

Sandhar Smart Manufacturing



By. SSM Team Sandhar

What is Industry 4.0?

A collective term for technologies and concepts of value chain organization.

Based on the technological concepts of

- Cyber-physical systems.
- **Internet of Things** and the Internet of Services,
- It facilitates the vision of the **Smart Factory**.
- Builds on the **Digital revolution**
- Smaller & powerful sensors
- **Machine Learning**
- Ubiquitous internet
- **Artificial Intelligence** (AI)
- Labor & Energy Cost



Why Industry 4.0?



Technology

- **Robotics** – Replacing humans on assembly line
- **3D Printing** – Manufacturing customized components
- **Big Data** – Collecting performance parameters
- **Analytics** – Understanding collected data



Process

- **Constant communication** – Data exchange between components
- **Decentralized decision making** – Routine decisions
- **Standardization** – Ease of customization
- **Smart Transport System** - Automated transportation of raw material / final products



People

- **Increased efficiency** – Reduction in labor per unit
- **Skill Development** – Up-skilling, Re-skilling, Continuous learning & Mindset change
- **Only to handle disruptions** – Monitoring and corrective actions



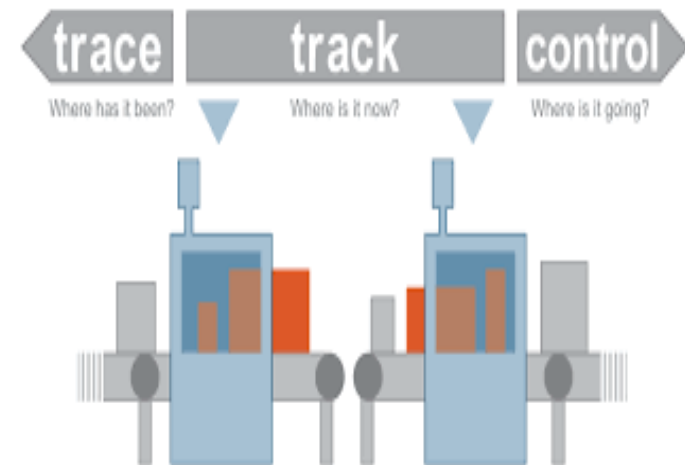
Sandhar initiative towards Industry 4.0



Connected Manufacturing



Assembly Automation



Material Traceability



Connected Manufacturing

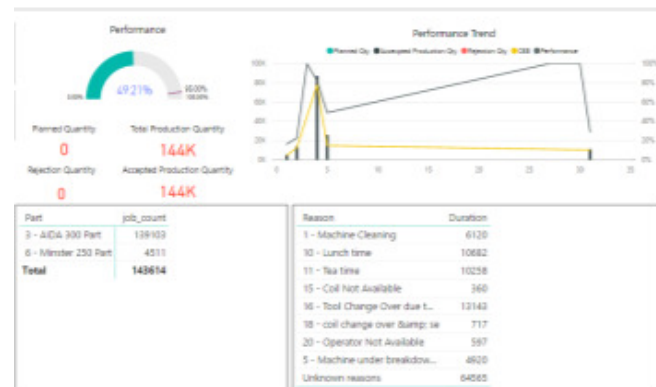
Connected manufacturing is a business strategy that leverages cloud computing to harness operational and business data for greater visibility, efficiency, control, and customer satisfaction. Connecting your people, processes, and supply chains gives us an end-to-end visibility and control.

Alert , Notification, Data and Reports on real time basis.

