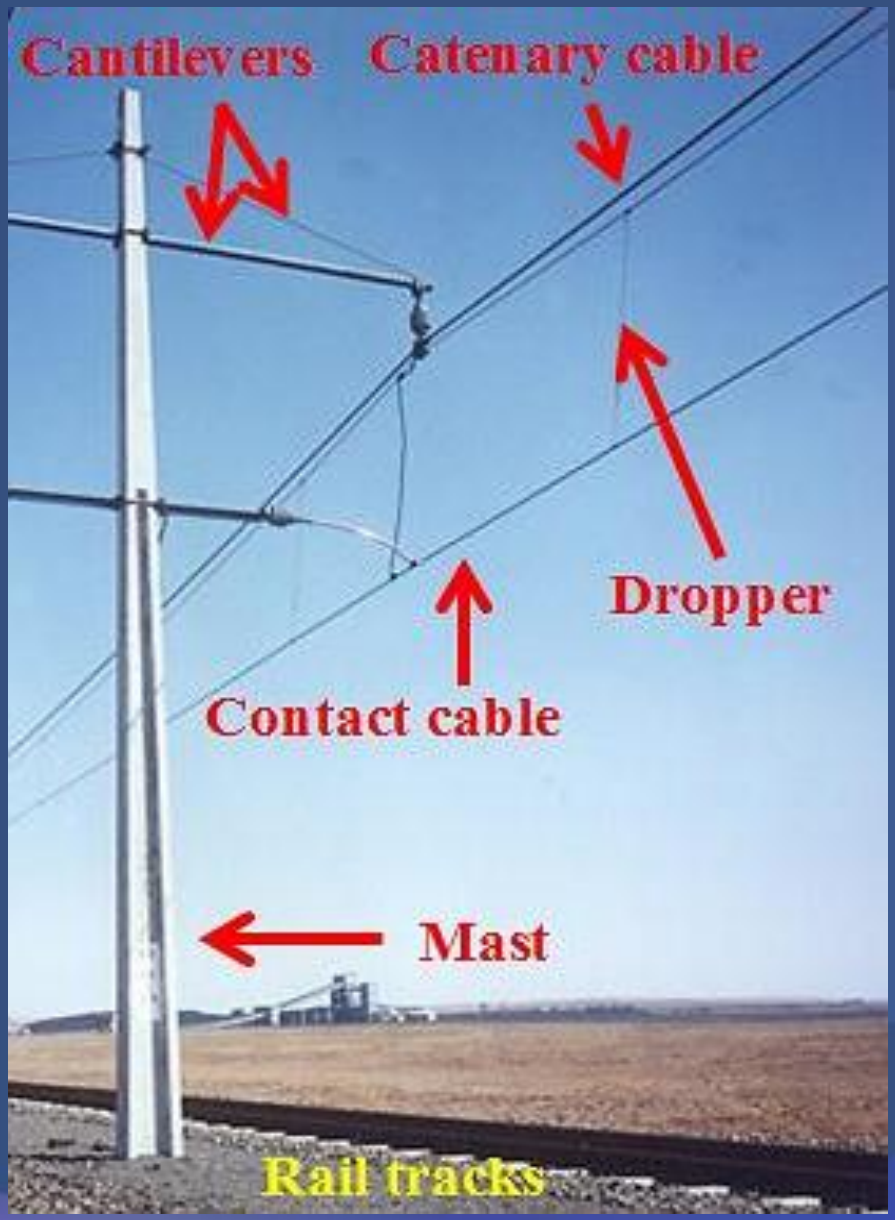
Salient Features:

As Indian Railways has published its innovation policy only in 2022 (E&R no. 01/2022) to engage with the entrepreneurs, technology developers and innovators, through Startups, to get low cost user friendly reliable products and solutions for use on Indian Railways network, very few or negligible direct/indirect competitors are expected outside the organization of Indian Railways as the domain experts in Railway Engineering are very few in private sector.

Unique Value Features of the product:

Novelty, Efficiency, Accommodative to High Speed operation of trains with safety leading to increased frequency of trains, quick transport of raw materials & goods and travel time savings for passengers.

