



MADE HERE · LEVEL 2 · STANDARDS 6 TO 10

How an industry actually works.

Eight sessions with people who run factories for a living. You will measure things, break things and fix them.

BLUE APPLE

START HERE

You live in the most industrial state in India. When did you last go inside a factory?

FACTORIES

No. 1

Tamil Nadu has more than any other
state

STATE ECONOMY

40%+

Of Tamil Nadu's GDP is manufacturing

ELECTRONICS EXPORTS

\$9.56 bn

In one year, up 78%

INDIA'S EVS

40%

Were made in this state

All of this is happening within an hour of where you are sitting, and almost nobody has shown it to you. That is what these eight sessions are for.

MODULE 01

Nothing is made in one place.

A phone touches thirty countries before it reaches your hand. Each step adds cost, and each step adds value. Industry is the business of adding more value than cost.



Break any one link and every link after it stops. That is why a chip shortage in Taiwan stopped car factories in Chennai.



02

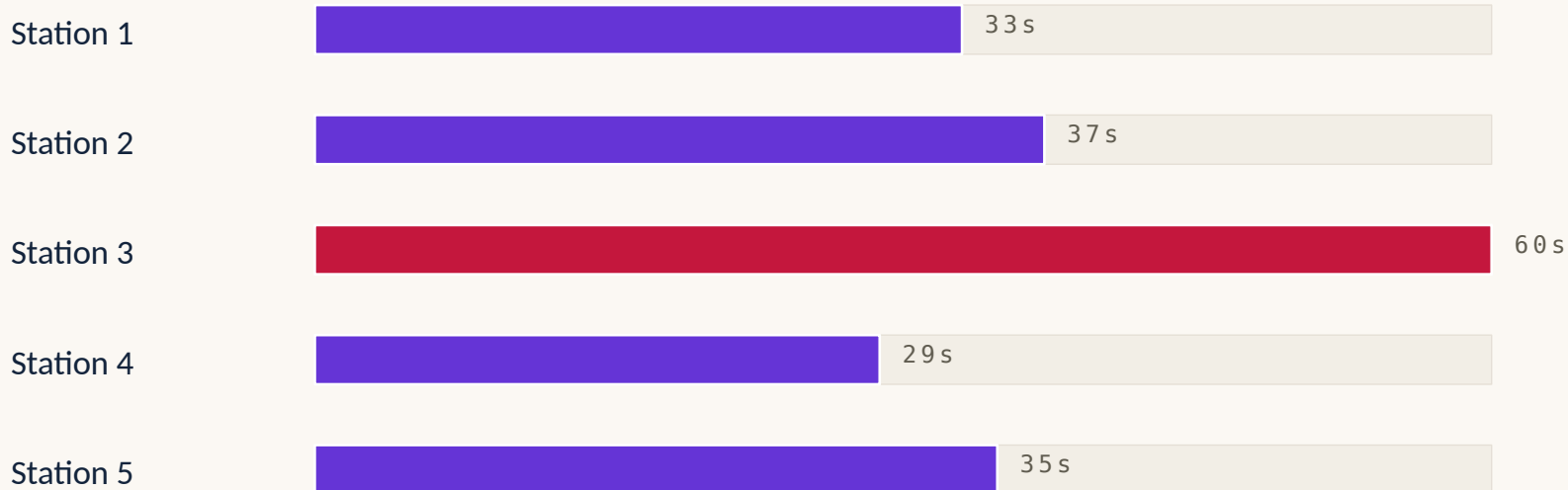
PART 02

How a factory runs

Flow, takt and the one machine everybody is waiting for.

OPERATIONS EXCELLENCE

A line runs at the speed of its slowest station. Not its fastest.



THE BOTTLENECK

Station 3

Everything before it piles up.
Everything after it waits. Speeding up
any other station changes nothing at
all — it just makes the pile bigger.

DO THIS, DO NOT WATCH IT

Run a five-station production line

1

Set up five stations

Fold, fold, fold, mark, stack. One student per station, one job each.

2

Run for three minutes

Count the finished pieces. Count the piles waiting at each station.

3

Find the bottleneck

It is wherever the pile is biggest. Time each station to prove it.

4

Rebalance and re-run

Move work off the slow station. Re-run and compare the count.

WHAT THEY SHOULD LEAVE WITH

A line is only as fast as its slowest step — and the fix is usually moving work, not working harder.