Production data, Quality data, OEE, Down Time . etc,



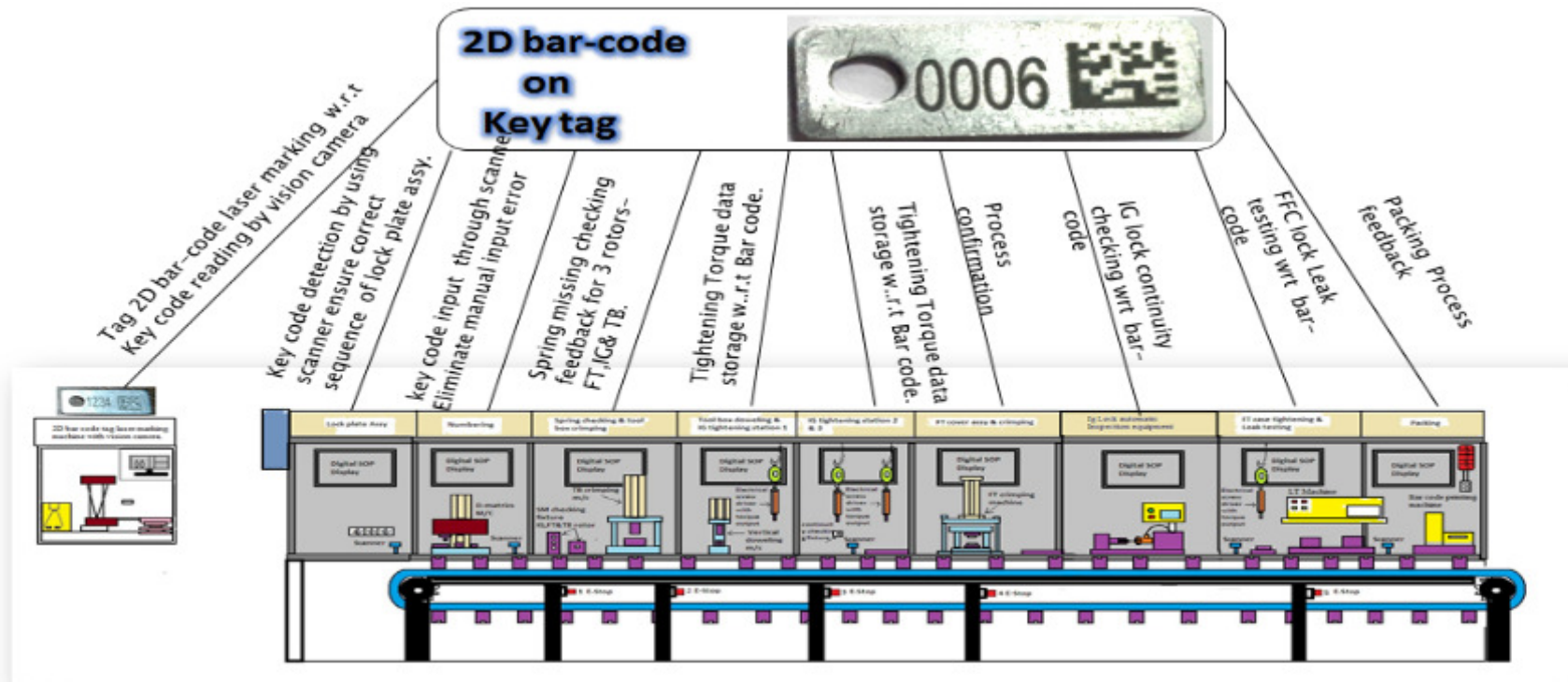
Operator Performance analysis



MTTR and MTBF



Assembly Automation



Line Features

- Testing Automation and data recording
- Rejection Part Interlocking
- Hourly out put monitoring .
- Rejection data with value .
- Poka Yoke Process Confirmation.



Material Traceability

Material Traceability (Track and Trace)

- Vendor Management
- Inventory Management (Smart Intelligent Store)
- Work in process management
- FG Management
- Warranty Tracking



