



MV ELECTROSYSTEMS LTD.

DISCUSSION DOCUMENT

CMP: Rs. 612 (7th August 2026); MCAP: Rs.1672 Cr.; EV: Rs.1727 Cr.

FY26 Revenue ₹49.4 cr | FY26 EBITDA ₹(9.9) cr | FY26 PAT ₹(12.6) cr | FY26 order book ₹989 cr (20x trailing revenue)

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Speaker – Tushar Bohra

- **Partner, INVEXA CAPITAL** (SEBI Registered Investment Advisor **INA000018443**). **Co-founder, MK Ventures.**
- 2 decades of cross-functional, cross-industry experience across **Consulting and Investing.**
- Before starting Invexa / MK Ventures, I was part of the Investments team at Reliance Mutual Fund (now: Nippon India Mutual Fund). Previously, I have also worked at Accenture Management Consulting and Tata Consultancy Services Ltd.
- At Invexa, I lead the investment initiatives in Pharma / Healthcare and jointly oversee the investments in several other sectors including Chemicals, Auto/Auto Ancillaries, Technology, FMCG, Discretionary Consumer and Telecom. I am also keen about emerging technologies across multiple sectors. I am a regular speaker at Investor Conferences and represent Invexa at select media interactions and industry events.
- Bachelor of Engineering degree (Electronics & Telecommunications) from Mumbai University and an **MBA (PGDM) from the Indian Institute of Management Calcutta (IIM C)**
- Besides investing, I am also very passionate about writing, and maintain my own **blog** (<https://thestormcatcher.com>). I have also authored a **book** titled **“Ouch! Middle Age!”**, available on Amazon Kindle

Investment Philosophy

- Strong business models with reasonable but certain growth characteristics
- Passionate promoter with a clear and well articulated vision for the company
- Significant upside optionality – like Business Optionality, Turnarounds and Perception Gaps
- Sectors benefitting from sustained government spending and policy tailwinds
- Superior / Improving - balance sheet / return ratios / cashflows
- Valuations that I can relate to

Railways Propulsion sits at the apex of technological challenges
working with a high voltage system, high tonnage load, fast moving vehicle with multiple decisions
to be taken every second...

It is this combination of electrical, mechanical and software complexity that makes propulsion fundamentally challenging and complex to create

The Locomotive Propulsion Symphony: Converting Power to Motion

2 Traction Converters: 2.7MW x 2

3 Auxiliary Converters: 3 x 130 kVA

2 Vehicle Control Units (VCU)

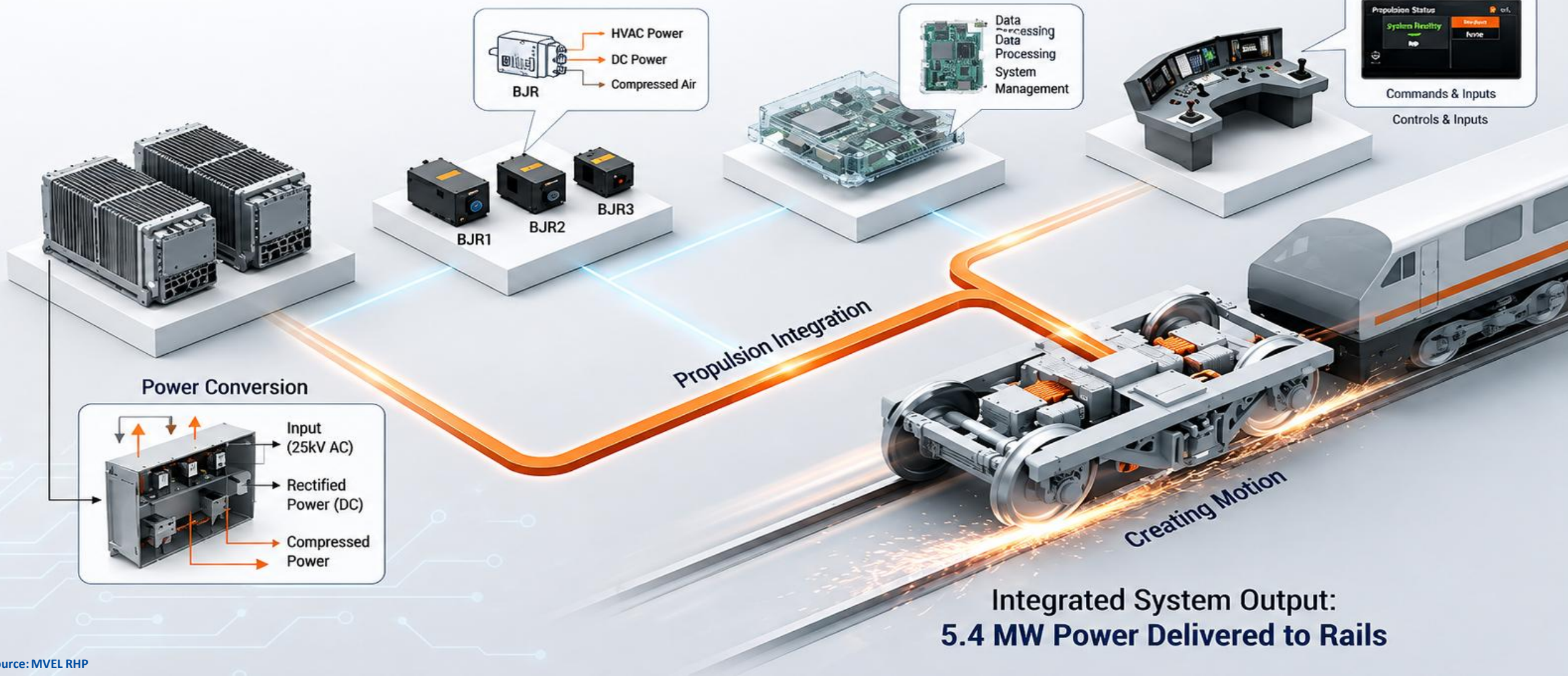
2 Driver Consoles

Human-Machine Interface

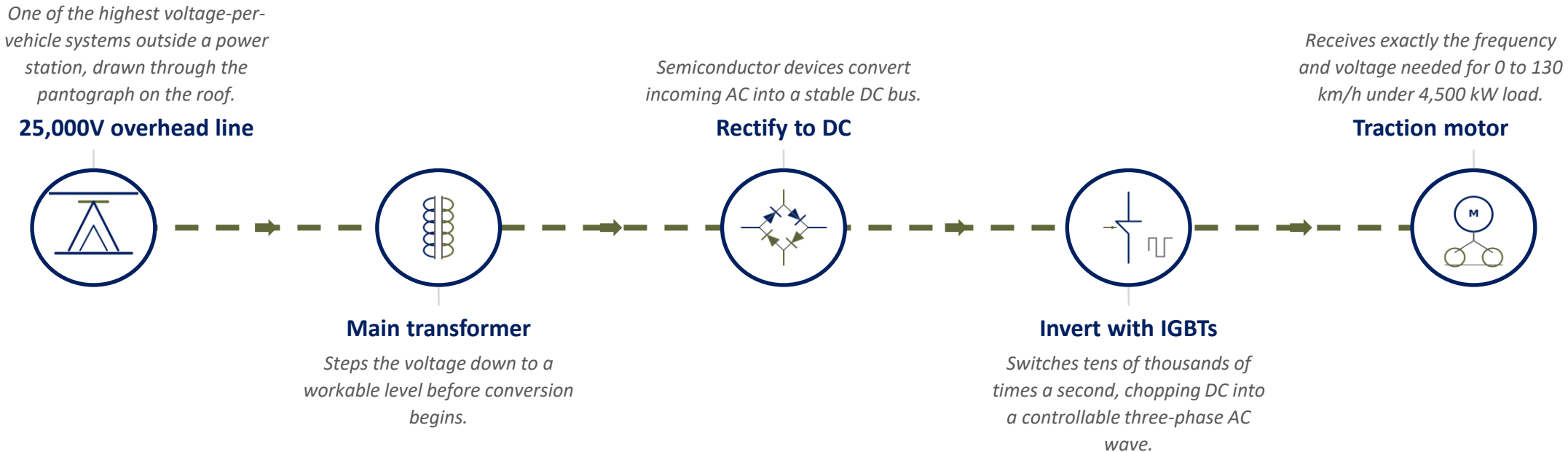


Commands & Inputs

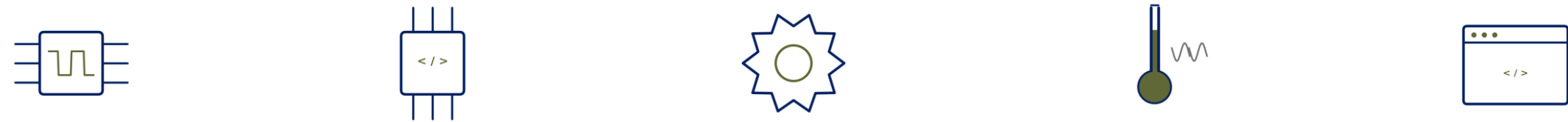
Controls & Inputs



What appears to be one integrated system is actually the convergence of multiple specialised engineering disciplines



The challenge isn't manufacturing propulsion. It's integrating multiple engineering disciplines into one reliable system



- Power electronics**

Circuit topology for converter/inverter stages. IGBT ratings, protection schemes, transient handling. Deep semiconductor knowledge.
- Embedded systems**

Real-time firmware deciding, thousands of times a second, when each IGBT switches. Latency, determinism, safety certification.
- Mechanical engineering**

Packaging built for 30 years of vibration, -20°C to 50°C cycling, water ingress, and technician-level serviceability.
- Thermal design**

A 6,000 HP set at full load throws off 100+ kW of waste heat. Pumps, heat exchangers, coolant chemistry, flow paths.
- Software engineering**

The Train Control and Management System — a real-time stack spanning the display, controller, brakes, and safety layers.