Business Model



Salient Features:

As per the innovation policy of Indian Railways, order for initial scalability of the product will be placed by Railways directly to the innovator. For this product, Railway is planning to scale up the quantity to 50 numbers initially. Thereafter depending upon the supply capacity of the product from the innovator, more orders are expected from 68 divisions of 17 Railway zones in India.

Regarding the Business Model, it is envisaged that one time payment business model seems to work out for this product initially and thereafter manufacturing of product will be based on orders received. In addition Online Market Place option shall be provided to facilitate various Railway divisions to place the order and pay advance online.

Technical Design Features

- ✓ Calculation of horizontal load, moment and its deflection considerations.
- ✓ Calculation of vertical load, moment and its deflection considerations.
- ✓ Design of Cantilever to hold the Catenary wire.
- ✓ Design of Cantilever to hold the Contact wire.
- ✓ Specifications for droppers, catenary cables, contact cables, insulators, fixing plates including its bolts & nuts.
- ✓ Specifications for supply of 25 KV power to the proposed system through feeder line arrangements.

Work Breakdown Structure

List of tasks
• Structural Analysis to estimate horizontal & vertical moments and deflections.
• Steel structure design of Bracket assembly and required fittings.
• Selection of durable material for cantilever bars which satisfies the above design specifications as well as withstands harsh environment and suitable for various sections of track network.
• Procurement of the required bracket, fitting and cable materials as per design and specifications which are less in weight.
• Fabrication of the bracket assembly at workshop.
• Handling, transportation and installation at site.
• Testing and scheduling maintenance arrangements.

Software Tools
• Structural Analysis software like Staadpro/Etabs etc.
• Steel structure design utilities like branded or customized tools developed as per IS 800.
• Project Management tools.
• Communication tools.
• Project Monitoring and Evaluation tools.

Man power resources		
Sl.No	Resource	Numbers
1.	Steel structure analysis & design expert	1
2.	Electrical Engineer	1
3.	Project Manager / Lead	1
4.	Procurement specialist	1
5.	Fabrication & installation experts	2
6.	Testing and maintenance trainer	1

Deliverables

- ✓ OHE Bracket analysis results and design
- ✓ Fabricated bracket assembly model
- ✓ Installation and maintenance guidance

Future Plan

As the Indian Railway network extends about 67,368 route km and 1,15,000 track km in which 83% are electrified, the potential for commercializing this product is huge which is exclusive of the Royalty payment to the innovator.

Financials

Cost of simplified OHE Cantilever fabrication with modern materials		
Sl.No	Breakup of Total Cost	Cost INR
1	Procurement of modern Glass Fibre Reinforced Polymer (GFRP) bracket Materials excluding mast	50,000
2	Fabrication, Erection & Testing of Bracket assembly	50,000
3	Lifecycle cost including maintenance	1,00,000
4	Fees of Project lead & Steel structure design expert	1,50,000
5	Fees of Electrical Engineer-OHE	1,50,000
	Total Project Cost	**5,00,000**

Timelines

Breakup of total project time of 3 Months:

- ✓ Structural analysis and design – 1 month
- ✓ Procurement of bracket assembly and its constituents – 1 month
- ✓ Fabrication, Installation, Testing and Monitoring – 1 month

About My Profile

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Education:

- *Schooling from Chennai*
- *Under graduation degree from Annamalai University*
- *Post graduation and Doctorate from Anna University*

Experience: 20 years professional experience out of which more than 10 years experience in Railway projects.

Awards:

- *CDM Smith's Encore Team 2-5 appreciation award for impressive contributions and Great work at CDM Smith*
- *CDM Smith's award for outstanding contribution to the company*
- *CDM Smith's Service award in grateful appreciation of 5 years and 10 years of dedicated service*
- *Prof. Thillainayagam's Endowment prize and Gold Medal for securing highest marks in the project work in PG Engineering*
- *Prof. R.M Sethunarayanan's Endowment Prize for All-round Proficiency in UG Engineering*

End of the Presentation

Questions?

Thankyou for your attention