

TECHNICAL PROPOSAL



Modernization of Gantry Crane Motors & Controls

Using Siemens Motors and VFDs for AI-Vision Guided Autonomous Operation

Prepared for: ITC Mysore Facility



Oxmaint Inc.

December 2025



INTRODUCTION



The bale-unloading gantry cranes at the **Mysore ITC facility** currently operate using joystick-based relay/contactors and fixed-speed SEW geared motors.

This limits **precision, speed variability, and automation readiness** for modern AI-vision guided operations.

PROJECT GOAL

Upgrade cranes to enable AI-vision-guided autonomous movement, requiring **precise speed control, soft acceleration, and PLC-integrated operation.**

EXISTING SYSTEM OVERVIEW

Current mechanical and electrical configuration at ITC Mysore



Mechanical

SEW-EURODRIVE geared motors

Power: 0.75–2.2 kW typical

Gear ratios for controlled motion



Electrical

Joystick + relay logic

Contactor-based direction switching

Mitsubishi / Schneider VFD retrofits

No PLC speed control or feedback



Limitations

Sudden starts/stops

No speed ramping capability

High maintenance on relays

No AI-aligned positioning



PROPOSED SOLUTION OVERVIEW

Modernization goals and architecture



Modernization Goals

- 1 Smooth crane motion for AI alignment
- 2 Variable speed (slow pickup, fast travel)
- 3 PLC control replacing joystick
- 4 Reduced mechanical shock
- 5 **Autonomous operation readiness**

CONTROL ARCHITECTURE



CONTROL SIGNALS

Run/Stop: PLC DO › Direction: PLC DO › Speed:
PLC AO or Ethernet/IP

KEY BENEFITS

Smooth accel/decel › AI-driven speed › No
contactor wear



LIVE VISION AUDITOR

Real-time AI-powered bale detection and monitoring dashboard

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Live Vision Auditor

Real-time AI-powered object detection and analysis

Powered by Synapse AI

Hay Bale Unloading Monitor

Real-time AI-powered monitoring of hay bale unloading operations with live bale detection, count tracking, and automated quality assessment

TRUCK NUMBER	UNLOADING DURATION	BALES UNLOADED	CRANE ID
KL05 Y 0963 Currently being unloaded	00:44:30 Time elapsed (hh:mm:ss)	0 / 36 Real-time bale count	CRN-03 Active crane unit

Camera Feed REAL-TIME | Video Feed LIVE

Choose a feed type to start real-time monitoring

Available Data Sources

Real-time access to field operations data

Image Sensors: 6	Frames/Second: 180	AI Selected Frames: 24
Detection Events: 156	Temperature Sensors: 12	GPS Trackers: 3

What's New: View our latest update v1.1.0

Settings

REAL-TIME TRACKING

Live bale count, truck ID, and unloading duration monitoring

MULTI-SENSOR DATA

6 image sensors, 180 fps, temperature and GPS tracking

AI DETECTION

156+ detection events with automated quality assessment

AI BALE DETECTION IN ACTION

Computer vision identifies and tracks each bale with 3D coordinates

The interface displays a live camera feed of a truck loaded with hay bales. Each bale is identified with a green bounding box and a number from 1 to 21. The AI analysis panel shows a success message: "Bale placement verified - position optimal" at 10:15:53 PM. The detection results table below provides detailed data for each bale.

BALE ID	COORDINATES (X, Y, Z)	ORIENTATION	CRITICALITY	STATUS	CONFIDENCE
BALE-1	500mm, 300mm, 1241mm	-3°	Normal	Processing	98%
BALE-2	0mm, 0mm, 0mm	0°	--	Pending	--
BALE-3	0mm, 0mm, 0mm	0°	--	Pending	--
BALE-4	0mm, 0mm, 0mm	0°	--	Pending	--
BALE-5	0mm, 0mm, 0mm	0°	--	Pending	--
BALE-6	0mm, 0mm, 0mm	0°	--	Pending	--

21

Bales Detected

98%

Detection Confidence

±3mm

Position Accuracy

Real-time X, Y, Z coordinates for precise crane positioning



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LIVE MONITORING & AI INSIGHTS

Continuous crane tracking with real-time AI analysis and alerts

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← Back **Live Monitoring** Hay Bale Unloading in Progress Live 00:50:29 Powered by Synapse AI

Live Camera Feed REC
Real-time video from hay bale unloading camera

AI Analysis
Real-time insights

- Slight deviation in bale alignment detected 8:29:33 PM
- New hay bale detected in unloading zone 8:29:28 PM
- Crane movement tracked successfully 8:29:24 PM
- Multiple objects identified in frame 8:29:20 PM
- Slight deviation in bale alignment detected 8:29:16 PM
- GPS coordinates synchronized 8:29:12 PM

