Waste Management & Pollution Control

Team:
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Internal C-SC1

BOSCH



Value Yard facility

BEYOND DISPOSAL

Engineering a Waste-to-Resource Journey Towards Zero Waste to Landfill



SORTING

CIRCULAR ECONOMY

RECOVER • REUSE • RECYCLE

RECOVERY

RECYCLING





Thermocol Waste



Solder Dross



SMT Reel Cut Pieces



Mixed Industrial Waste



Recycled Thermocol



Recycled Plastic



Recovered Solder



Recycled Paper

CHALLENGE • RECOVER • CIRCULARIZE

ZERO WASTE TO LANDFILL IS NOT JUST A TARGET



WE MAPPED THE JOURNEY OF WASTE — NOT JUST THE QUANTITY



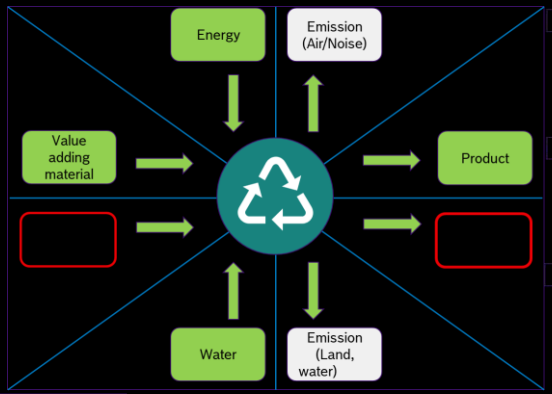
Waste-stream mapping → Opportunity identification → Recovery projects

Value Stream Waste Mapping

Process

- Waste Stream Identification
- Waste Generation Data Collection (Scope: Process waste)
- Mapping of Final Disposal Method
- Assign 4R score Based on the Percentage of Waste Stream Aligned with 4R principles

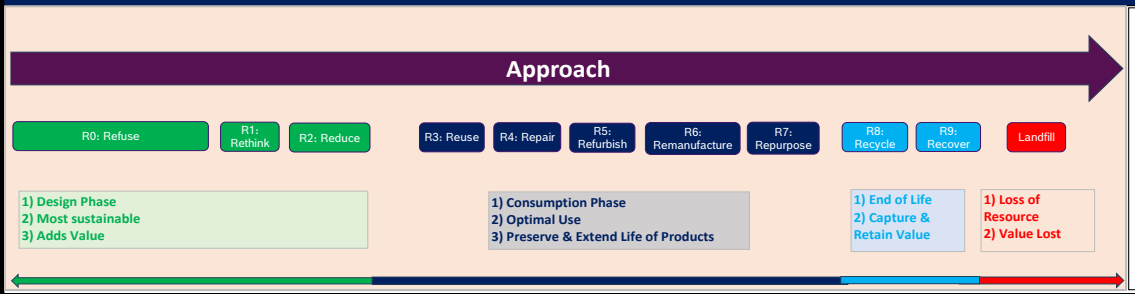
Approach





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Waste Stream Mapping





Department:

Location:

Assessment Done By:

Machine / Process Name	R0: Refuse				R1: Rethink				R2: Reduce				R3: Reuse				R4: Repair				R5: Refurbish				R6: Remanufacture				R7: Repurpose				R8: Recycle				R9: Recover				Landfill			
	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan	Waste	Quantity	handling method	Improvement plan
Flexi X.1																																											
Housing Preparation Station	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	LDPE	7000pcs/month	Recycling the plastic material	Nil	Nil	0	Nil	Nil				
Dispensing of TC 4525	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	LDPE	8000 pcs/month	Recycling the plastic material	Nil	Nil	0	Nil	Nil				
Dispensing DC7091	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	Nil	0	Nil	Nil	LDPE	20 cans/month	Sent for AFR	Potential for Recycling				

