



## AUTOMATED & INTELLIGENT MACHINE-AIDED CONSTRUCTION – SCIENCE & TECHNOLOGY

**NEWS:** The Automated & Intelligent Machine-aided Construction (AIMC) system will expedite construction, and provide real-time data on the status of each highway project.

### WHAT'S IN THE NEWS?

#### Introduction to AIMC in Highway Construction

##### 1. Objective:

- To address delays in National Highway projects by using Automated & Intelligent Machine-aided Construction (AIMC) systems.
- AIMC enables real-time monitoring of project progress and quality at every stage of construction.

##### 2. Real-Time Data Integration:

- Surveys are conducted simultaneously with construction, generating real-time data shared with stakeholders, including the Ministry of Road Transport & Highways (MoRTH).
- This ensures up-to-date information for effective decision-making and project management.

##### 3. Stakeholder Consultation:

- MoRTH issued a draft circular to stakeholders like NHAI and NHIDCL, seeking feedback and suggestions for AIMC adoption in National Highway projects.

#### Need for AIMC

##### 1. Addressing Delays:

- Out of 952 ongoing projects (each costing more than ₹150 crore), **419 projects** have surpassed their original completion schedules.
- Causes include outdated technology, poor contractor performance, and unavailability of updated project information.

##### 2. Revolutionizing Construction with Technology:

- Intelligent machines, powered by advanced technologies like GPS, enhance road durability, productivity, and adherence to schedules.
- The system reduces manual interventions and ensures faster project completion.

#### Pilot Implementation of AIMC

##### 1. Lucknow-Kanpur Expressway Project:

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- AIMC was piloted in the **63-km long Awadh Expressway** using machines like GPS-aided motor graders, intelligent compactors, and stringless pavers.
- Results from this project will guide the nationwide rollout of AIMC.

## 2. Advantages Highlighted in Pilot:

- Reduction in manpower requirements.
- Continuous construction during night hours.
- Simultaneous surveying and quality checks.

## Key Features of AIMC Machines

### 1. Technology and Functionality:

- AIMC machines rely on **project-specific data input**, unlike AI, which processes pre-existing datasets.
- Machines like GPS-aided motor graders and intelligent compactors ensure precision in construction.

### 2. Automated Quality Surveys:

- Traditional post-stage surveys are replaced by real-time quality monitoring, ensuring consistent data flow to stakeholders.

## Working Mechanism of AIMC Machines

### 1. GPS-Aided Motor Grader:

- Utilizes **3D machine control technology** with Global Navigation Satellite System (GNSS) and angle sensors.
- Calculates precise blade orientation and compares it with digital design plans for accurate grading of embankments and pavement layers.

### 2. Intelligent Compaction Roller (IC Roller):

- Minimizes post-construction consolidation by reducing voids, air pockets, and water in materials like soil or concrete.
- Prevents road damage and enhances long-term durability.

### 3. Other AIMC Tools:

- **Stringless Pavers:** Ensure smooth and precise layer application without manual string line setups.
- **Tandem Vibratory Rollers:** Compact soil and pavement layers uniformly.



## Benefits of AIMC Implementation

### 1. Enhanced Construction Quality:

- Real-time surveys ensure adherence to quality standards at every stage of the project.

### 2. Time and Cost Efficiency:

- Faster construction timelines with reduced reliance on manpower and manual surveys.
- Minimization of errors reduces rework costs.

### 3. 24/7 Construction Capability:

- Machines enable nighttime operations, expediting project completion.

## International Benchmarking

### 1. Global Practices Studied:

- MoRTH examined AIMC implementations in the **US, Norway, and European Union countries** to design India's plan.

### 2. Adaptation for Indian Context:

- Customization of AIMC tools and strategies to address challenges specific to Indian infrastructure projects.

**Source:** <https://indianexpress.com/article/explained/roads-ministry-intelligent-machines-national-highways-construction-9737533/>