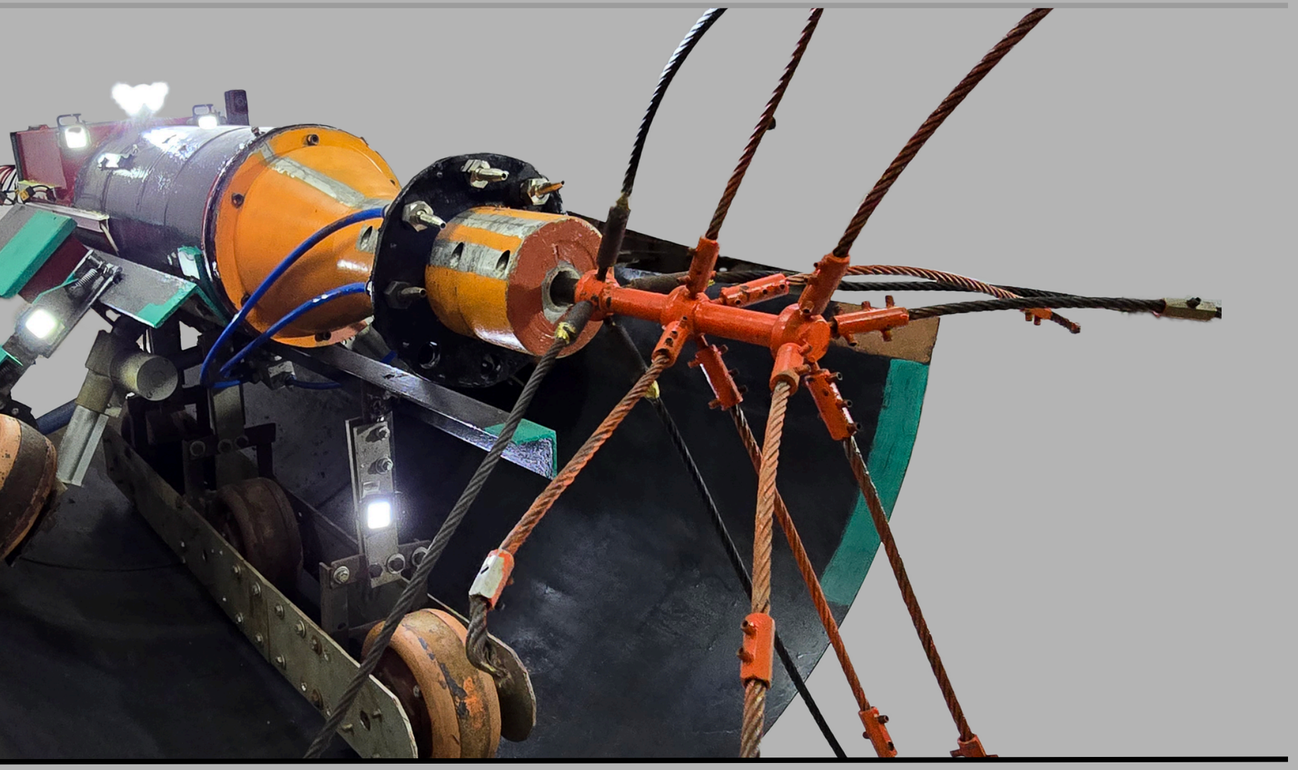
GRASS ENGG.

PIPELINE
DESCALING/ MAINTENANCE

2026



PROJECT
M-TBM

www.grassengg.in

operations@grassengg.in

GRASS

MTBM PROJECT IS DEVELOPED UNDER
GRASS ENGINEERING PVT. LTD.

GRASS ENGG. Pvt. Ltd. is a research-driven engineering and manufacturing company focused on developing indigenous industrial assets built for scale.

We design innovative specialized machinery in fields of propulsion systems, marine mobility, and Industrial problem-solving technologies, creating foundational platforms that enable long-term industrial growth.

Our team is dedicated to developing supply chain eco-system that are that support critical infrastructure, contributing meaningfully to the nation's industrial advancement.