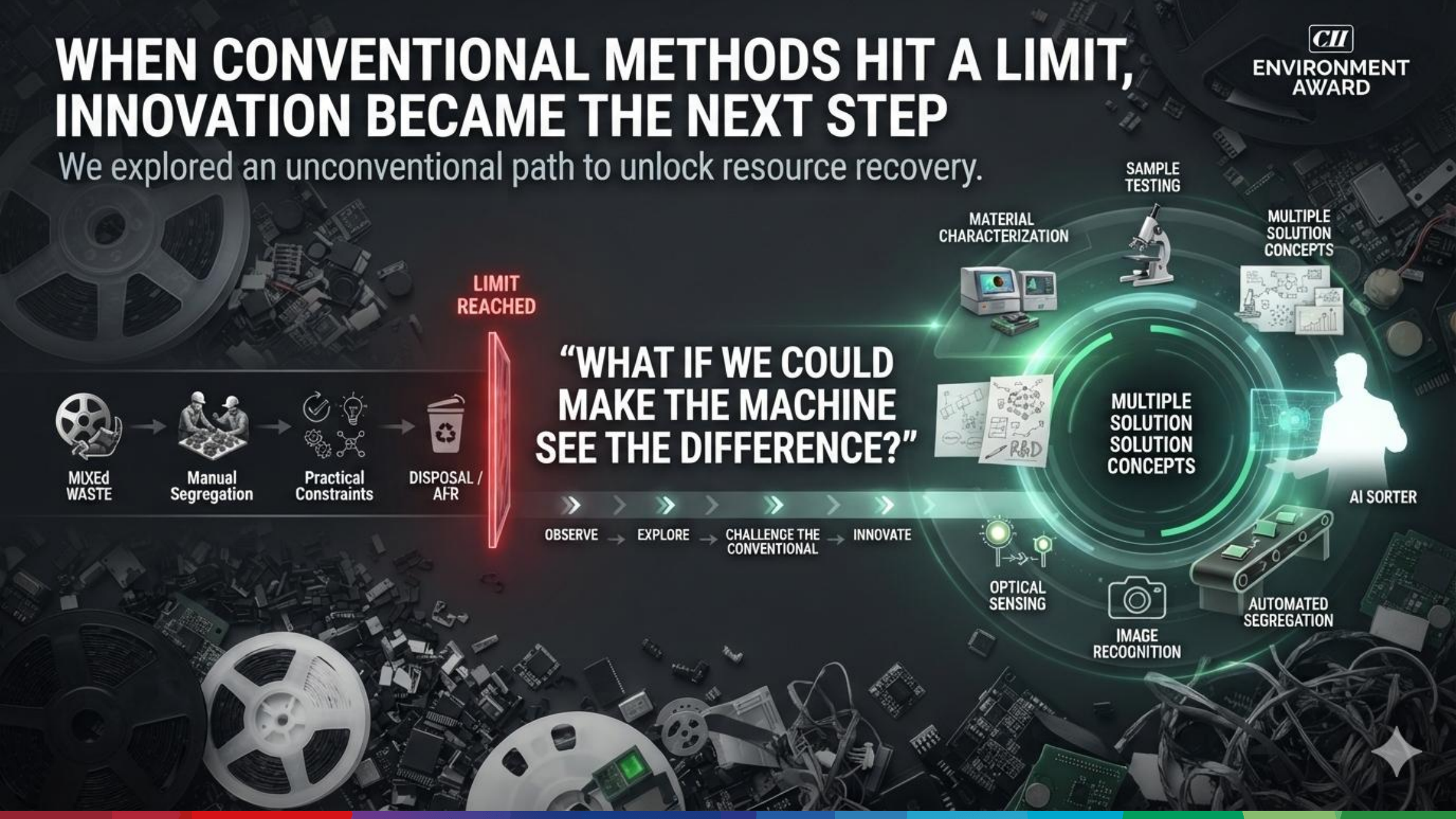
FROM DISPOSAL MANAGEMENT TO RESOURCE RECOVERY



WHEN CONVENTIONAL METHODS HIT A LIMIT, INNOVATION BECAME THE NEXT STEP

We explored an unconventional path to unlock resource recovery.