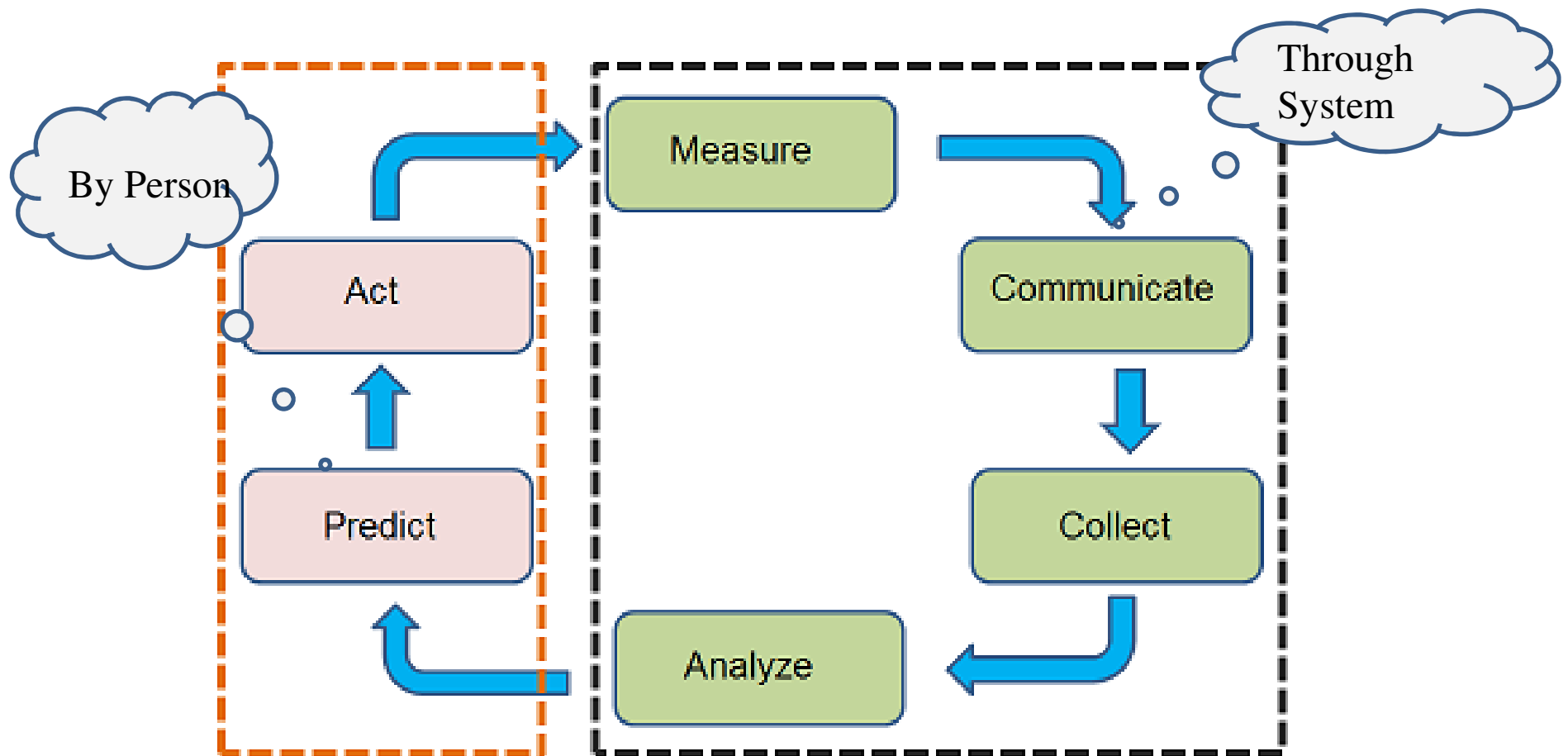
DS8178-SR

Benefits

- Elimination of manual data entry for material receipt and Issue in all stages
- Auto up-dation of Inventory
- Auto scheduling to vendor as per material consumption
- Auto shipment note
- Minimal Difference between physical and system stock data