Source: Siemens Sitras documentation

Only 12 major companies have cleared the railways propulsion bar globally so far to create a relevant business opportunity; MVEL has actually broken into an exclusive club

Company	Country	Technology Ownership
Siemens Mobility	Germany	Proprietary SITRAS traction converters, motors, control software, auxiliary converters
Alstom	France	ONIX traction system — converters, propulsion software, traction motors
ABB	Switzerland	Proprietary traction converters, motors, control software, auxiliary converters
Hitachi Rail	Japan / Italy	Complete traction propulsion platform for EMUs, metros, locomotives, high-speed trains
Mitsubishi Electric	Japan	Proprietary IGBT/SiC-based traction converters, propulsion controls, traction motors
CRRC	China	Indigenous propulsion systems across locomotives, metro and high-speed rail
CAF Power & Automation	Spain	Proprietary propulsion equipment and auxiliary converters
Stadler Rail	Switzerland	In-house propulsion engineering across multiple rolling-stock platforms
Kawasaki Railcar	Japan	Proprietary propulsion systems for EMUs and high-speed trains
Hyundai Rotem	South Korea	Indigenous propulsion technology for metro and railway vehicles
Medha Servo Drives	India	Indigenous IGBT-based propulsion — EMUs, MEMUs, locomotives, metro
MV Electrosystems	India	Indigenous IGBT-based propulsion for locomotives; distributed power trains under development

Source: Careedge research, MAIA research

How the current tender framework treats intellectual property ownership

*“The recent tender issued by Indian Railways explicitly lays down a requirement that the Bidder must possess ownership of the intellectual property rights related to the propulsion system being offered. Specifically, the lead bidder or consortium member must have designed an IGBT-based propulsion system of electric locomotives of 4,000 horsepower or more, and must have manufactured and supplied it. Bidders relying on designs procured from third parties — **except from their own Associates** — are declared ineligible.”*

RDSO propulsion tender

1

The Associate carve-out

A foreign OEM with an Indian subsidiary — Alstom via Madhepura, Siemens via its Indian arm — still qualifies. This doesn't shut out the global majors. It shuts out unrelated third-party licensing deals.

2

The no-claims cure

Technology acquired from a third party within the last ten years just needs a no-claims certificate from the original provider. A well-capitalised licensee can effectively buy their way in.

3

The ten-year window

Technology acquired more than ten years ago needs no certificate at all — precisely why Hind Rectifiers, on Westinghouse-era tech, isn't caught by this clause even in principle.

The clause does not eliminate competition; it favours companies that have invested in developing or owning propulsion technology

The significance of MVEL’s achievement becomes clearer when viewed through three decades of industry history

Every company that has tried to clear India's propulsion-IP bar since 1993

ABB (Switzerland)	1993 Technology Transfer Agreement with Indian Railways for the WAG-9 / WAP-5 classes. IPR stayed with ABB — a foreign owner, not eligible under today's ownership rule.	IP HELD ABROAD
BHEL	India's own PSU. Pursued indigenous development before finally seeking a technology collaboration with a foreign partner in 2020.	TECH PARTNERSHIP ROUTE
CG Power	A brief entry into the space evaporated when its parent group went into a fraud investigation. Can re emerge as one of the competitors under their new leadership	DISCONTINUED
Hind Rectifiers	Long-standing participant in railway power electronics. Indigenous mainline locomotive propulsion approval remains pending.	STILL PENDING
Medha Servo Drives	First Indian company to secure indigenous mainline locomotive propulsion approval (~2013). Today India's largest indigenous propulsion player.	CLEARED · 2013
MV Electrosystems	Received indigenous propulsion approval in September 2025, approximately twelve years after Medha.	CLEARED · 2025

Source: Bhel public disclosures, Company public information

A small example serves to highlight the criticality of propulsion systems to railways and the route to indigenization

2019 incidence of cancelled tender

“In the past six months, two consecutive bulk tenders for propulsion systems were cancelled on technical grounds.”

 **Sudhanshu Mani** · “Father of Vande Bharat,” former ICF General Manager

	2019	The T-18 (Vande Bharat) production programme stalls — tender controversy triggers vigilance cases against the officials who ran it.	STALLED
	DEC 2019	A fresh ₹1,400 cr global tender is floated for propulsion on 44 trains. Six bidders show up: BHEL, a Chinese JV, three smaller Indian firms — and Medha.	6 BIDDERS
	AUG 2020	Cancelled outright. The Chinese JV had emerged as frontrunner — scrapped under Make-in-India pressure so only a domestic entity could win.	CANCELLED
	SEP 2020	Re-tendered from zero, under the revised Public Procurement (Preference to Make in India) Order.	RE-TENDERED
	JAN 2021	₹2,110 cr finally awarded — to Medha alone, the only 2019 bidder still standing as a serious contender.	AWARDED
	CASUALTY	The next-generation, aluminium-bodied “T-20” EMU programme — shelved entirely, a direct casualty of the delay.	SHELVED

Source: Sudhanshu Mani Interviews and article

Railways has always been a unique case of compounding advantage of a long-term supplier relationship

Long-term supplier relationships in Indian Railways create cumulative learning advantages that compound over multiple procurement cycles



Unmatched Access

THE OPPORTUNITY SIDE

Multiple simultaneous relationships give a vendor visibility into not just current orders but future development plans — from several angles inside the same client at once.



A Built-In Deterrent

THE DISCIPLINE SIDE

Too much is at stake for any one vendor to cut corners. A major mistake in one relationship threatens the standing of every other relationship with the same client.



Mentor, Not Just Customer

THE RELATIONSHIP SIDE

The client doubles as mentor in a programme it needs to succeed. Gentle accommodation for unintentional faults, and course correction that tends to be constant and immediate.



A Culture, Not a Favour

THE READ ACROSS THE SECTOR

This dynamic appears to hold for every serious Railways vendor, not just MVEL — a culture that rewards indigenisation and local entrepreneurial risk-taking, rather than preferential treatment of any one company.

MVEL’s promoter group were well entrenched in railways, though not significant in criticality. They have actually spotted and maximized the indigenization opportunity across both Propulsion and TCAS

8

MANUFACTURING FACILITIES

4

R&D CENTRES

1,400

PROFESSIONALS

34 YRS

SWITCHGEAR LINEAGE — NEC, SINCE 1992

Quadrant Future Tek Ltd

Listed (NSE/BSE) · specialty cables + Kavach signalling

₹979 cr KAVACH order book

Specialty railway cables and Kavach signalling. Participates in another strategic railway modernisation programme under the same promoter group.

NEC Switchgears & Controls

Partnership · control panels & switchboards, since 1992

34 years, Dhawan family

Control panels and switchboards since 1992

MV Mobility Ltd

Coach interiors & rolling-stock parts

Seating, doors, PIS displays

Coach interiors including seating, doors and passenger information systems, extending the group's presence into another rolling-stock subsystem.

Prime Electronics

Partnership · cable & wire distribution

Profitable, ₹35.6 cr rev. (FY25)

Cable, wire and electronics distribution business. A disclosed top-10 related-party supplier to MVEL.

Iboard India Ltd

Heavy-duty electric trucks (N3 category)

Already exporting to Saudi Arabia

Manufactures heavy-duty electric trucks (N3 category) and has begun exports to Saudi Arabia, providing exposure to electrification beyond railways.

Viewed collectively, the wider group already possessed railway understanding, supplier relationships and execution experience across multiple railway subsystems before entering propulsion

Source: MV RHP, company website, Quadrant investor presentation

But MVEL is not just another "access story", it is a good example of a well-structured, tech / IP-led business backed by domain understanding and regulatory tailwinds

Every critical railway subsystem now has domestic players scaling

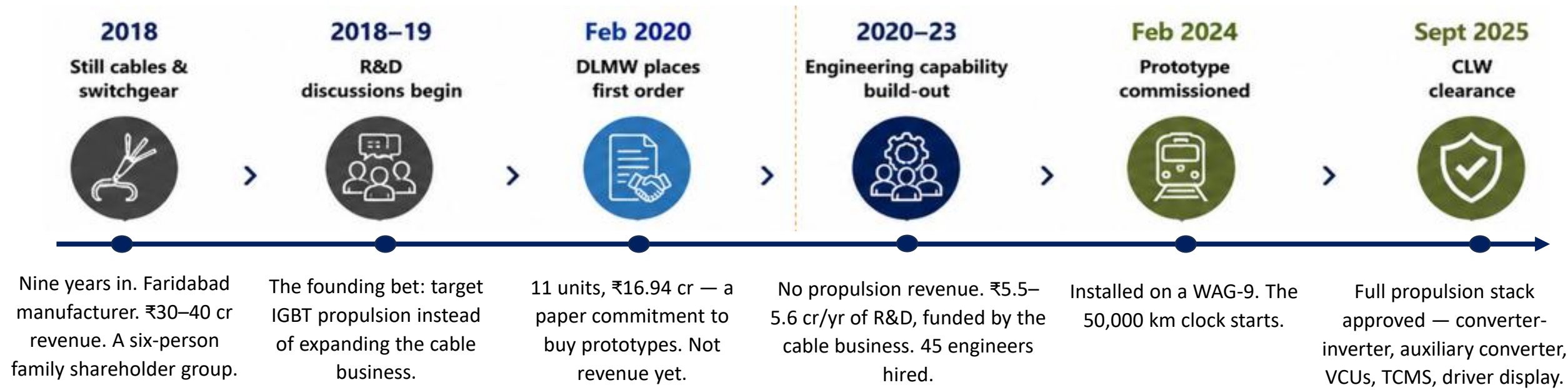
SUBSYSTEM	KEY INDIAN PLAYERS	RAMP SIGNAL
Wagons	Titagarh, Texmaco, Jupiter, HEI, BEML	Output 2.5× in 2 yrs. 2.5L incremental FY25–30
Traction Propulsion	MVEL, Medha, Hirect	Only 2 indigenous players approved by RDSO
Signalling (Kavach)	HBL Power, Kernex	Kernex ₹19cr → ₹430cr revenue in 2 yrs
Traction Motors	Medha, Hirect, BHEL, ABB India	JV-heavy. Import substitution accelerating
Wheels & Axles	Ramkrishna Forg., RINL, Jindal	New JV capacity — Ramkrishna setting up plant
HVAC & Braking	Faiveley, Knorr-Bremse, Sidwal	Rising Make-in-India localisation mandate
Metro Coaches	Titagarh, BEML, Alstom, Medha	2,000–2,500 coaches, 3–5 yrs. ₹30K–35K cr

Every subsystem with domestic players scaling has seen order books run ahead of delivery.
Propulsion — MVEL's segment — also looks to be at the cusp of similar trajectory

Source: Company annual reports, Tracxn, conference calls, railway tender bid documents

MVEL has leveraged their domain and system understanding, and backed it with product development from "first principles" to develop their own propulsion system in a record time

The evolution from distribution to indigenous product development unfolded over several years



