MADE HERE · LEVEL 3 · STANDARDS 11 AND 12

The industry you are about to choose.

Where manufacturing actually is in the world, what world class means, the eight disciplines inside it, and what each one pays.

BLUE APPLE

WHY WE ARE HERE

You are about to make a career decision with almost no information.

Most students choose a stream because of family, marks and what the coaching centre said. Almost nobody chooses it because they have seen the work being done. That is not your fault — nobody showed you.

56.35%

India's employability rate in 2026. Four in ten graduates are not ready for the jobs being created.

17%

Manufacturing's share of India's GDP today. The national target is 25% by 2035.

143 million

Jobs the National Mission on Manufacturing aims to create by 2035.

Sources: India Skills Report 2026; IBEF; National Mission on Manufacturing.

01

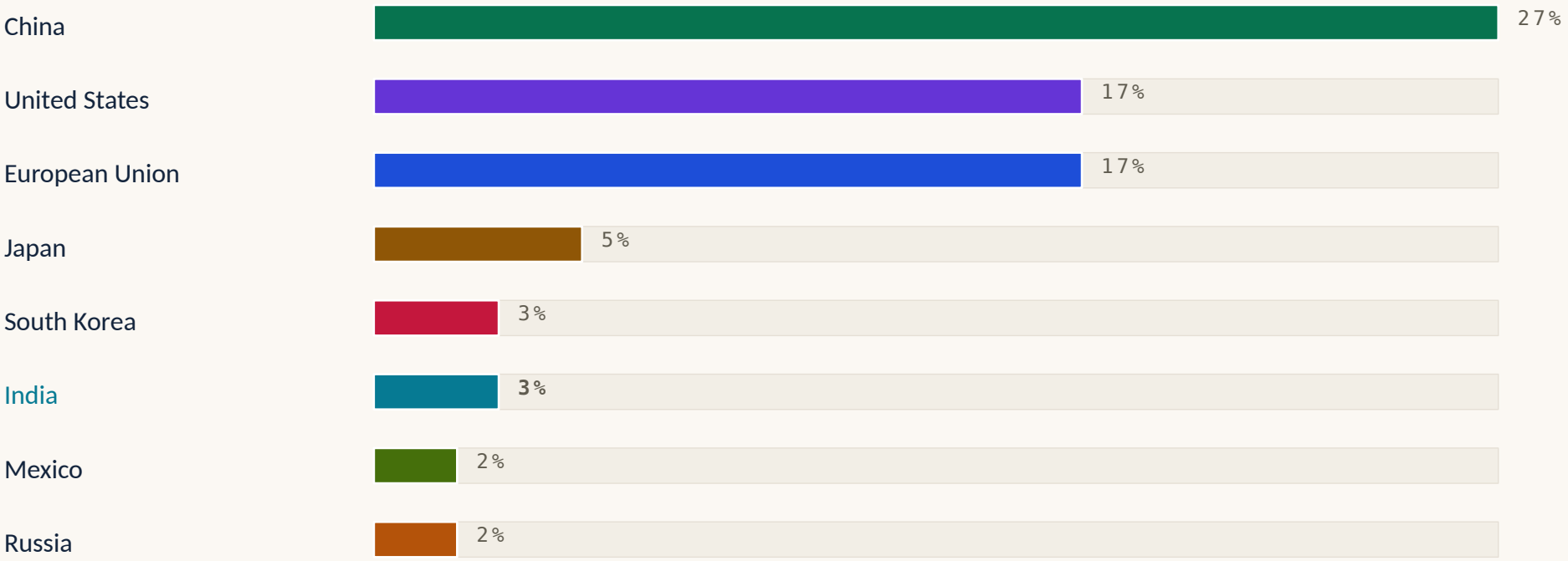
PART 01

Where manufacturing actually is

Who makes the world’s goods, how that has shifted in twenty years, and where India sits now.

SHARE OF GLOBAL MANUFACTURING VALUE ADDED, 2025

Six economies make most of what the world uses.



INDIA

6th

Up from 2% to 3% of global output since 2005 — the only large economy other than China to gain share.

Source: Visual Capitalist analysis of World Bank and BEA data, 2025. Percentages are share of global manufacturing value added.

THE NEXT TEN YEARS

India is trying to move from 17% to 25% of its own economy in ten years.

That is the largest deliberate industrial expansion being attempted anywhere. It cannot happen without people, and the people it needs are sitting in classrooms right now.

TODAY

17%

Manufacturing share of GDP

TARGET

25%

By 2035, National Mission on Manufacturing

SECTOR SIZE

$1 trillion

Projected by FY26

PLI JOBS

14.4 lakh

Already created under production-linked incentives

Source: IBEF, National Mission on Manufacturing, PLI scheme data to December 2025.

THE STATE YOU ALREADY LIVE IN

You are sitting inside the answer.