MODULE 03

5S is not tidying up. It is making problems visible.

When a tool has a painted outline and the outline is empty, you can see the problem from across the room. That is the whole idea — not cleanliness, visibility.

SEIRI

Sort

Remove what you do not need. Most plants find a third of it is not needed.

SEITON

Set in order

A place for everything, marked, so a gap is a signal.

SEISO

Shine

Cleaning is inspection. You find the leak while you wipe it.

SEIKETSU

Standardise

The same way, everywhere, written down and photographed.

SHITSUKE

Sustain

Audited weekly, forever. This is the one everybody fails.

THE EIGHT WASTES

Anything the customer would not pay for is waste.

A customer pays for a good part, on time. They do not pay for it to sit in a corner, be moved four times, or be made twice.

**Defects**

Made wrong, made again

**Overproduction**

Made before it was needed

**Waiting**

People and machines idle

**Not using talent**

The operator knew the fix

**Transport**

Moved, not improved

**Inventory**

Money sitting still

**Motion**

Walking, reaching, searching

**Extra processing**

Doing more than asked

The first letters spell DOWNTIME. That is how every plant in the world remembers them.

DO THIS, DO NOT WATCH IT

Hunt the eight wastes in your own school

1

Pick a real process

Lunch queue, book issue,
morning assembly, lab setup.

2

Walk it and time it

Follow one person through,
stopwatch running, writing down
every wait.

3

Tag each waste

Which of the eight is it? Argue
about the boundaries — that
argument is the lesson.

4

Propose one fix

One change, costing nothing, that
removes the biggest waste. Then
try it.

WHAT THEY SHOULD LEAVE WITH

Waste is invisible until you walk the process with a stopwatch. Then you cannot stop seeing it.

MODULE 04

A defect gets ten times more expensive at every step it survives.



This is why quality is designed in at the machine, not inspected in at the end. Inspection finds defects. It does not stop them.

DO THIS, DO NOT WATCH IT

Prove that measurement itself can be wrong

1

One object, three students

Same bolt, same ruler, three people measure it independently.

2

Write the numbers up

They will not match. Nobody is being careless.

3

Now three instruments

Ruler, tape, vernier. The spread gets worse, or better — find out which.

4

Decide the rule

Write down exactly how it must be measured so anyone gets the same answer.

WHAT THEY SHOULD LEAVE WITH

Before you can trust a measurement you must prove the measuring is repeatable. Engineers call this gauge R&R.

MODULE 05

A machine that is not running is not making money.

Overall equipment effectiveness multiplies three things together. Because it multiplies, a bad score anywhere ruins the total — which is why $90\% \times 95\% \times 99\%$ is only 85%.

AVAILABILITY

90%

Was it running when it should have been?

×

PERFORMANCE

95%

Was it running at full rate?

×

QUALITY

99%

Was the output good first time?

= 85% world class

DO THIS, DO NOT WATCH IT

Measure your own classroom's availability

1

Agree what counts

Class should start at 9:00 and run 40 minutes. Anything else is a loss.

2

Log it for a week

Start time, finish time, interruptions, equipment that did not work.

3

Compute availability

Actual teaching minutes divided by planned minutes. Expect a shock.

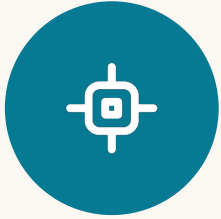
4

Attack the biggest loss

One countermeasure, run for a week, then measure again.

WHAT THEY SHOULD LEAVE WITH

Availability is not an opinion. Once it is measured, the argument changes from who is to blame to what to change.



MODULE 06

A model is a machine that has seen ten thousand examples.

It does not understand a scratch. It has learned what pixels look like when humans called it scratched. That distinction explains almost every mistake AI makes.