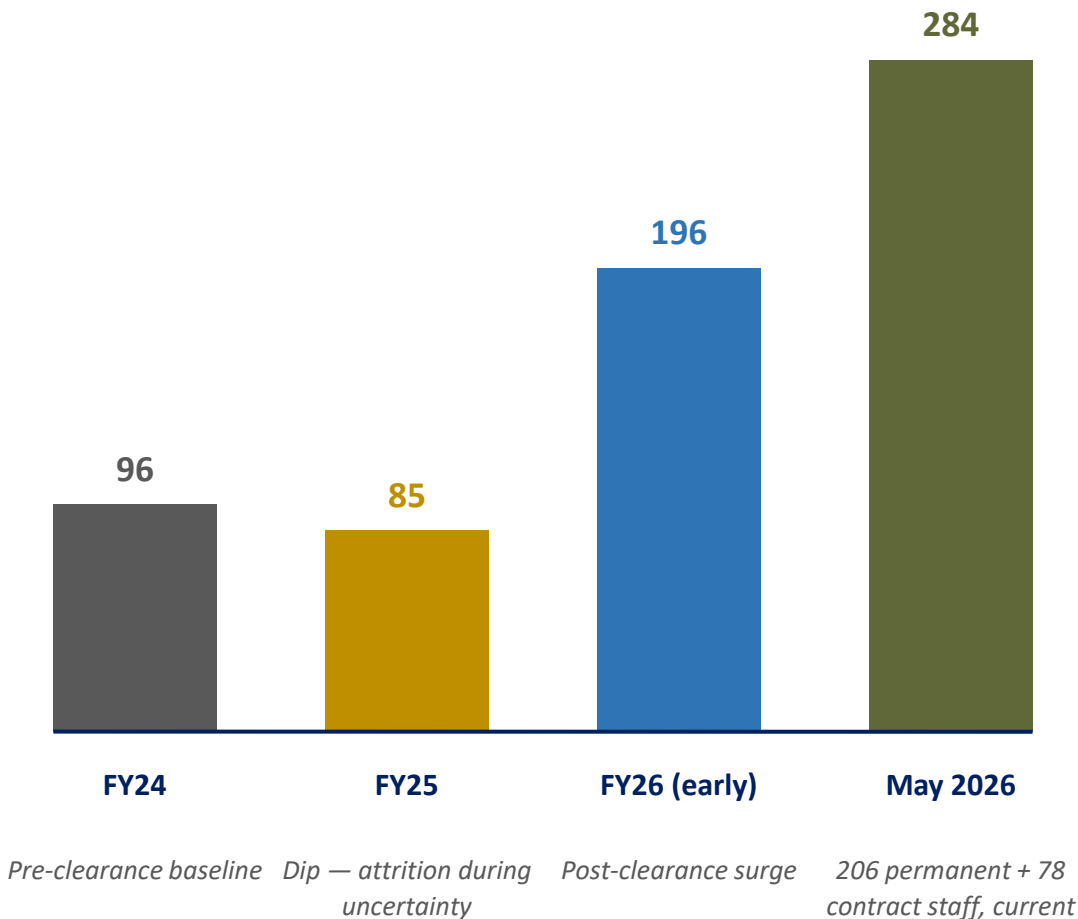
Capacity to deliver 285 propulsion sets/year has been set up – with further increase in capacity already planned



Source: MV RHP, Careedge report

In doing so, they have brought together a purpose led and capable team (first for R&D, now for scale-up)...

This wasn't scattered hiring. It was a strong core, recruited on purpose!



Mohit Vohra — Founder & Promoter
29 yrs across Thermax, a 3M subsidiary, and Tyco Electronics before founding MVEL in 2009. Still runs Quadrant Future Tek, MV Mobility and Iboard India alongside it.

 **Pankaj Rastogi**
MD — 32 yrs power electronics. Joined May 2021 to build the propulsion line.
EX-AUTOMETERS ALLIANCE

 **Sanjay Mann**
GM, R&D Software — 30 yrs embedded systems. Also ex-Motorola.
EX-AUTOMETERS ALLIANCE

 **Pradeep Bansal**
VP Operations — joined Sept 2023, among six prior employers.
EX-AUTOMETERS ALLIANCE

 **PhD, R&D**
One of MVEL's two PhD holders in propulsion R&D.
EX-AUTOMETERS ALLIANCE

It pulled four senior specialists from a single prior employer, stacking three decades of shared power-electronics experience into one team before day one of the propulsion line. Below them sits real manufacturing depth too: a dedicated 24-person assembly and wiring team (ITI/diploma-qualified), not just an R&D bench.

Source: MV RHP, LinkedIn

And focused on creating their own IP + backward integration...

1. PROPRIETARY DESIGN & IP



Indigenous IGBT-based 3-phase propulsion platform



In-house Research, Design & Development Centre



Make-in-India strategy centred on in-house Intellectual Property



Expansion into adjacent products using the same engineering platform



Technical ownership of propulsion architecture, software and control



Designing core technology in-house to build proprietary, differentiated solutions

2. BRINGING MANUFACTURING IN-HOUSE

✓ SMT line for in-house PCB population

✓ In-house production of:



Vehicle Control Units (VCU)



Control Electronics Assemblies



Power Electronic Modules



Control Interfaces

✓ Laser cutting machines for precise fabrication

✓ Unit 1 dedicated to power electronics manufacturing

✓ Unit 2 expansion to increase production capacity and localisation



From components to assemblies—increasing in-house manufacturing depth

3. BUILDING PROPRIETARY VALIDATION INFRASTRUCTURE

✓ Installed Test Setup 1 – fully operational

✓ Test Setup 2 under installation

✓ Three additional test setups planned at Unit 2

✓ Every propulsion set tested rigorously before dispatch

✓ Dedicated testing infrastructure for electrical, thermal, vibration and environmental validation

✓ In-house capability to complete RDSO qualification and approvals



Proprietary test benches ensure reliability, safety and compliance at every stage

4. DEEP ENGINEERING CAPABILITY



Electrical Design



Power Electronics



Embedded Software



FPGA & Control Algorithms



Mechanical Design



Thermal Engineering



Simulation & Modelling



EMI / EMC Engineering



Validation & Testing



Manufacturing Engineering



Field Commissioning



After-Sales Support

End-to-end engineering across the entire product lifecycle

Engineering capability alone isn't enough. The approval process is designed to prove it under real operating conditions.

THE TRIAL IS WHERE THIS ACTUALLY GETS HARD



KM • ZERO-DEFECT FIELD TRIAL

ANY OF THE FOLLOWING RESTARTS THE TRIAL

- Hardware failure • Software failure • Thermal instability • Protection logic fault • Communication failure

Feb 29, 2024 — Prototype
commissioned onto a WAG-9

Sept 15, 2025 — CLW clearance issued



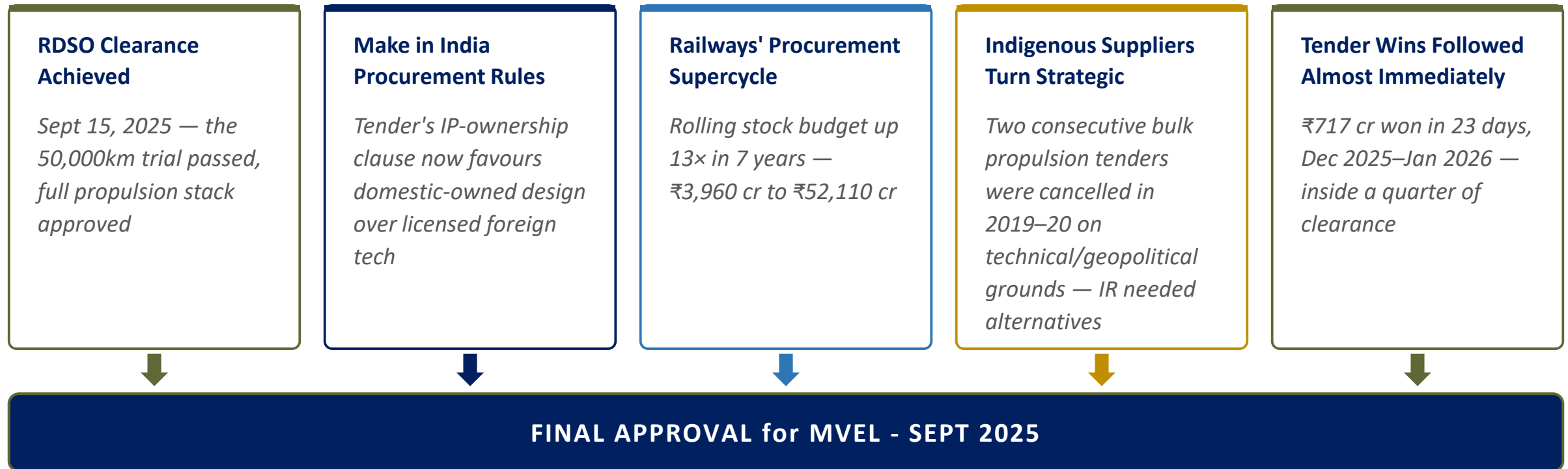
On top of five years of pre-prototype R&D.

Since Medha passed this same test in 2013, exactly one other company has made it through — twelve years later...

Source: MV RHP, Companies publicly available information and disclosures

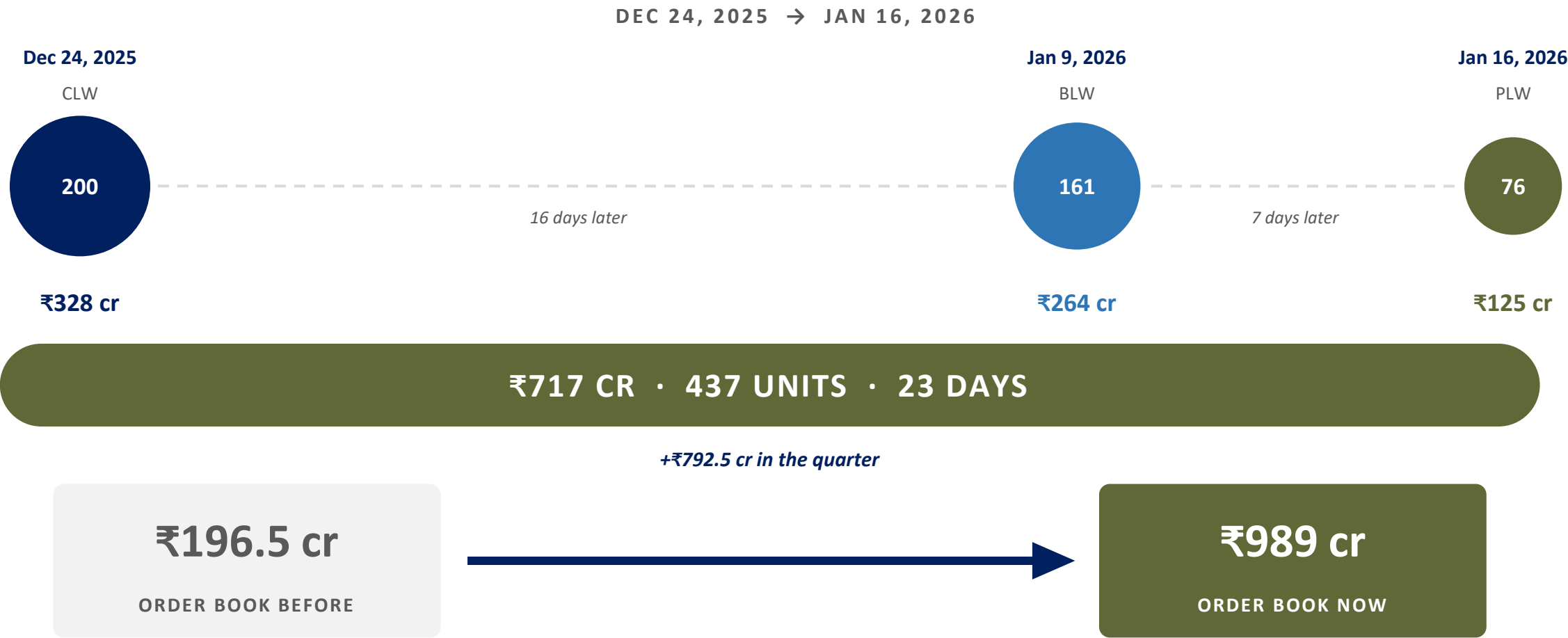
Great businesses often emerge when capability, policy and timing reinforce each other rather than acting independently

Access, product complexity and regulatory complexity are what let incumbents scale and keep competitors out for years — this is the moment that access opened for MVEL.