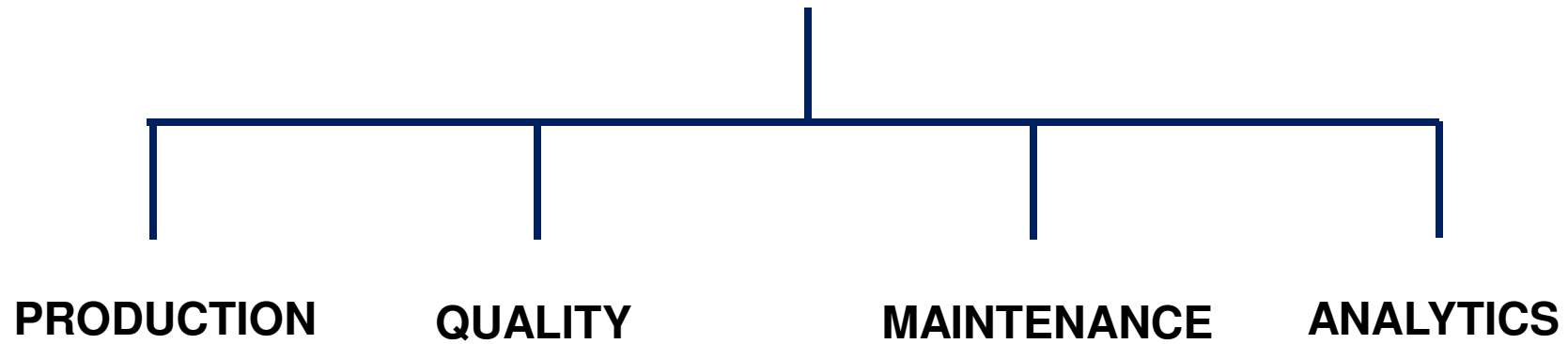
Work Scope – Connected Manufacturing





Scope

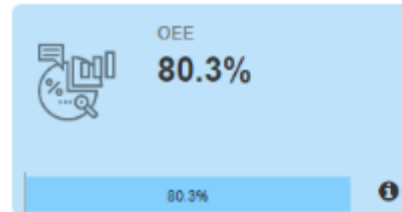
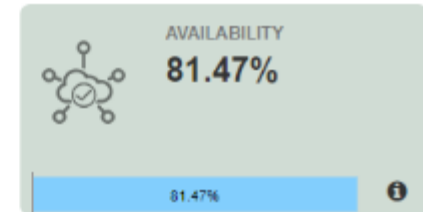
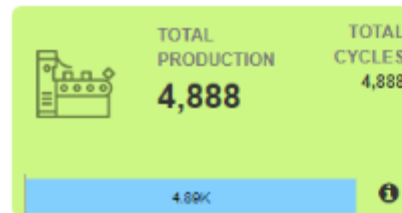
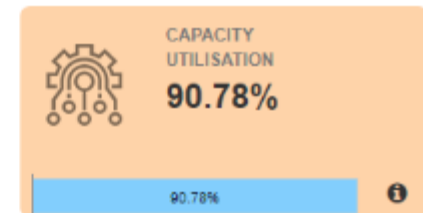
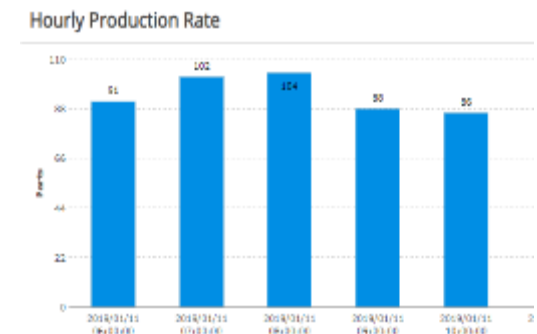
Connected Manufacturing



- Production monitoring
- Quality data recoding
- Maintenance alerts
- CBM parameter monitoring and alert
- Comparison of data



Scope - Production





Scope - Maintenance



Electricity

10.11 kWh

Hourly Electricity Consumption



MTTR and MTBF



Downtime in Mins by Reason



Number of Failures

76

Planned Down Time

6 days,
21:48:47

Unplanned Down Time

Operating Time

Machine Maintenance Report

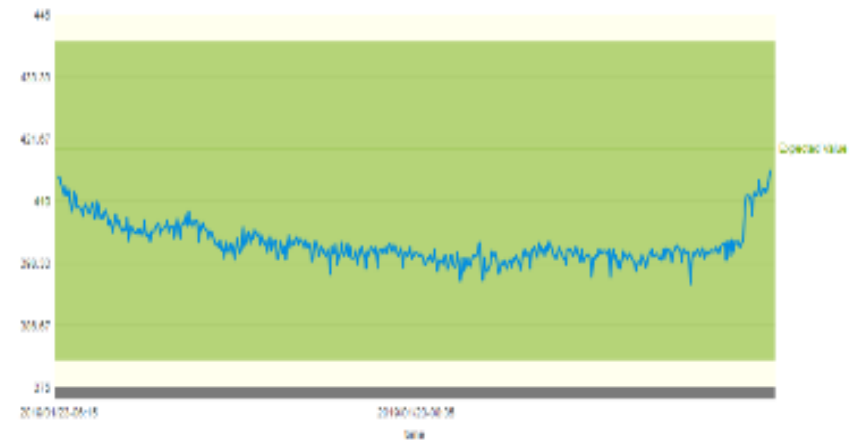
Code #	Name #	Health Remaining	Last Maint. Time	Cycles Since Last Maint.	Maint. Threshold	Likely Maint. Due Time	Actions
Anterior Diaphragm Die	Anterior Diaphragm Die	49791 cycles	2016/10/02 06:30	269	50000	2043/01/11 21:35	⚙ 🔍
Gear Grinder	Gear Grinder	15409 cycles	2016/10/02 06:30	9541	25000	2017/02/14 13:39	⚙ 🔍
Press Trimmer	Press Trimmer	5459 cycles	2016/10/02 06:30	9541	15000	2016/12/02 10:47	⚙ 🔍
Drill bit 25mm	Drill bit 25mm	35000 cycles	2016/10/02 06:30	0	30000	NA	⚙ 🔍