Detection Results
All detected objects with status and risk assessment Pause Picking

BALE ID	COORDINATES (X, Y, Z)	ORIENTATION	STATUS	CONFIDENCE
BALE-9	2100mm, 900mm, 1390mm	-13°	Completed	91%
BALE-10	2900mm, 900mm, 1368mm	-14°	Completed	91%
BALE-11	3700mm, 900mm, 1359mm	-3°	Completed	91%
BALE-12 PICKING	4500mm, 900mm, 1225mm	+13°	Processing	92%
BALE-13	0mm, 0mm, 0mm	0°	Pending	--
BALE-14	0mm, 0mm, 0mm	0°	Pending	--

What's New
View our latest update v1.1.0

Settings

AI ANALYSIS FEED

- › Bale placement verified
- › Crane movement tracked
- › Objects identified in frame
- › Alignment deviation alerts

COMPLETED BALES

12 / 36

91% avg confidence

PROCESSING

BALE-12

4500mm, 900mm, 1225mm

RECOMMENDED SIEMENS EQUIPMENT

Motors and VFDs for crane modernization



SIMEGEAR Motors

Helical Geared Motors

Key Features

- › Crane-duty rated (S4/S5)
- › Direct SEW R-series replacement
- › IE3 efficiency, smooth torque output

Recommended Ratings

LT

1.1–1.5 kW

CT

0.75–1.1 kW

Hoist

2.2–3.7 kW

Example Part Number

1LE1501-1BB23-2AA4-Z + GKA47



SINAMICS VFDs

Variable Frequency Drives

PREFERRED

SINAMICS G120

- › PROFINET/Modbus capable
- › Adjustable ramps & torque boost
- › Crane-duty suitable

Modules: PM240-2 Power + CU240E-2 PN Control

SINAMICS V20 (Economical)

- › Suitable for motors under 2.2 kW
- › Simple, reliable, low-cost option



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MECHANICAL & ELECTRICAL INTEGRATION

Seamless retrofit with minimal modifications



Mechanical

Direct Mounting Compatibility

SIMOGEAR matches existing SEW mounting footprint for seamless replacement

✓ Minimal modifications required

Same shaft dimensions › Compatible gear ratios › Standard bolt patterns



Electrical

● **Remove:** Direction contactors

● **Add:** Direct PLC–VFD wiring

● **Optional:** Ethernet for G120

SIMPLIFIED ARCHITECTURE

Eliminates relay/contactor complexity with direct digital control



COST ESTIMATE

Per-crane investment breakdown



Siemens SIMOGEAR Motors

Helical geared motors with IE3 efficiency

₹28,000

to ₹52,000



SINAMICS V20

Economical option for smaller motors

₹12,000

to ₹18,000



SINAMICS G120

Premium option with PROFINET

₹35,000

to ₹75,000

TOTAL PER CRANE

(2 motors + 2 VFDs)

₹85,000

to ₹1,40,000

Price varies based on motor ratings and VFD selection (V20 vs G120)

Excludes installation, PLC programming, and commissioning costs



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EXPECTED IMPROVEMENTS

Measurable benefits across operations, maintenance, and automation



Operational

30–60%

Smoother travel motion

±3 mm

Position repeatability for AI

Faster bale cycles

Optimized speed profiles



Maintenance

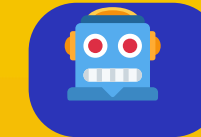
70%

Fewer control failures

✓ Reduced gearbox shock

✓ No contactor replacement

Extended equipment lifespan with soft-start protection



Automation

AI Vision-Guided

Autonomous crane movement

Predictive Motion

Optimized path profiles

Full PLC Integration

Ready for AuxAI platform

IMPLEMENTATION PLAN

Phased approach for minimal production disruption



Total Timeline Per Crane

From survey to handover

8-13 Days

Depending on crane configuration

CONCLUSION

Upgrading to **Siemens SIMOGEAR motors** and **SINAMICS G120/V20 drives** enables precise, PLC-controlled crane movement suitable for AuxAI's autonomous bale-handling system.



Minimal Mechanical Changes



Reduced Maintenance



Dramatic Performance Gains

The modernization requires minimal mechanical changes, reduces maintenance burden, and dramatically improves operational performance for AI-guided autonomous operation.

INVESTMENT PER CRANE

₹85K–1.4L

POSITION ACCURACY

±3 mm

IMPLEMENTATION TIME

8–13 Days



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READY TO MODERNIZE?

Let's discuss your gantry crane upgrade



Phone

+1 (315) 888-1995



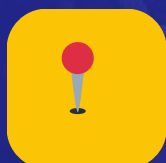
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