FACTORIES

No. 1

Most factories and the largest industrial workforce of any Indian state

STATE GDP

40%+

Comes from manufacturing

ELECTRONICS EXPORTS

$9.56 bn

FY 2023-24, up 78% in one year

EV PRODUCTION

40%

Of all EVs made in India in 2023

INVESTMENT

₹2.97 lakh cr

Proposals in two years

SCHOOLS

57,935

Teaching 1.25 crore students — almost none of whom are told any of this

Sources: India Briefing; Ministry of Statistics; UDISE+ 2024-25.

02

PART 02

What “world class” actually means

Not a slogan. Three numbers that a plant anywhere in the world is measured against.

THE WORLD ECONOMIC FORUM'S GLOBAL LIGHTHOUSE NETWORK

201 factories in the world are considered the best there is.

They are chosen for having actually deployed digital manufacturing at scale, not for having piloted it. This is what the latest cohort achieved on average.

+40%	−48%	−41%	−44%	−28%
Labour productivity	Lead time	Product defects	Cycle time	Energy consumption

Indian plants are in this network — CEAT and Hindustan Unilever sites among them. This is not something that only happens elsewhere.

Source: World Economic Forum, Global Lighthouse Network, September 2025 cohort.

OVERALL EQUIPMENT EFFECTIVENESS

World class is 85%. Most plants run at 60%.

OEE multiplies three separate things. Because it multiplies, being good at two of them is not enough — and that is the entire reason operations, quality and maintenance cannot be run as separate departments.

AVAILABILITY

90%

Running when it was supposed to be

×

PERFORMANCE

95%

Running at the designed rate

×

QUALITY

99.9%

Good the first time, no rework

= 85%

The gap between 60% and 85% is, in a real plant, the difference between losing money and funding a new line. Closing it is a career.

Benchmark from Nakajima's TPM standard; typical figures from industry surveys.

HOW GOOD IS GOOD ENOUGH

99% good sounds excellent. In manufacturing it is a disaster.

99%	10,000 defects per million	A car with 30,000 parts would have 300 faults
99.9%	1,000 per million	Still one bad part in every thousand
99.99%	100 per million	Typical automotive supplier expectation
Six sigma	3.4 per million	The statistical target the discipline is named after

This is why quality engineering is a mathematical discipline and not a clipboard. The gap between 99% and 99.99% is where the whole profession lives.

03

PART 03

The eight disciplines

What each one actually does, the number it is judged on, and who does it.

01 — SUPPLY CHAIN AND PLANNING

Deciding what gets made, when, and where every part comes from.

THE NUMBER IT IS JUDGED ON

Landed cost per unit

Demand planning

Forecasting what will be needed, and being measured on the error.

Sourcing and vendor development

Not just negotiating price — making suppliers capable.

Logistics and EXIM

Freight, customs, duty structure, landed cost per unit.

Inventory strategy

Money sitting still. Too little stops the line, too much sinks cash.

02 — OPERATIONS EXCELLENCE

Designing how work flows, then holding it there every shift.

THE NUMBER IT IS JUDGED ON

Cost per minute of running time

Line design and balancing

Where each task happens, and why the line runs at that rate.

Takt and cycle time

Matching the rate of making to the rate of buying.

Constraint management

Finding the bottleneck and deciding whether to break or protect it.

Standard work

Writing down the best known way, then training and auditing it.

03 — LEAN, 5S AND WASTE ELIMINATION

Removing everything the customer would not pay for.

THE NUMBER IT IS JUDGED ON

Value-added time as a share of total

5S

Sort, set in order, shine, standardise, sustain. Visibility, not tidiness.

The eight wastes

Defects, overproduction, waiting, unused talent, transport, inventory, motion, over-processing.

Kaizen

Small improvements run by the people doing the work, continuously.

Value stream mapping

Drawing the whole flow to see where time actually goes.

04 — TOTAL QUALITY MANAGEMENT

Defining what good means, then proving the process can hold it.

THE NUMBER IT IS JUDGED ON

Defects per million opportunities

SPC and capability

Is the process capable, and is it staying capable? Cp, Cpk.

Measurement systems

Gauge R&R — proving the measurement itself is trustworthy.

Structured problem solving

8D and A3. Root cause, verified, not guessed.

Supplier and customer quality

Incoming control, and closing complaints at source.

05 — TOTAL PRODUCTIVE MAINTENANCE

Making the machine available, with the operator owning its condition.

THE NUMBER IT IS JUDGED ON

Overall equipment effectiveness

Autonomous maintenance

Cleaning, inspection and lubrication done by the shift that runs it.

Planned maintenance

Criticality, frequencies, spares strategy, planning systems.

The six big losses

Breakdowns, setup, small stops, speed loss, defects, start-up loss.

SMED

Changeover reduction, run on the actual changeover with the setters.