Scope - Quality

Point out of limit: 0

Range	Mean
Min: 394.42 Max: 415.61	401.80
UCL	UCL
330	440
UWL	UWL
-	-
Std Deviation	Deviation From Target
3.71	-13.11
cp	cpk
1.09	1.00





Scope - Analytics

Cell Line#
Molding

Show 5

Search for...

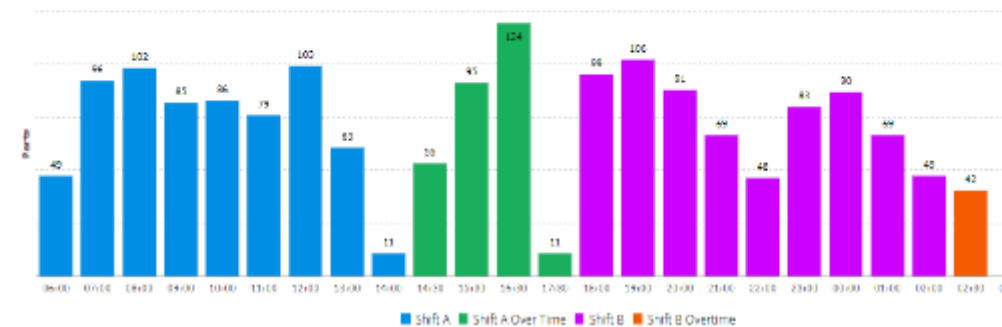
Workcenter Name #	Health Remaining %	Maint. Threshold (hours)	Last Maint. Time	Next Maint. Due Time	Actions
Molding 1	80.00 hours	1000	2018/07/14 23	2019/04/05 09:18	
Molding 2	80.00 hours	1000	2018/07/14 25	2019/08/11 07:24	
Molding 3	NA	NA	NA	NA	
Molding 4	88.00 hours	900	2018/08/18 01	2019/03/02 06:42	