CII ENVIRONMENT AWARD



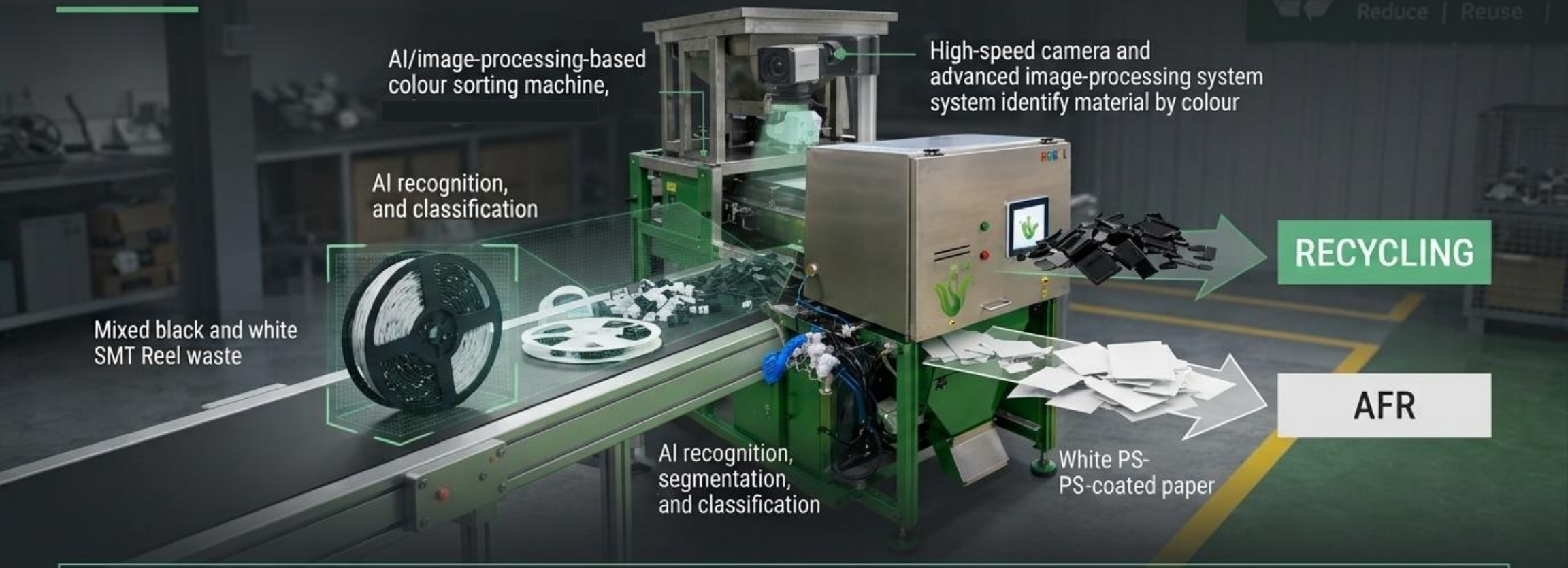
WHEN MANUAL SEGREGATION WAS NOT PRACTICAL



MIXED AT SOURCE • MANUAL SEGREGATION NOT PRACTICAL



WE DID NOT START WITH TECHNOLOGY.
WE STARTED WITH THE WASTE PROBLEM.



CHARACTERIZE → EXPLORE → AUTOMATE → RECOVER

Before Situation

BEFORE

19 t/year mixed reel-cut waste

↓

Difficult manual segregation

↓

Mixed stream

↓

AFR

₹11/kg cost

Mixed Waste condition



After Situation

AFTER

19 t/year captured at source

↓

AI identification

↓

Recyclable fraction recovered

↓

Recycling

₹24/kg realization

Segregated waste



VALUE SHIFT: ₹11/kg AFR cost → ₹24/kg recycling realization = ₹35/kg improvement per kg diverted


Environmental Benefits
CIRCULARITY
Recyclable material diverted from AFR to recycling
RESOURCE VALUE
19 t/month waste stream becomes a controlled recovery opportunity
WASTE MANAGEMENT
~171 tons/year of waste diverted from AFR to Recycling
506 tCO2e/year reduction
Cost Benefits
₹35/KG
Value swing for every kg shifted from AFR to recycling
Other benefits
AI ENABLEMENT
Consistent segregation of small mixed strips

WOOD WASTE REUSE

Driving Circular Economy Through Pallet Rework & Reuse

From single-use to multiple-use — giving wood a longer life, reducing waste and creating value.