The hard part is done...order ramp-up and execution may actually be the easier battle to win

The tender wins that turned a ₹196.5 cr order book into ₹989 cr



First commercial supply followed on March 30, 2026 — three units invoiced to CLW, paid in 17 days. Separately, ₹51.3 cr of MVEL's ₹67.5 cr inventory is IGBT propulsion stock pre-positioned against 9 units of lifetime output — the visible cost behind the FY26 loss

THE STRUCTURE OF THIS MARKET

Railways isn't a **winner-takes-all** business.
It's an **all-are-winners** one.

*It's a **gated-access market** — getting in is the hardest part, and MVEL has already solved for that. From here, so long as they don't mess up execution or commit deliberate fraud, they're positioned to keep taking a share of the spoils, consistently.*

Once inside that gate, the opportunity becomes both visible and remarkably durable

PART IV

The Size of the Opportunity

₹19,797 Cr

Already on the tender portal. Indian Railways' own 5-year loco propulsion plan on IREPS — 10,000 units, published, not a forecast.

₹30,000+ Cr

Near-term addressable pool over 5 years across loco + MEMU + Vande Metro — the three pools where MVEL already has a foothold.

₹1.7+ Lakh Cr

Gross rail-propulsion-adjacent programme value in motion across Vande Bharat, metro coaches and Kavach retrofits — same underlying engineering.

At MVEL's FY26 tender-win share of 27.12% — this published plan maps to ~₹5,369 cr of addressable orders over 5 years

₹19,797 Cr
ALREADY ON THE TENDER PORTAL

CLW
₹11,849.81 cr
6,000 units

Chittaranjan Locomotive Works (CLW)
Avg ₹1.97 cr/unit

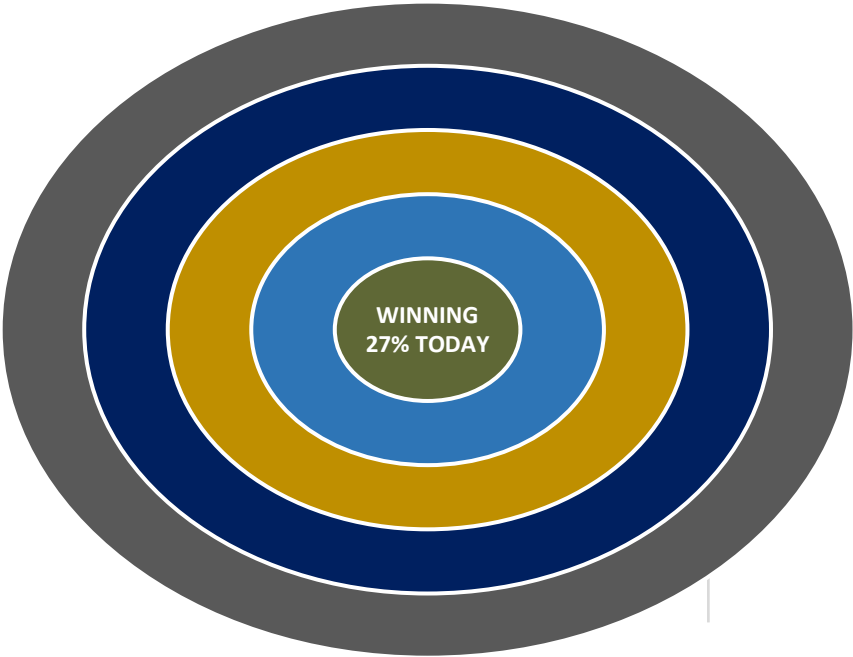
BLW
₹4,880.67 cr
2,500 units

Banaras Locomotive Works (BLW)
Avg ₹1.95 cr/unit

PLW
₹3,066.53 cr
1,500 units

Patiala Locomotive Works (PLW)
Avg ₹2.04 cr/unit

And locomotives are only the first application of the capability the company has built, *Every one of these pools uses the same underlying propulsion/TCMS engineering*



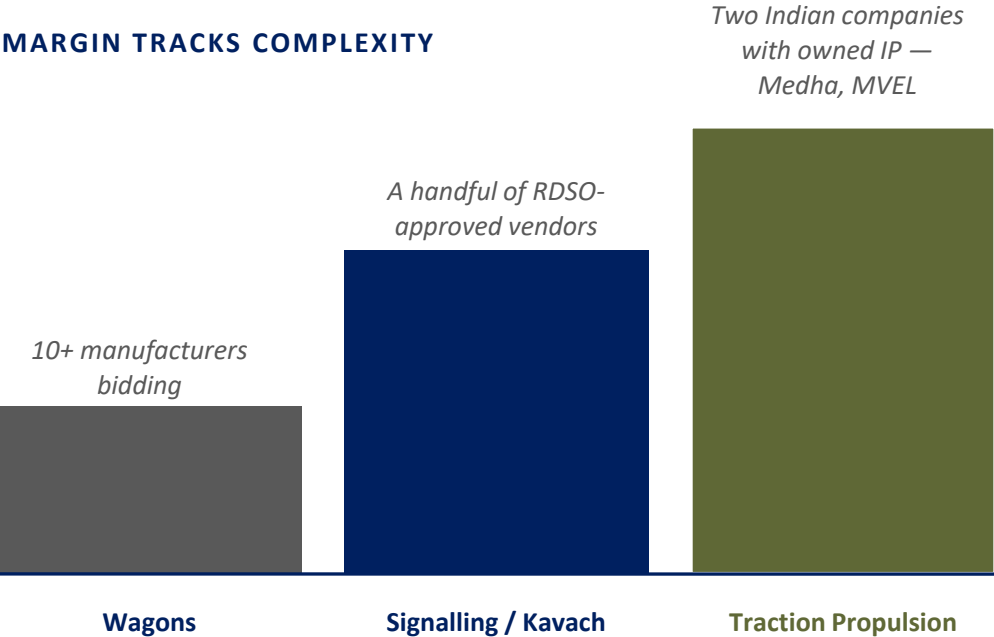
IREPS 5-year loco plan ₹19,797 cr · FY27–31 · already published	DIRECT ACCESS
MEMU + Vande Metro ~₹15,000+ cr · FY27–31 · just entered	JUST ENTERED
Metro coach systems ₹30,000–35,000 cr (propulsion ~20%) · FY27–31	NOT YET WON
Vande Bharat programme ₹1,04,000 cr gross (propulsion ~15–20%) · FY27–30	NOT YET WON
Kavach modernisation retrofit Large, unsized · FY27–30 · latent demand layer	NOT YET ACCESSED

Source: MVRHP, Careedge report, IREPS

The real value lies not just in participating, but in participating where complexity naturally limits competition

Margin tracks complexity, not scale — and railways' market structure genuinely differs from defence and aerospace

MARGIN TRACKS COMPLEXITY



RAILWAYS' MARKET STRUCTURE IS DIFFERENT

DEFENCE

- Sovereign, restricted — exports approval-gated at the government level
- Lumpy demand, tied to procurement cycles and geopolitics

AEROSPACE

- 2–3 private players at the apex, but a large, fragmented supplier base below them
- Cyclical — tied to global aircraft delivery schedules

RAILWAYS

- Genuinely open to cross-border expansion — a narrow field of IP-owners, not a fragmented one
- Constant domestic pipeline, alongside real export optionality

Complexity narrows the field and lifts margin — and unlike defence or aerospace, railways rewards more than one winner, with real cross-border upside too.

The current railway capex cycle is broad-based, with simultaneous expansion across wagons, locomotives and coaches,

WAGONS

13,262/yr → 33,606/yr

2.5× PRODUCTION SURGE

LOCOMOTIVES

12,147 → 16,092

FLEET +32% · 1,681 BUILT IN FY25 (RECORD)

COACHES

74,010 → 98,845

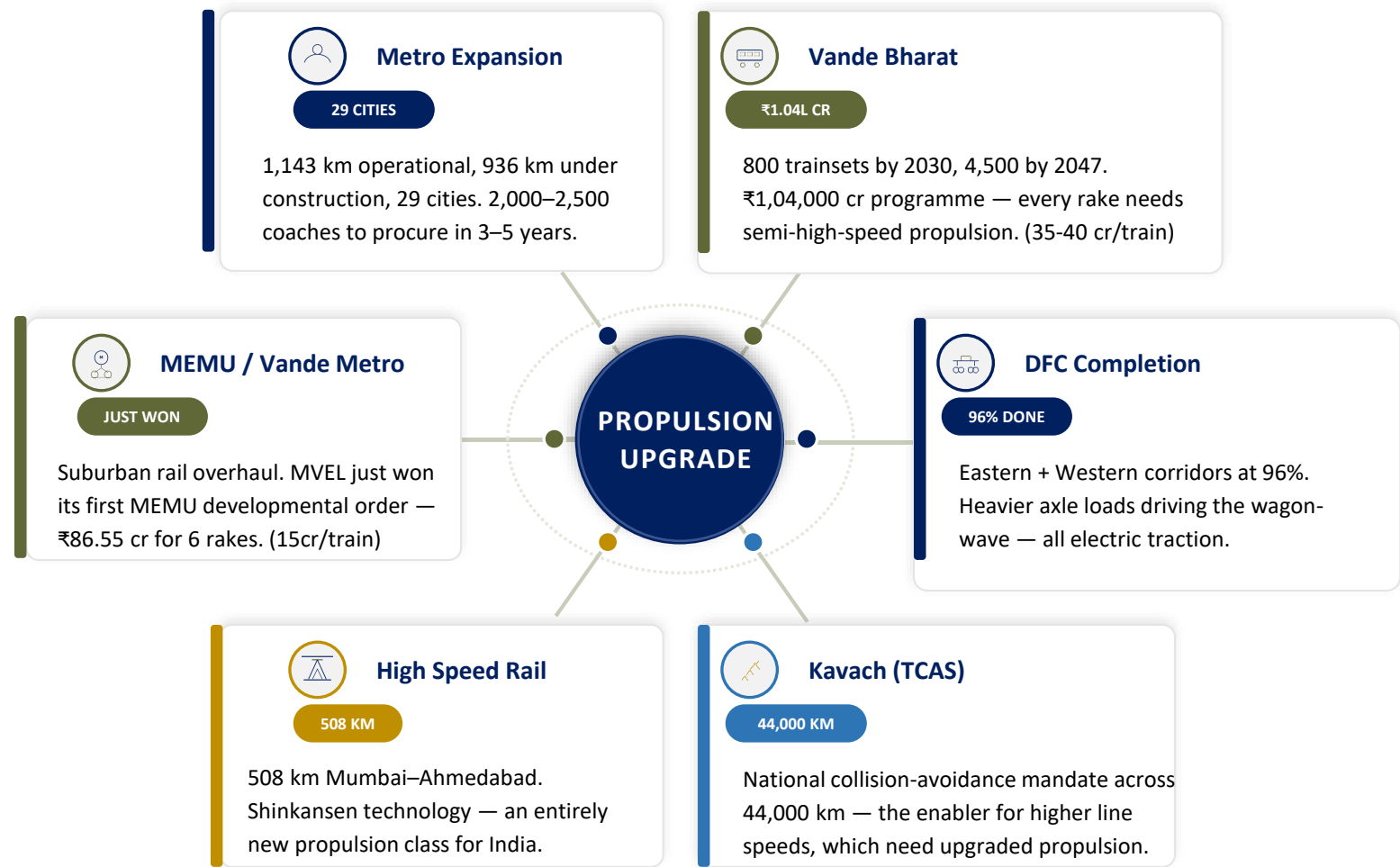
4.6% CAGR · 34% FLEET GROWTH IN 6 YEARS

Rolling stock budget: ₹3,960 cr (FY17) → ₹52,110 cr (FY26BE)