Website : grassengg.in Email : operations@grassengg.in JAMSHEDPUR 831001

PROBLEM OVERVIEW

2025

PIPELINE DESCALING/ MAINTENANCE

Documentation of the Pipeline deposition and maintenance process.

The video is a documentation of Industrial pipeline maintenance process at TATA Steel Kalinganagar.

Showing the scale and workforce required to carry out the task of dismantling of pipes, Hot work, flange making and the slag deposition present in the pipelines.

PIPELINE RESTORATION/MAINTENANCE

ASSOCIATED PROBLEMS

01 Labor-Intensive & Hazardous

- 11–15 personnel required
- Confined spaces & hot work exposure
- High safety & liability risks

02 High Time & Cost

- 12–13 day shutdown
- ₹2–3 lakh per pipe section
- ₹40+ lakh for a 15 meter long section of 1200 mm diameter.

03 Complex Physical Dismantling

- Cutting, welding, flange fabrication
- Scaffolding erection
- Large sections removed
- Heavy machinery for high-elevation access

04 Environmental & Operational Loss

- Debris dumping & land damage
- Toxic gas exposure risks
- Production downtime
- Revenue loss

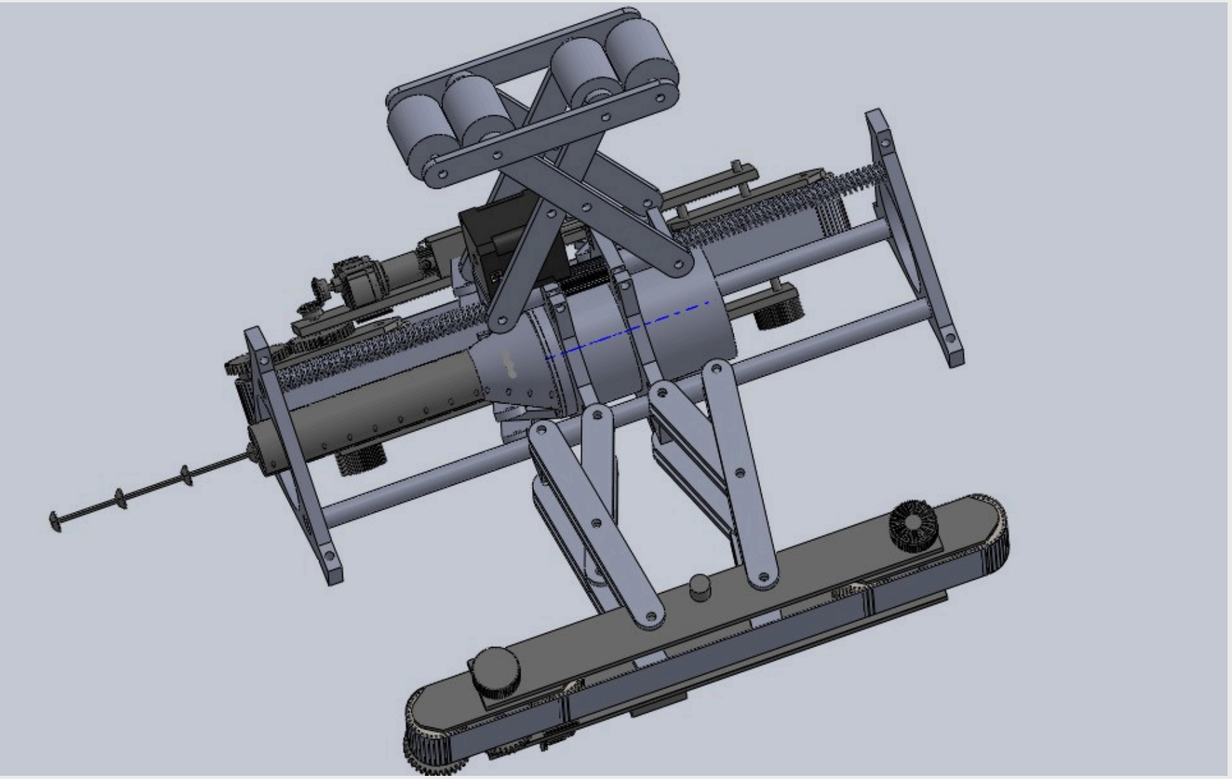
SOLUTION : M-TBM

MINI TUNNEL BORING MACHINE

A VIABLE SOLUTION MUST:

- Work inside the pipeline.
- Avoid dismantling or cutting.
- Eliminate human exposure to toxins.
- Handle abrasive, sticky deposits.
- Operate in low visibility.
- Be remotely controlled.
- Be adaptable to site conditions.
- Capability to drain-out deposits.
- Deposit extraction and handling.

2025



CAD illustration of Prototype 1

Demonstrating In-House
designing , manufacturing
and assembling capabilities.

DEVELOPEMENT HISTORY

PROJECT TIMELINE

1. **Jun 2024**
   - 1st Site Survey Problem Assessment

2. **July 2024**
   - LOI Granted [Letter of Intent]

3. **Aug 2024**
   - Work Order Issued

4. **Sept. 2024**
   - Ideation of Solution
   - Process Planning
   - Resource Mobilization
   - Design Phase

5. **Oct 2024**
   - Fabrication
   - Assembly

6. **November 2024**
   - Fabrication
   - Assembly

7. **December 2024**
   - Testing Pipeline Inspection at TSK

8. **Jan 2025**
   - Prototype – 1 ready for 1st mechanical trial

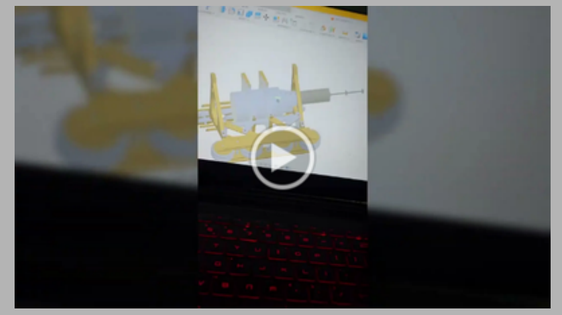
9. **Feb – 2025**
   - 1st Prototype performed mechanical trial
   - Meeting b/w us and TSK Utilities Chief
   - 9 points of developments to be made were discussed

10. **May – 2025**
    - Development of 2nd Prototype begins

11. **Dec – 2025**
    - 2nd Prototype completion
    - Internal Testing completed

12. **Jan– 2026**
    - 2nd Prototype Ready For mechanical testing

13. **Jan–Feb 2026**
    - Establishment of GRASS ENGG. private limited



Montage of Development and proof of concept.

The technology has evolved from an initial AC-cabled system to a more stable, second-generation wireless DC model.

Field Validation accomplishing 3 objectives :