Vision inspection

Finds the defect at line speed, at 3am, without getting bored

Failure prediction

Hears the bearing going before the bearing goes

Demand forecasting

Guesses next month better than the spreadsheet does

Bad data

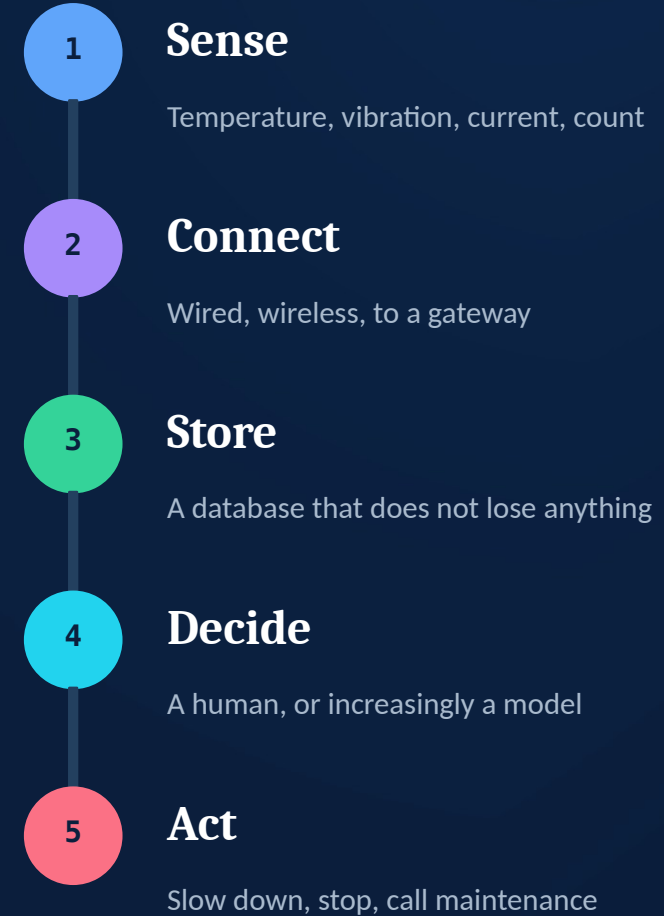
Beats a good model every single time



MODULE 07

Every machine can now keep its own diary.

A sensor costs less than a cup of tea. Put one on a motor and it will tell you its temperature every second, for years. Ten thousand machines doing that is the industrial internet of things.



MODULE 08

A factory borrows from the earth, and it has to give most of it back.



Energy

KWH PER UNIT MADE

The number every plant now
tracks



Water

LITRES IN, LITRES OUT

It must leave cleaner than it
arrived



Waste

SEGREGATED AT SOURCE

Mixed waste is worth nothing



Carbon

SCOPE 1, 2 AND 3

Your customer will ask for it

This is not a separate subject from the other seven. Energy per unit is an operations number, and scrap is both a quality problem and a waste problem.

DO THIS, DO NOT WATCH IT

Audit your school's energy, and cost it

1

Count everything

Every tube light, fan, computer, pump. Rating in watts, hours used.

2

Estimate the units

$\text{Watts} \times \text{hours} \div 1000 = \text{units a day}$. Multiply by the tariff.

3

Find the top three

Almost always lighting left on, an old pump, or something nobody owns.

4

Cost the fix

Rupees saved per year against rupees to fix. Hand it to the principal.

WHAT THEY SHOULD LEAVE WITH

Sustainability becomes real the moment it has a rupee sign in front of it — and that is exactly how a plant treats it.

WHAT THIS LEADS TO

Every one of these eight modules is somebody's whole career.

Planning & supply chain

Decides what gets made, when, and where the parts come from

Industrial engineering

Designs the line and the standard work that runs on it

Quality engineering

Defines good, proves the process can hold it

Maintenance & reliability

Keeps the assets running and predicts what will stop

Data & AI engineering

Turns shop-floor data into decisions

Automation & controls

Makes the machines sense, talk and act

EHS & sustainability

Owens energy, water, waste and compliance

Continuous improvement

Runs kaizen across all of the above

None of these existed as school subjects. All of them are hiring in Tamil Nadu right now.

THE PROJECT

Run your classroom like a plant.

Everything in these eight modules applies to the room you are sitting in. Prove it over one term.

Availability

Was the class present, and did it start on time?

Quality

Did the work come back for correction?

Waste

Where does the time actually go?

Performance

Did the period cover what it was meant to?

5S

Does everything in the room have a home?

Environment

What does this room cost in units of power?

Measure for four weeks. Find your biggest loss. Change one thing. Measure again and prove whether it held.



MADE HERE
BLUE APPLE INDIA



You now know more about how things get made than most adults.

The next step is to see it running. Ask your teacher about the plant visit — and when you are there, ask somebody what they earn and what they studied. They will tell you.

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