Order book growth has consistently outpaced delivery across subsystems — execution bottleneck, not demand deficit. Capacity addition will be sharper as new domestic players scale.

Six national railway programmes are running at once — faster trains, heavier freight, safer signaling

Six parallel railway programmes, each independently scaling — all demanding the same underlying engineering

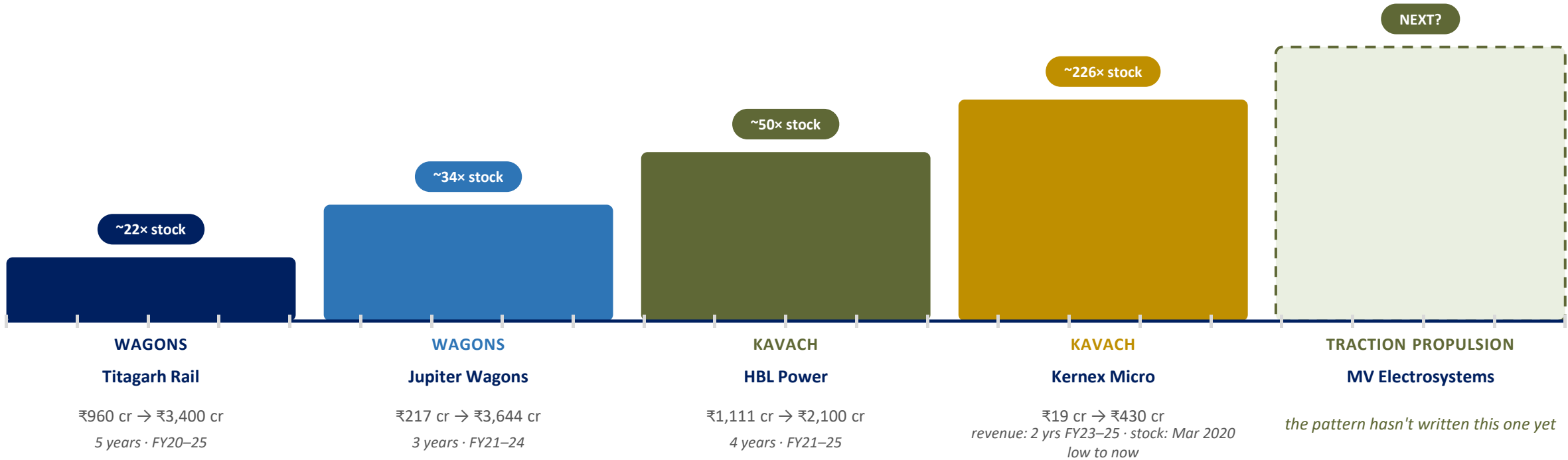


The investment case does not depend on a single railway programme. Multiple independently funded initiatives are expanding the addressable market simultaneously.

Source: Ministry of Railways, National Rail Plan, DFCL, NHRCL

If every other railway subsystem has eventually produced domestic leaders, there is little reason to believe propulsion will be the exception

Propulsion may be following a pattern already observed elsewhere in the railway ecosystem.



Observed Pattern → Domestic Capability → Policy Support → Industry Scale-up → Market Re-rating → MVEL?

₹989 cr ORDER BOOK at listing	₹49 cr FY26 REVENUE first full year	2nd INDIGENOUS PLAYER approved by RDSO	20x ORDER BOOK / TRAILING REVENUE
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Source: Screener

Railway timelines are planning milestones rather than hard commercial deadlines. Procurement programmes often extend beyond their original schedules while the underlying demand remains intact

Extensions despite delays *Titagrah, Jupiter Wagons, Texmaco*

(b) Delivery Period extended without Liquidated Damages and Denial Clauses

As per Clause 6 of contract order issued by Railway Stores (W) Directorate and Clause 12 of General Conditions of Contract (GCC), Liquidated Damages (LD) should be imposed in the event of supplier's failure to deliver wagons by due date.

During review of contract files of wagons pertaining to 2017-18, Audit observed that delivery dates were extended several times initially with LD and Denial Clauses, recording reasons therefor. The delivery period was subsequently extended without LD on the same reasons recorded earlier. Some examples are cited below:

- Delivery period of Contract awarded to M/s. Cimmco Ltd, Kolkata on 28 December 2017 for supply of 1191 wagons was extended four times initially with LD and Denial Clause. However, the delivery period was subsequently extended without LD and Denial Clause through Amendment.
- The delivery periods of the contracts placed on M/s. Jupiter Wagons Ltd., M/s. Titagarh Wagons and M/s. Texmaco Rail & Engg. Ltd. under same tender batch, were initially extended with LD and Denial Clauses. Later on, the delivery periods were extended without LD and Denial Clauses without mentioning any new reasons.

Thus, non-enforcement of LD clause as per contract order and GCC resulted in delayed supply of wagons by the wagon manufacturers.

Fresh Orders despite delays *Titagrah, Jupiter Wagons, Texmaco*

Audit observed that:

- M/s. Besco Ltd. could manufacture only 412 wagons (15 *per cent* of total orders of 2706 wagons) during 2018-19. Despite such poor performance, the firm was awarded fresh orders of 395 wagons on 14 January 2019. Out of outstanding supply of 587 wagons as on 1 April 2020, the firm was able to produce only 175 wagons (29.81 *per cent*) during 2020-21.
- M/s. Cimmco Ltd. could not produce any wagon from January 2018 to May 2018 and also in September 2018. At that time, huge orders were due from the firm.
- Outstanding order against M/s. Titagarh Wagons Ltd. as on 01 April 2017 was 218. Though the firm was able to produce only 197 wagons during 2017-18, they were awarded fresh order for 1147 wagons on 28 December 2017.
- Out of outstanding orders of 1407 wagons as on 01 April 2020, M/s. Texmaco was able to manufacture only 863 (61.34 *per cent*) wagons during 2020-21.

Despite short supply, lease arrangements remained

SER: In 2019-20, 195 wagons were taken on lease under OYWS and other schemes (M/s. TISC (TML)-11 nos., M/s. Rungata Mines Limited (RML)- 7 nos., M/S Rashmi Metalics (ORSM)- 3 nos. and M/s Adani-174 nos.). In 2019-20, demand of 265, 129 and 92 rakes were placed by M/s. TISC, M/s. Rungata Mines Limited (RML) and M/s. Rashmi Metalics (ORSM) respectively. Out of the demand made above, SER Administration could not supply 124, 69 and 50 rakes respectively due to delay in turnaround.

WR: An amount of ₹ 1.34 crore stood unrealized on account of lease charges at the end of the year 2020-21. Further, Six BTPN wagons of M/s. Indian Oil Corporation (IOC) were condemned without assigning any reason for condemnation and without Enquiry Report. This resulted in excess payment of lease charges amounting to ₹ 0.42 crore on the condemned wagons. On being taken up, WR Administration stated that the above wagons were not condemned. Railway's reply is not tenable as no such documentary evidence was furnished to Audit.

In ten Zones¹⁰³, no wagon was taken on lease under OYWS during the review period.

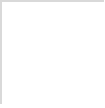
Modern Industries – Fresh Orders

- Outstanding order against M/s. Modern Industries as on 01 April 2017 was 688. The firm manufactured no wagons during July 2017 to December 2017 and could manufacture only 249 wagons (i.e. only 25 *per cent* of total order) during 2017-18. The firm was given fresh order to supply 323 wagons on 28 December 2017 and 2643 on 06 December 2018. But the firm could not supply wagons as per committed time.

Umesh Chowdhary:

Titagarh – delivery period readjusted

No. The delay has been there because of the period of uncertainty. And as I had mentioned, the railways themselves have acknowledged that this period of uncertainty had nothing to do with the technology provider that is ourselves. And they have suitably readjusted delivery period for the same. We now expect the first train of Vande Bharat to be rolled out from our factory by March 2026 based on the agreement signed between us and the railways, a few days ago.



THE OPPORTUNITY EXTENDS FAR BEYOND RAILWAYS

Everything so far has been Indian Railways.

The same IGBT switching, thermal design and control firmware travels far beyond it.



Power electronics is the underlying capability; railways is simply where it was first commercialised.

BESS Power Conversion

₹25,000–35,000 cr TAM

 Same IGBT switching, thermal design, and control firmware as a traction propulsion converter — 80–90% shared engineering, different certification (CEA/grid codes vs RDSO).

Solar / Wind Inverters

₹15,000–20,000 cr/yr TAM

 Both solar and wind inverters are IGBT-based, grid-code certified, built for thermal reliability under continuous duty — the same engineering discipline as propulsion conversion.

Industrial & Commercial Power Conversion

~₹15,000 cr/yr TAM

 All variable-frequency drives and power converters — IGBT-based, control-firmware-heavy, reliability-critical. Direct engineering overlap with propulsion, no new discipline required.

EV Charging Infrastructure

~₹800–1,200 cr/yr TAM

 India target: 45,000+ public chargers by 2030, against ~15,000 today. High-power bus/truck charging needs 350+ kW per charger — all IGBT-based, all grid-interfaced.

Marine & Defence

₹70,000 Cr

 12 diesel-electric attack submarines, 70–80% indigenous content, cleared for final approval in 2026 — same core IGBT power-electronics, thermal design and control firmware as rail propulsion.

Power Quality Restorers

₹2–50 Cr

 Near-literal architecture match: AC supply → AC-DC converter → DC link → IGBT inverter → PWM/DSP control — same as loco propulsion, just swapping the traction motor for an injection transformer.