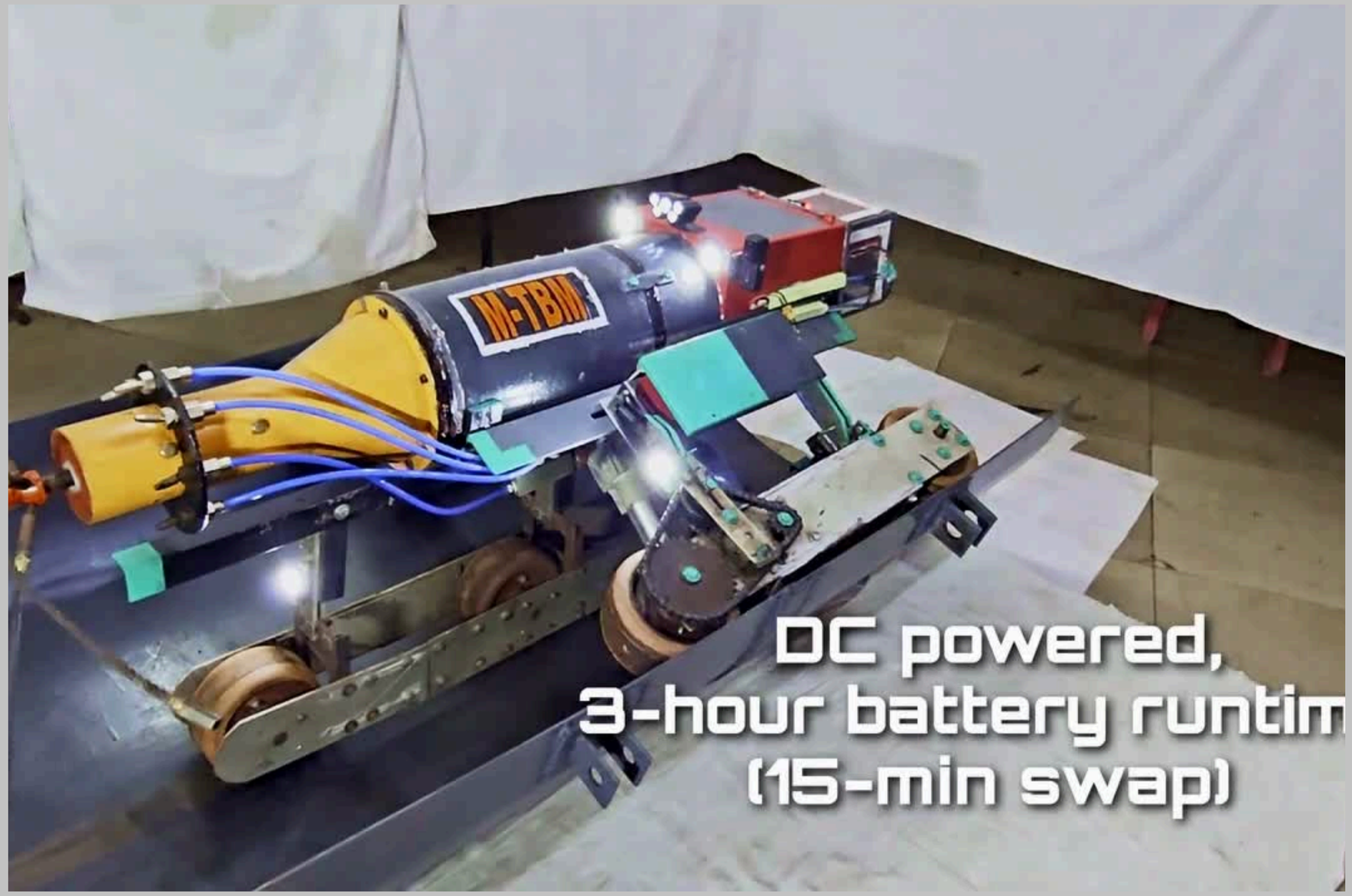
- To demonstrate effectiveness of the cutting assembly.
- The ability of M-TBM to traverse inside the pipe.
- Ability of M-TBM to drain the debris outside the pipe.

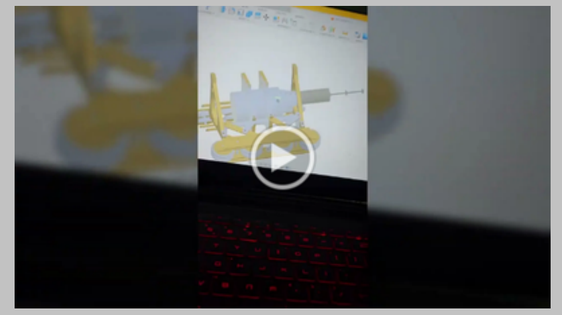
GRASS

2025 - 2026

FASTER OPERATIONAL SPEED
WIRELESS CONTROL SYSTEM
BATTERY POWERED.

PROTOTYPE 2





M-TBM Prototype 2

The M-TBM offers a platform for in-situ pipe maintenance, extends operational life and delays capital required for pipe replacement.