06 — APPLIED ARTIFICIAL INTELLIGENCE

Models that run on the line, scoped against a payback.

THE NUMBER IT IS JUDGED ON

Payback period, in weeks

Vision inspection

Defect classes defined with quality first, then trained on your own parts.

Predictive maintenance

Prediction only on assets worth predicting, routed into the maintenance plan.

Forecasting

Demand and production models measured against the planner they replace.

Data quality

Bad data beats a good model every time. Most of the work is here.

07 — INDUSTRIAL IOT AND INDUSTRY 4.0

Making machines sense, talk and act — at the scale of a whole plant.

THE NUMBER IT IS JUDGED ON

Data completeness and latency

Sensing and edge

What to measure, how often, and what to do at the machine.

Connectivity and protocols

OPC-UA, MQTT, industrial ethernet, and why they matter.

MES and ERP integration

The shop floor talking to the business system, both directions.

Digital twins

A model of the line you can experiment on without stopping it.

08 — SUSTAINABILITY, EHS AND ESG

Energy, water and waste as measured process losses — and the audits that follow.

THE NUMBER IT IS JUDGED ON

Energy and carbon per unit

Energy and utilities

kWh per unit, sub-metering, and the three biggest losses.

Carbon accounting

Scope 1, 2 and 3, built on the same data the OEE model already uses.

Compliance systems

ISO 14001, ISO 45001, HIGG FEM, ZDHC — built to survive an audit.

Circularity

Water balance, effluent, recovery and what happens at end of life.

04

PART 04

Your actual decision

What these jobs pay, what to study, and what to do in the next two years.

WHAT THE WORK IS, AND ROUGHLY WHAT IT PAYS

None were school subjects. All are hiring now.

Graduate engineer trainee	Any discipline, on the floor from day one
Industrial / production engineer	Line design, standard work, capacity
Quality engineer	SPC, capability, supplier quality, audits
Maintenance and reliability engineer	Availability, criticality, spares, prediction
Automation and controls engineer	PLCs, robotics, sensing, integration
Data / AI engineer in manufacturing	Vision, forecasting, shop-floor data
EHS and sustainability officer	Energy, compliance, carbon, safety

THERE IS MORE THAN ONE DOOR

A degree is one route in. It is not the only one.

ITI

2 YEARS AFTER 10TH

Trade certificate. Fastest route onto a shop floor, and many plant heads started here.

Diploma

3 YEARS AFTER 10TH

Polytechnic. Lateral entry into the second year of a degree is possible afterwards.

B.E. / B.Tech

4 YEARS AFTER 12TH

Mechanical, production, industrial, electrical, mechatronics, computer science.

Apprenticeship

1–2 YEARS, PAID

Under the Apprentices Act, inside a real plant, often converting to a job.

What matters more than the route is whether you have actually been on a floor. Do a summer in a workshop, however small. It counts for more in an interview than a certificate.

WHAT ACTUALLY MAKES YOU GOOD AT THIS

Four habits matter more than any subject.

Measure before you argue

A number ends an argument that an opinion cannot. Nearly every improvement starts with someone bothering to time something.

Ask why five times

The first answer is never the cause. The discipline of not stopping is the whole of root-cause analysis.

Explain it simply

If you cannot explain it to the operator, you cannot install it. Communication is not a soft skill here.

Finish things

Most improvements fail at week six, not week one. The people who are trusted are the ones who came back.

Notice that none of these depend on your marks in any single subject.

FOUR THINGS YOU HAVE PROBABLY BEEN TOLD

And why each one is wrong.

“Factories are dirty and dangerous.”

Modern plants are cleaner than most schools, and safety performance is a board-level metric. Walk into one before you decide.

“It is all being automated away.”

Automation moves the work, it does not remove it. Someone specifies, installs, maintains and improves every robot.

“Software pays better.”

Some software pays better. Manufacturing pays well, promotes on capability, and cannot be offshored away from where the plant is.

“You need top marks.”

You need to be curious and finish things. The best plant engineers we know came through ITI and diploma routes.

BEFORE YOU LEAVE SCHOOL

Five things, none of which need permission.

1	**Visit one plant**	Any plant. A bakery, a press shop, a workshop. Ask to be shown around.
2	**Take one thing apart**	A fan, a pump, an old printer. Photograph every step so you can rebuild it.
3	**Measure something for a month**	Anything. Your commute, your marks, the canteen queue. Plot it.
4	**Learn one tool properly**	A spreadsheet, or Python. Not both. Depth beats breadth at your age.
5	**Talk to one person who does it**	Any engineer, any plant, any sector. One conversation changes more than a brochure.

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BLUE APPLE INDIA

Somebody has to build what India is about to build.

It will be people who are in school right now. There is no reason it should not be you — and now, at least, you know the job exists.

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