The same power electronics, control and software platform can support a broader product portfolio

1

AUXILIARY CONVERTER SYSTEMS



Functions

- Hotel Load Supply
- Battery Charging
- HVAC
- Compressor
- Blowers
- Auxiliary Motors



High content opportunity in every propulsion platform.

2

VEHICLE CONTROL UNITS (VCU)



Opportunity



Locomotives



Metro



Marine



Defence



Electric Buses

Same controller architecture across multiple platforms.

3

CONTROL ELECTRONICS ASSEMBLIES



Opportunity

- Control boards
- Interface boards
- Driver electronics



Every propulsion platform needs high-value control electronics.

4

EMBEDDED SOFTWARE PLATFORM



Opportunity

- Firmware
- Control algorithms
- Diagnostics
- Fleet management
- Predictive maintenance



Not a product today, but a high margin, recurring revenue stream.

5

FPGA & CONTROL ALGORITHMS



Transfers across

- Rail
- Marine
- Industrial Drives
- Energy Storage



Algorithms are a durable competitive moat.

6

BATTERY MANAGEMENT SYSTEMS (BMS)

(Logical adjacency)



Natural adjacency leveraging existing strengths in:

- Power electronics
- Embedded software
- Control
- Communication



Strong fit for Energy Storage, EV and rail battery applications.

7

VEHICLE DIAGNOSTICS PLATFORM



Opportunity

- Health monitoring
- Predictive maintenance
- Condition monitoring
- Remote diagnostics



Drives uptime, safety and lifecycle value for customers.

8

POWER ELECTRONIC MODULES



Opportunity

- Higher localisation
- Supply to external OEMs
- Scalable module platform



Enables stronger margins and new customer segments.

9

CONTROL INTERFACES & HMI SYSTEMS



Opportunity

- Human Machine Interface
- Digital dashboards
- Operator displays
- Touch & rugged interfaces



Enhances user experience and operator control.

Export markets represent one possible extension of an established propulsion capability...

Industry experience suggests that successful propulsion platforms can expand beyond their domestic market over time

Established Export Platform

Medha Servo Drives

50+ countries

- Deployed across 50+ countries via subsidiaries in Italy, Spain, Poland and the United States — a decade-plus track record, not a maiden order.
- International JV structure with Traktionssysteme Austria manufactures AC traction motors and extends into the EV segment abroad.

THE END STATE. Twelve years after its own RDSO clearance, export scale is Medha's normal, not its news.

Early Commercial Validation

Hirect (Hind Rectifiers)

First export order, Jul 2026

- Secured its first-ever US export order for traction motor assemblies in July 2026, slated for FY27 delivery — the maiden order, not an established franchise.
- Debuted its complete 6,000 HP locomotive propulsion system at Railway Interchange 2026 in Omaha, North America's largest rail trade show, including a successful loaded run.

PROOF THE WINDOW IS OPEN NOW. A domestic-only company converted a global trade show into an order within one cycle.

Current Position

MV Electrosystems

Export track record: None

- The RHP's own comparison table records MVEL's export track record as "None" — the only blank cell against every credible peer in this set.
- MVEL's RHP lists "different global regions" as its own first-listed diversification strategy — the ambition is on paper; the order book isn't yet.

THE NEXT LINE TO WATCH. Every other milestone on this deck has already flipped from zero to something. This one hasn't — yet.

THE GLOBAL PROPULSION EQUIPMENT INDUSTRY, BY GEOGRAPHY — 2030P



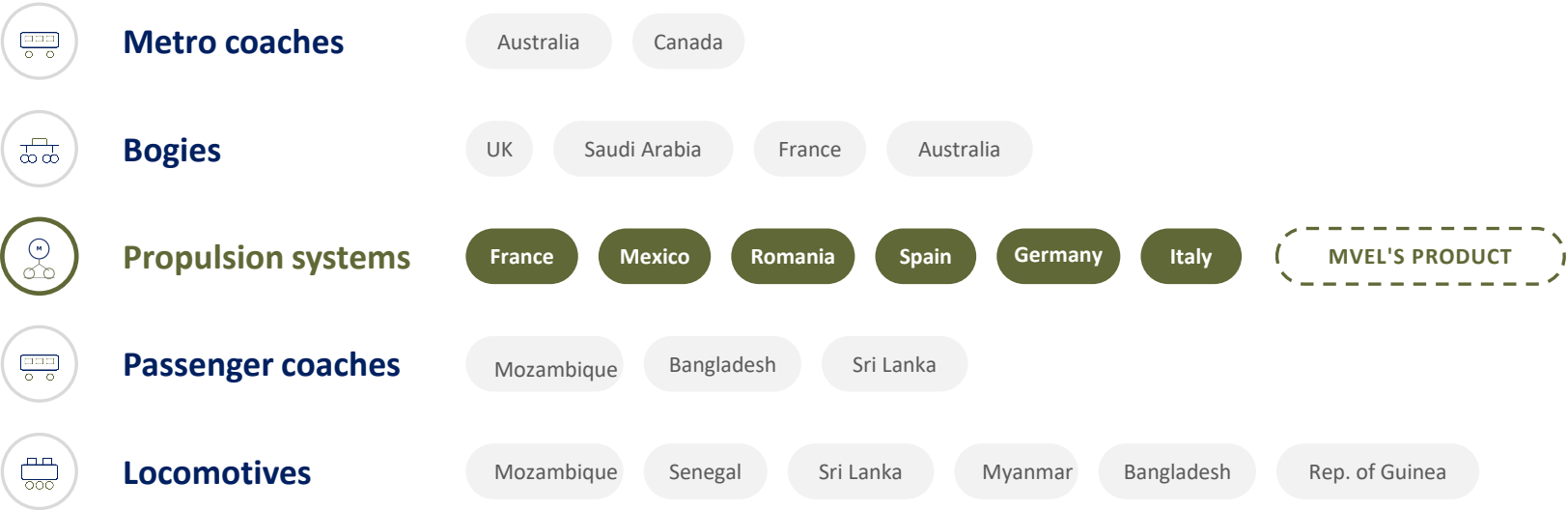
Source: Medha public disclosures, Hind Rectifier presentations, MAIA report

Global markets are already buying Indian railway products across multiple subsystems

Indian Railways has highlighted the growing international acceptance of domestically developed railway products.

"India's railway products are increasingly reaching international markets. This growing export footprint in more than 16 countries is a reflection of India's commitment to design, develop, and deliver to the world."

— Statement from Indian Railways



AND IT'S NOT JUST RAILWAYS — INDIAN MANUFACTURERS OVER OTHER SECTORS TOO ARE BUILDING REAL EXPORT REVENUE

Solar Industries

₹1,076 cr of defence export orders announced; order book has crossed ₹21,300 cr

BEML

Exports to 67+ countries; defence exports ~\$2.63 bn in FY24, up 32.5% YoY

Bharat Forge (Kalyani)

₹850 cr of export orders won; first-of-its-kind supply agreement signed with Embraer, May 2026

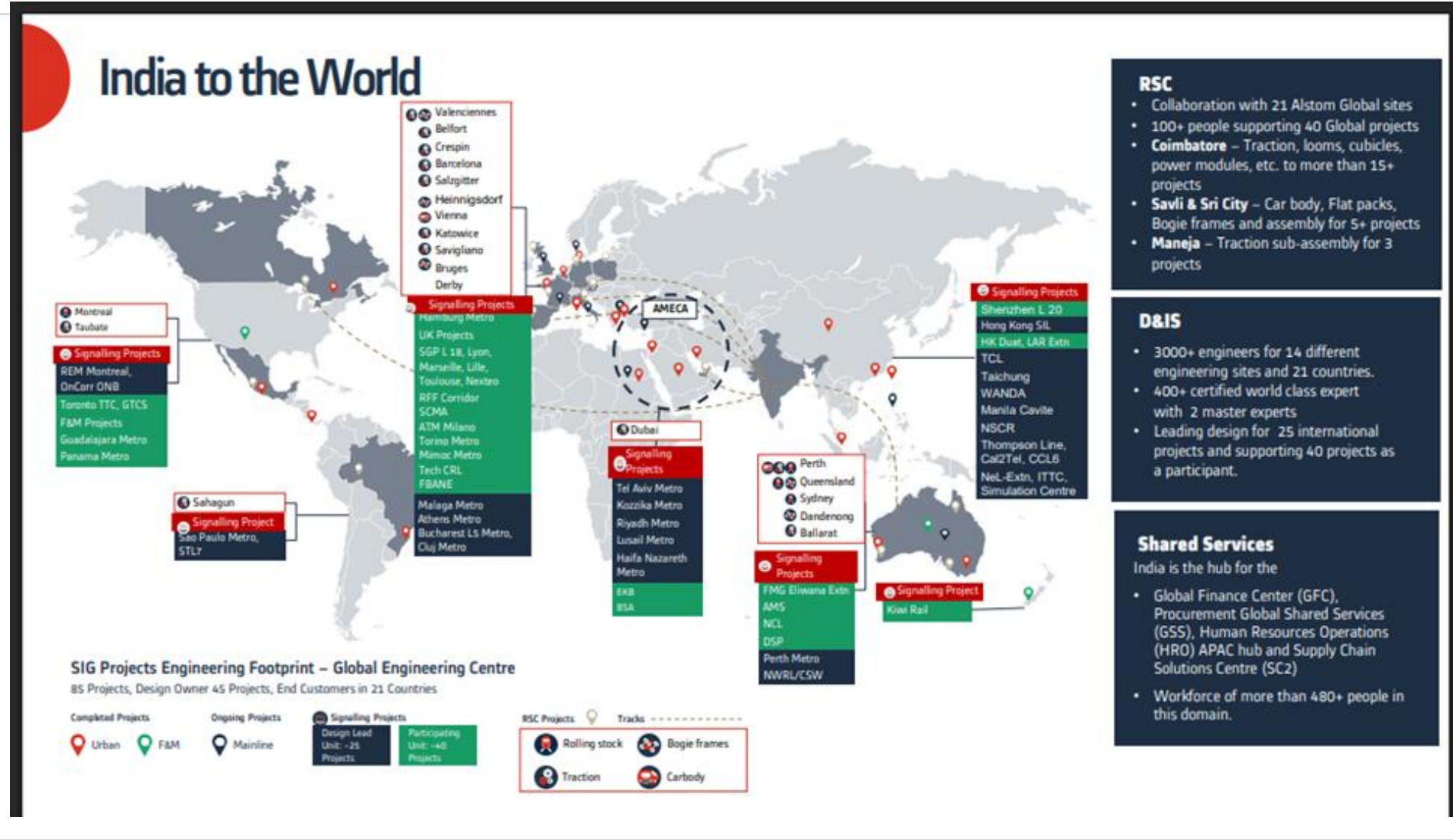
~150 units
MARHOWRA PLANT, BIHAR

Six locomotives built at the Marhowra plant have already been exported to the Republic of Guinea; a second order brings the total to ~150 units for Africa — a public-private plant in Bihar, not a multinational's home factory, doing the exporting.