The design and engineering of the platform is derived from real-time information gathered during shut-downs and site maintenance conducted by out team at TSK.

M-TBM DEPLOYMENT PROCESS

Work Execution

M-TBM will be lifted to the provided opening and will be attached to the pipe segment.

+

Fire hydrant nozzle will be connected to the M-TBM.

↓

The cleaning process will start.

↓

The slurry will start to come out of the pipeline from the designated exit point.

→

The slurry will fall into a flexible pipe and run-off will be collected inside the tanker truck.

↑

The M-TBM will reverse back inside its shell and the crane will bring it down.

Process completes.

Requirements

- We must be provided an opening on one end of the pipeline.
- We must be provided a fire hydrant connection.
- We will require a crane to lift the M-TBM to the opening provided.
- We will require tanker trucks to transport the collected deposit slurry to safe dumping.

EXISTING CAPABILITIES

01 **Remote Pipeline Traversal**

Wireless, DC-powered machine capable of operating inside industrial pipelines while being controlled remotely, minimizing dismantling and performing Hot-Work/ fabrication jobs.

02 **Integrated Cleaning & Cutting System**

High-speed rotating shaft (up to 5000 RPM) with wire-rope assembly designed for descaling, debris removal, and internal pipe cleaning without damaging pipe walls.

03 **Adaptive Mobility System**

Chain-driven wheel system with 120 N-m combined torque enabling stable traversal inside pipelines up to 1 km/hr depending on application.

04 **Expandable Structural Platform**

Radial expansion through linear actuators and central load-bearing legs allows secure positioning and adaptability across pipeline diameters.

05 **Integrated Water & Debris Management**

Internal water distribution and exhaust system supports cutting, debris flushing, and dust suppression during cleaning operations.

06 **Onboard Vision & Monitoring**

Camera and high-intensity lighting system provide real-time inspection and monitoring inside dark industrial pipelines.

KEY USP OF THE M-TBM PLATFORM

01 **Eliminates Pipeline Dismantling**

Enables in-situ maintenance, avoiding cutting, welding, and re-fabrication.

02 **Significant Shutdown Reduction**

Designed to reduce pipeline maintenance downtime and operational disruption.

03 **Improved Worker Safety**

Removes human exposure to confined, hazardous, and high-temperature industrial environments.

04 **Compact Industrial Design**

1.8 m machine length allows deployment in highly restricted industrial pipeline spaces.

05 **Wireless Battery Operation**

No trailing power cables; suitable for wet, hazardous, and electrically sensitive environments.

06 **ESG & Environmental Compliance**

Prevents debris dumping and reduces industrial waste from pipe replacement.

CURRENT LIMITATIONS OF M-TBM PLATFORM

- Current Model requires Field Validation.
- Current Model cannot tackle bends.
- M-TBM can only service Straight Pipe sections.
- Slurry Collection System is not Universal and requires Site planning.
- M-TBM cannot completely eliminate the manual maintenance process

FUTURE DEVELOPMENT

The platform presents significant **untapped potential** across industrial maintenance operations, including:

- Cleaning of rotary kilns
- Agitator tank maintenance
- Chimney and stack cleaning
- Vertical hopper cleaning and inspection

Planned capability expansions include:

- Internal surface painting
- Epoxy coating applications
- Wall thickness measurement and inspection
- Adaptation for rotary kiln environments

GRASS ENGG.

We aim to develop the M-TBM to be a versatile industrial asset.

The current objective is to obtain trial order for demonstration the M-TBM in your live facility

Obtain proper Guidance and resources for automation of the project.

To establish network for proper compliance and deployment.

GRASS ENGG.

THANK YOU FOR YOUR TIME.

Contact Information

GRASS ENGG. Pvt. Ltd.
Swarn Swarup Tower 00215, New Kalimati Road, Sakchi, East Singhbhum, Sakchi, Jharkhand, India, 831001.

+91 6204488701
operations@grassengg.in
Website : https://grassengg.in/

For technical discussions or partnership inquiries regarding the M-TBM Project, please contact us directly via email with project details.