THE OPPORTUNITY



- High volume of wooden pallets used across operations
- After single use, pallets were being discarded
- Opportunity to reuse & reduce wood waste

PROJECT PHASES & IMPLEMENTATION

1 INBOUND PALLETS
(Domestic Dispatch)



Collect & Inspect → Rework / Repair → Reuse for Domestic Dispatch

Original Pallet Cost	Rework Cost
₹600 / pallet	₹190 / pallet

Wood Saved: **50 MT / year**

2 IMPORT PALLETS
(Export Dispatch)



Receive & Inspect → Rework / Repair → Supplier Support (Export Dispatch)

Original Pallet Cost	Rework Cost
₹1,200 / pallet	₹250 / pallet

Wood Saved: **20 MT / year**

3 CUSTOMER PALLETS
(Warehouse Returns)



Collect Back → Rework / Repair → Reuse in Warehouse

Original Pallet Cost	Rework Cost
₹600 / pallet	₹200 / pallet

Wood Saved: **10 MT / year**

TOTAL IMPACT

Resource Conservation | Cost Efficiency | Circular Economy

80 MT	~ 120 MT	~ ₹42.5 Lakhs	3 Projects
Wood Saved / Year (50 + 20 + 10)	CO_2 Avoided / Year (approx.)	Cost Avoided / Year (rework vs. new pallets)	Across Inbound, Export & Customer

EXTENDING THE LIFE OF WOOD

FOR A GREENER TOMORROW



LESS WASTE | MORE VALUE | A SUSTAINABLE FUTURE

THERMCOL RECYCLING PROCESS IMPLEMENTED TO REPLACE AFR

STAGE 1 – COLLECTION & SEGREGATION → **STAGE 2** – SHREDDING / SIZE REDUCTION → **STAGE 3** – Ddensification → **STAGE 4** – GRANULATION → **STAGE 5** – RECYCLED PRODUCT APPLICATION











THERMOCOL: FROM DISPOSAL COST TO RECYCLING VALUE



DISPOSAL → RECYCLING → VALUE RECOVERY

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SOLDER DROSS: FROM PROCESS RESIDUE TO MATERIAL RECOVERY







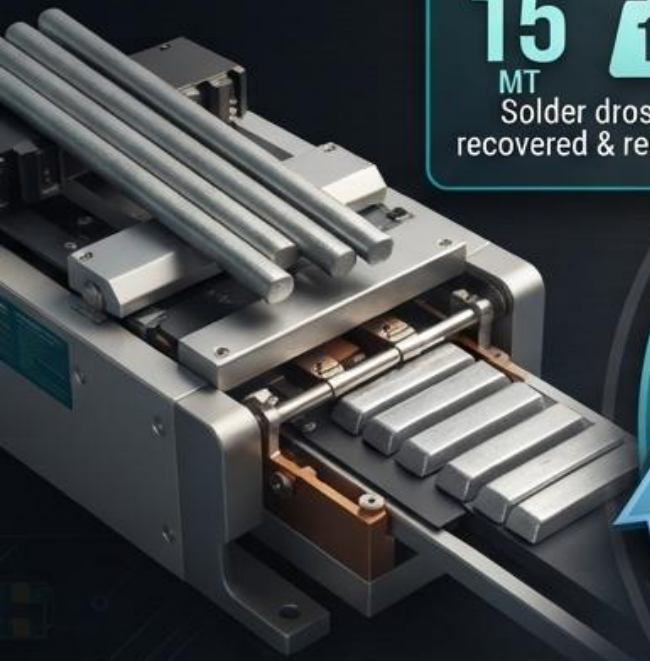
Solder Dross Handling Method(Before & After)





Internal C-SC1 | NhP1/HSE | 2026-09-16
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SOLDER DROSS: FROM PROCESS RESIDUE TO MATERIAL RECOVERY



15 MT
Solder dross recovered & reused



~3,000 BARS
Recovered solder bars reused



SOLDER BAR

SOLDER DROSS

DROSS EXTRACTION

RECOVERED SOLDER





48 MT CO_2
Carbon footprint reduction

₹5 MILLION
Cost saving / material value recovered

A REPEATABLE MODEL FOR ZERO WASTE TO LANDFILL



MAP →

CHALLENGE →
Team quostneliing team
to disposal route

CHARACTERIZE →
Material characterization
in skyle samples

EVALUATE →
Technical feasibility studies,
Models matrix

PILOT → Pilot testing of new processes

IMPLEMENT →
Full-scale implementationtion new
equipment operational procedure installed

MONITOR →
KPI monitoring on
diversion diversion rates,
environmental metrics

REPLICATE

Every waste stream becomes the next improvement opportunity.



Thank You

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