Source: Ministry of Railways annual report, India defence exports ORF

Increasingly, India is becoming an engineering base for the world, not merely a market to serve

Alstom's own materials: India isn't just a market it sells into — it's the engineering base it exports from



Integration Opportunities

Management's ambition extends beyond scaling capacity—it includes expanding the scope of what the company can offer

CAPABILITIES MANAGEMENT CAN ACQUIRE OR BUILD (EXAMPLES)

TRACTION MOTORS



- AC / PM traction motors
- Motor design & testing
- Higher localisation

AUXILIARY POWER ELECTRONICS



- HVAC converters
- Hotel load supply
- Battery chargers

HVAC SYSTEMS



- Heating, ventilation & air conditioning
- Environmental control systems

ENERGY STORAGE & BMS



- Battery management systems
- Energy storage packs

CAPACITORS & PASSIVES



- DC link capacitors
- Film capacitors
- High reliability passives

POWER ELECTRONIC MODULES



- IGBT/SiC power modules
- Power stacks
- Higher in-house content

CONTROL ELECTRONICS & INTERFACES



- Control boards
- Driver electronics
- HMI & operator displays

COOLING & THERMAL MANAGEMENT



- Liquid & air cooling
- Thermal design
- Heat exchangers

SENSORS & CONDITION MONITORING



- Sensors & data acquisition
- Health monitoring
- Predictive maintenance

SOFTWARE & DIGITAL SOLUTIONS



- Control algorithms
- Diagnostics software
- Fleet management

MVEL has entered into a business cooperation agreement with — PNC Technologies, South Korea, to bring world-class railway technology to India.



PNC Technologies Co., Ltd.

South Korea

KOSDAQ Listed (237750)



Business Cooperation Agreement

- Agreement signed on 13th August 2025 for a period of 3 years
- Collaboration for Marketing, Manufacturing, Supply, Distribution and After-sales Service in India
- For Auto Fault Locator systems for railway applications
- Meets 51% Indian content requirement under Make in India
- Enables participation in Indian Railways tenders

TECHNOLOGY IS MOVING FAST

SiC TECHNOLOGY



- Higher efficiency
- Higher power density
- Lower cooling needs
- Rapidly increasing adoption

HYDROGEN PROPULSION



- Clean energy alternative
- Requires advanced power electronics
- Energy management & control remain critical



OUR VIEW

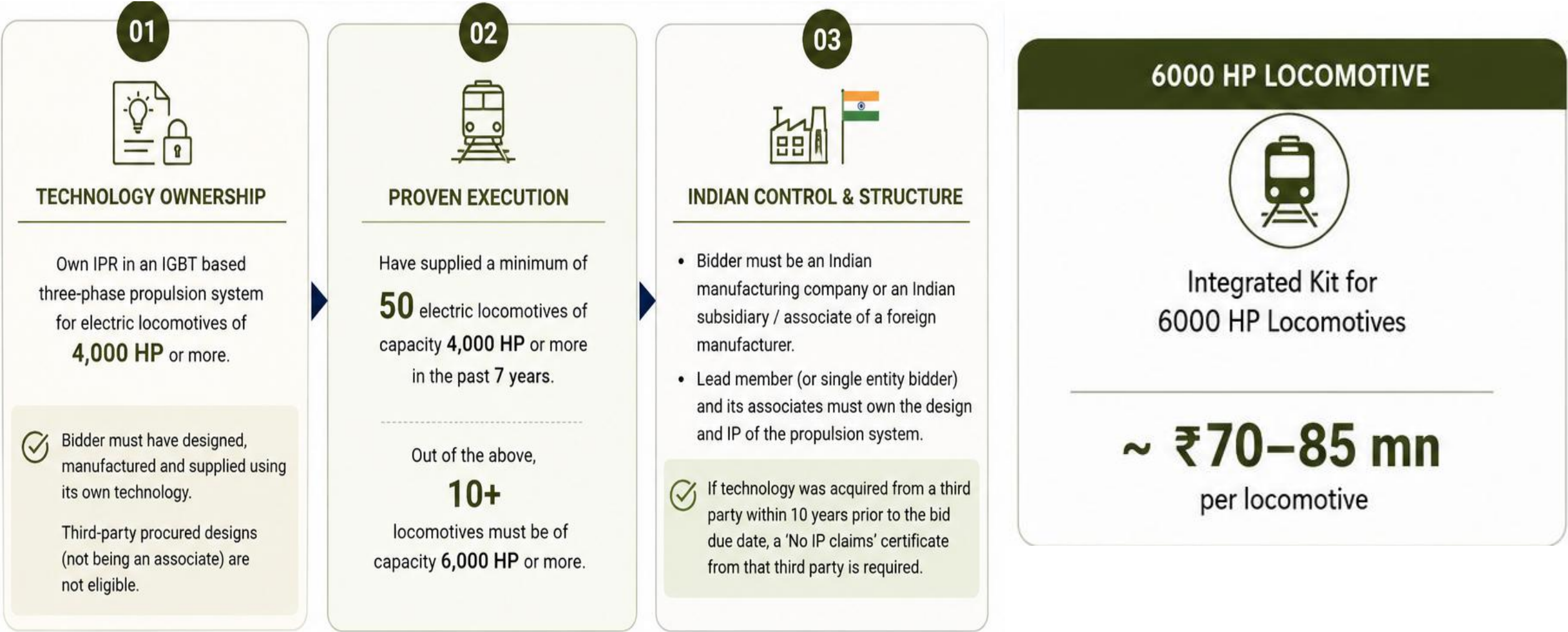


As technology evolves towards SiC-based systems and hydrogen propulsion, we believe management will be **fast in capturing these opportunities**—leveraging its strong engineering foundation, IP ownership and capital flexibility to build future-ready integrated solutions.

Source: MVRHP and our inferences, MGT INTERVIEW, PNC website

Development + acquisition of complementary capabilities will enable MVEL to participate in Integrated bids and access significantly high value orders

Requirements for participating in an IPR bid





Quiet capability build. Policy trigger. Order wave. Re-rating.

Every company on the next few pages rode this exact pattern — MVEL has already cleared the first two stations.

The pattern has repeated across multiple railway businesses, even if the products themselves were very different

Same trigger, same window — two different starting points, both re-rated for years before revenue caught up

Titagarh Rail Systems

Mid-scale wagon builder → DFC-driven category leader

~22× stock · 4× revenue



FY20: ~₹960 cr revenue, ~₹800 cr market cap — one of about a dozen private wagon builders, procurement depressed for years.



Trigger: Eastern + Western DFC hit 96% completion by Mar 2025. Private wagon output nearly doubled — FY14–24 avg ~15,875 units/yr to FY25–26 avg ~33,606 units/yr.



FY26: ~₹3,400 cr revenue (4× in 5 yrs), ~₹26,000 cr order book (7.7× revenue). Market cap peaked ~₹18,000 cr (~22×) in early 2024 before consolidating to ~₹11,000 cr.

The re-rating ran years ahead of revenue — the order book (1.5× to 7.7× trailing revenue) did the pricing work.

Jupiter Wagons

Reverse-merged body-builder → wagon-wave breakout

~34× stock · ~18×* revenue



FY20: a struggling body-builder (CEBBCO) reverse-merged into Jupiter Wagons in 2020; combined entity began trading as one company from FY21.



Revenue CAGR FY19–24: 75.9%. FY19 ₹217 cr → FY24 ₹3,644 cr peak revenue, PAT ₹331 cr — the break-out came in year four.



Market cap: ~₹500 cr (early 2022) → peak ~₹17,000 cr (mid-2024), 34× in 2.5 years. Order book grew from ~₹500 cr to over ₹5,800 cr at peak.

The re-rating happened in under three years once the order book became visible to the market.

HBL Power — The Closest Precedent

A quiet side-project, funded by a core business, made the main event by a national mandate

THE SETUP

HBL Power Systems (est. 1977, Hyderabad) was — and is — the world's second-largest NiCd battery manufacturer: a solid, unspectacular industrial and defence battery business. Alongside it, HBL had quietly developed a Train Collision Avoidance System (TCAS) since the mid-2010s — a small line item, funded by the battery business, barely mentioned in annual reports.

THE TRIGGER

In 2022, Indian Railways formally endorsed TCAS as the national standard under the brand "Kavach." Rollout plans firmed up, RDSO approval processes accelerated, and by 2024–25 orders arrived in category-defining size — turning a decade of quiet R&D into HBL's dominant growth driver almost overnight.

KAVACH ORDER FLOW

Apr 2024	5 LoAs, Central Railways — 413 stations, 3,900 km	₹762.56 cr
Dec 2024	CLW order — onboard Kavach on 2,200 locomotives	₹1,522.40 cr
Feb 2025	Ahmedabad Division order	₹410.42 cr
Aug 2025	West Central Railway — 18 stations, 166 km	₹54.12 cr
Aug 2025	IRCON International order	₹101.55 cr

TOTAL KAVACH ORDER BOOK ₹4,083 CR · TOTAL HBL ORDER BOOK ~₹5,300 CR

Revenue FY21→FY25: ₹1,111 cr → ~₹2,100 cr. PAT: ₹46 cr → ~₹340 cr. HBL delivered a 20–50× return from FY21 to peak.



HBL's core business quietly funded years of R&D on a side product — until a mandate made it the main event

The more critical technologies a company controls internally, the greater its strategic flexibility becomes over time

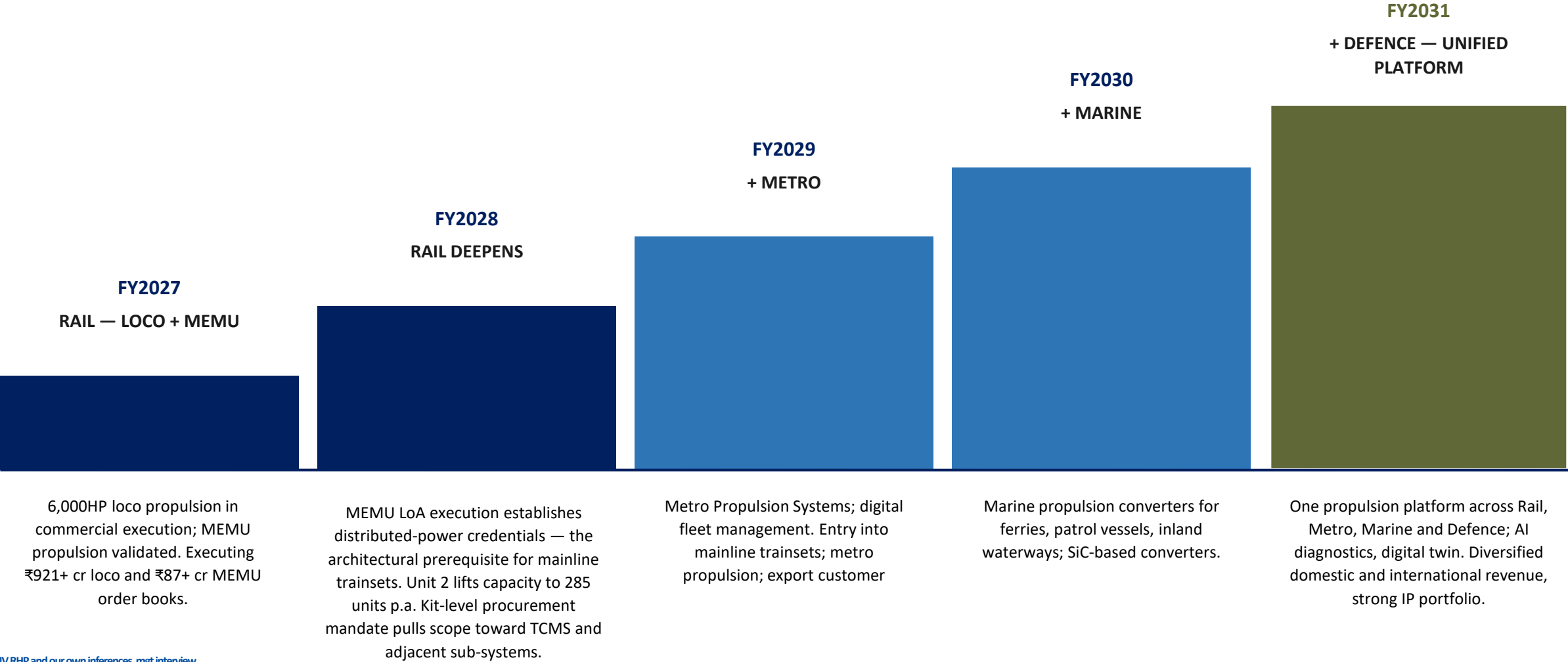
Here's what a valuation like MVEL's is paying for: a full propulsion value chain, benchmarked layer by layer against every serious player in the space.

		In-house / cleared	Partial / unconfirmed	Not in-house	Foreign / JV-sourced	No public data
		●	●	●	●	●
VALUE-CHAIN LAYER	MVEL	Medha	Hirect	BHEL	Alstom	Siemens
	₹49cr rev · 17 yrs	₹4,300cr rev · 1984	₹999cr rev · 1958	PSU · parked 2020	Madhepura JV	Dahod JV
IGBT power modules	–	–	–	–	–	–
Control electronics / PCBs	✓	P	JV	✓	P	–
Power stage assembly	✓	✓	✓	✓	✓	✓
Mechanical packaging	✓	✓	✓	–	–	–
Embedded firmware / TCMS	✓	✓	✓	–	–	–
Traction transformer	–	–	✓	✓	P	–
Traction motors	–	JV	✓	✓	P	–
CLW/RDSO approval	✓	✓	P	–	JV	JV

MVEL's shape on this matrix matches Medha's: deep on the IP-heavy layers (control electronics, firmware, packaging), currently absent from the heavy-industrial ones (transformers, motors)

Source: Companies' technical disclosures in website and brochures

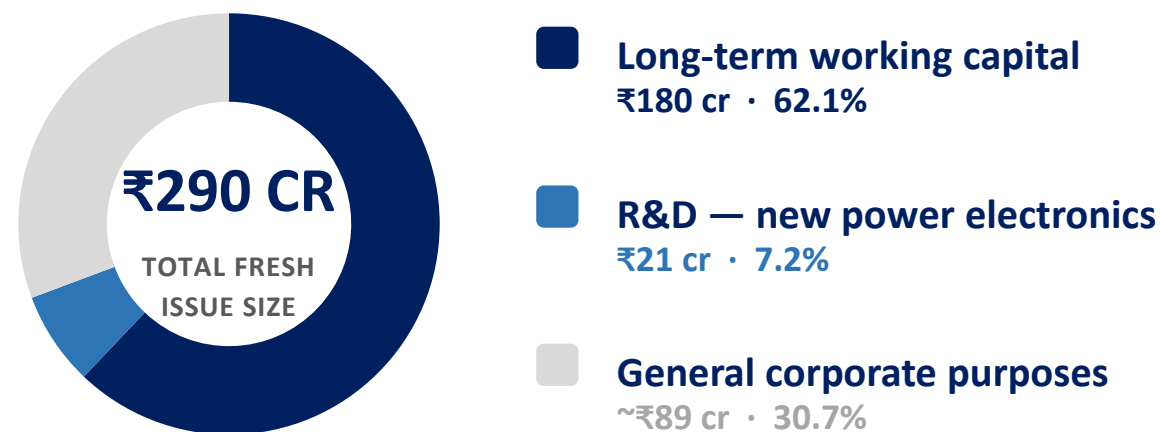
MVEL's platform now creates multiple avenues for long-term growth...



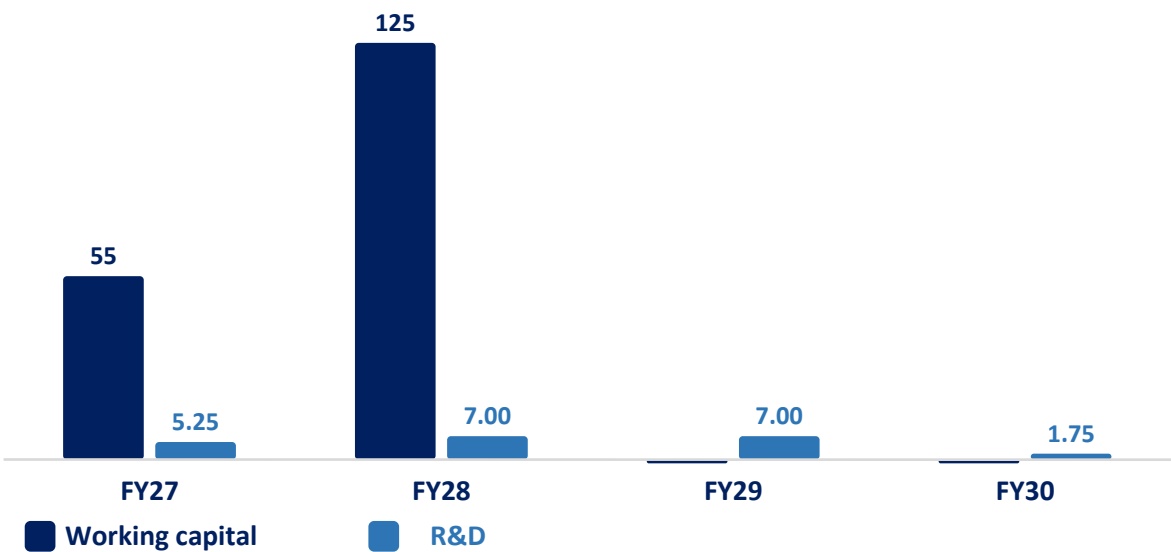
Source: MVRHP and our own inferences, mgt interview

The ₹290 Cr Raise

RHP's Objects of the Issue — this is overwhelmingly a working-capital raise, funding the cycle needed to execute the order book



DEPLOYMENT SCHEDULE



R&D is just 7.2% of the raise. The bulk (62.1%) is long-term working capital — funding the inventory and receivables cycle needed to execute an order book that's already ₹989 cr

Financials – P/L (Our Internal Estimates)

MV Electrosystems Limited	FY 24	FY 25	FY 26	FY 27E	FY 28E
Total Loco Propulsion				140	420
Revenue	50	63	49	275	744
% YoY Growth		25%	-21%	456%	171%
Gross Profit	21	22	11	83	231
Gross Margin (%)	41.6%	35.7%	21.9%	30.0%	31.0%
Growth YoY %		8%	-52%	662%	180%
Contribution	18	20	8	66	186
Contribution Margin (%)	36.9%	31.8%	16.2%	24.0%	25.0%
EBITDA	6	7	(10)	20	105
EBITDA Margin (%)	11.6%	11.0%	-20.8%	7.3%	14.2%
Growth YoY%		19%	-249%	-296%	422%
EBIT	3	3	(14)	15	98
EBIT margin %	5.9%	5.5%	-27.7%	5.3%	13.1%
PBT	1	2	(17)	15	95
PBT Margin (%)	2.2%	3.8%	-34.0%	5.5%	12.8%
Net Profit	1	1	(13)	11	71
Net Profit Margin (%)	1.3%	2.0%	-25.5%	4.1%	9.5%

Financials – B/S (Our Internal Estimates)

MV Electrosystems Limited	FY 24	FY 25	FY 26	FY 27E	FY 28E
<u>EQUITY AND LIABILITIES</u>					
Share Capital	7	9	10	14	14
Total Reserves	9	9	52	350	421
Net worth	17	18	63	364	435
Total Equity	17	18	63	364	435
Long-Term Borrowings	7	5	10	10	10
Other Long Term Liabilities	5	5	5	5	5
Long Term Provisions	1	1	2	2	2
Total Non-Current Liabilities	13	11	16	16	16
Trade Payables	12	19	22	23	61
Short Term Borrowings	20	22	40	40	40
Other Current Liabilities	3	4	5	5	5
Total Current Liabilities	36	45	67	68	106
Total Liabilities	66	74	146	448	557
<u>ASSETS</u>	FY 24	FY 25	FY 26	FY 27E	FY 28E
Tangible & ROU Assets - GB	27	28	46	66	91
Less: Accumulated Depreciation	14	16	19	24	32
Tangible & ROU Assets - NB	13	12	27	41	59
CWIP	-	-	2	2	2
Investment Property	11	11	11	11	11
Deferred Tax Asset (DTA)	1	2	6	6	6
Other Non Current Assets	1	1	2	2	2
Total Non-Current Assets	27	26	47	62	79
Inventories	24	32	67	121	224
Sundry Debtors	13	15	10	57	143
Cash and Bank	0	0	0	189	91
Other Current Assets	1	2	20	20	20
Short Term Loans and Advances	0	1	1	1	1
Total Current Assets	39	48	98	386	478
Total Assets	66	74	146	448	557

Source: Our own estimates; assumptions factor in public mgmt. guidance and inferences from Railways peers' financials

Risks

- Large locomotive orders are delayed, restructured or staggered across multiple years (Railway procurement has historically seen timeline slippages, although demand has generally been deferred rather than cancelled)
- Indian Railways remains the dominant customer for longer than expected (Management's expansion into metro, marine, exports and adjacent power-electronics applications could gradually diversify the revenue base, but execution remains to be demonstrated)
- Rapid order-book growth stretches manufacturing, working capital or execution capabilities (Unit 2 expansion and ongoing capacity additions are intended to address this, but execution risk remains during periods of rapid growth.)
- Power-electronics technology evolves towards SiC devices, new architectures or hydrogen-based propulsion faster than anticipated
- Existing players strengthen indigenous capabilities or new domestic competitors obtain approvals