Hourly P/E/C

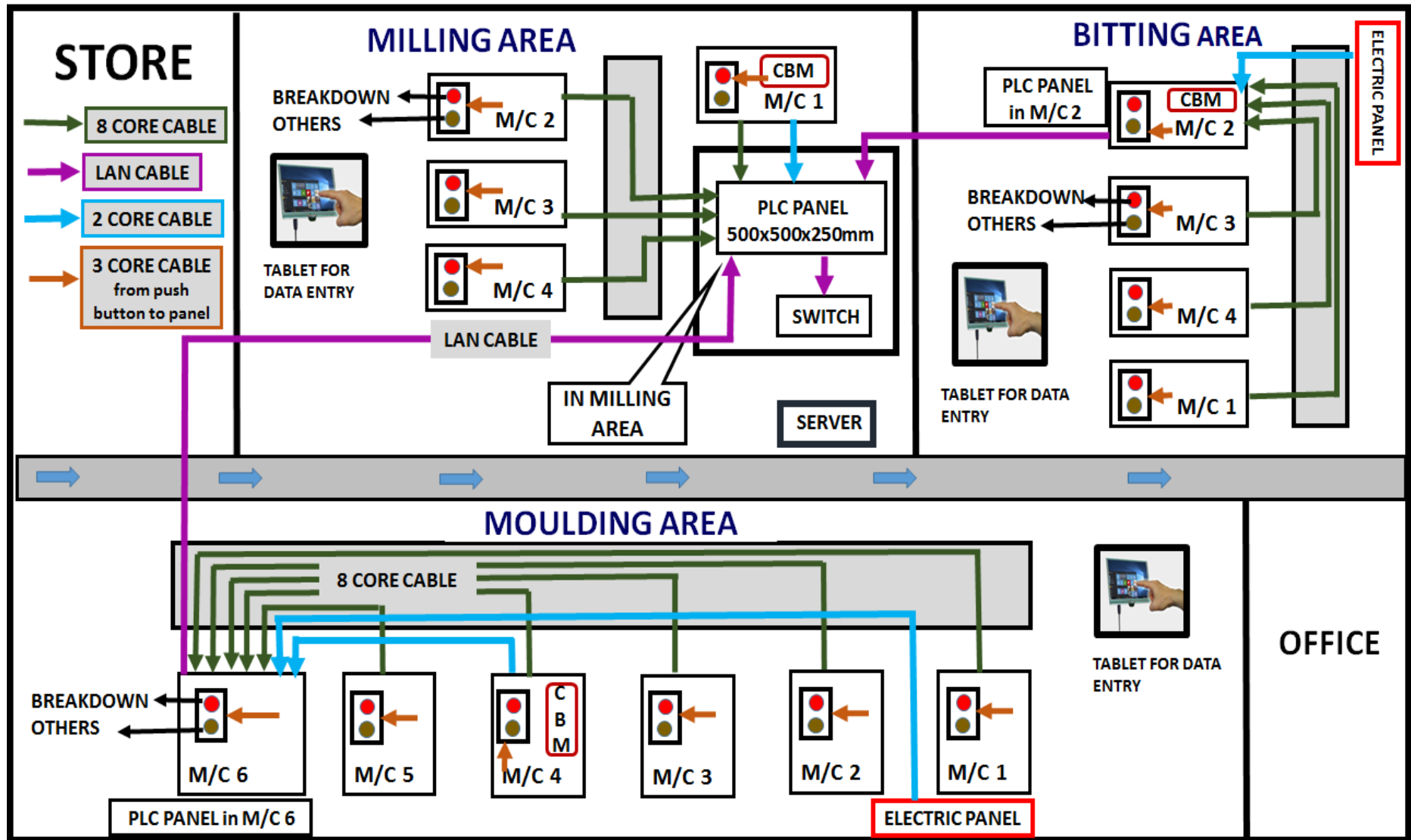
Workcenter#
Molding 1

Date
2019/01/21

Hourly Production Rate

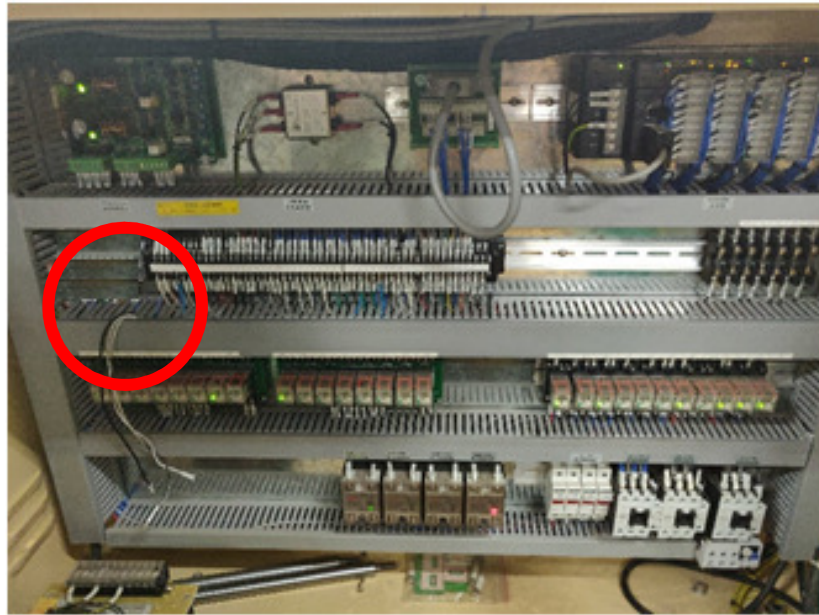


Key Section Layout with wiring detail- After





For Production Data – All machine



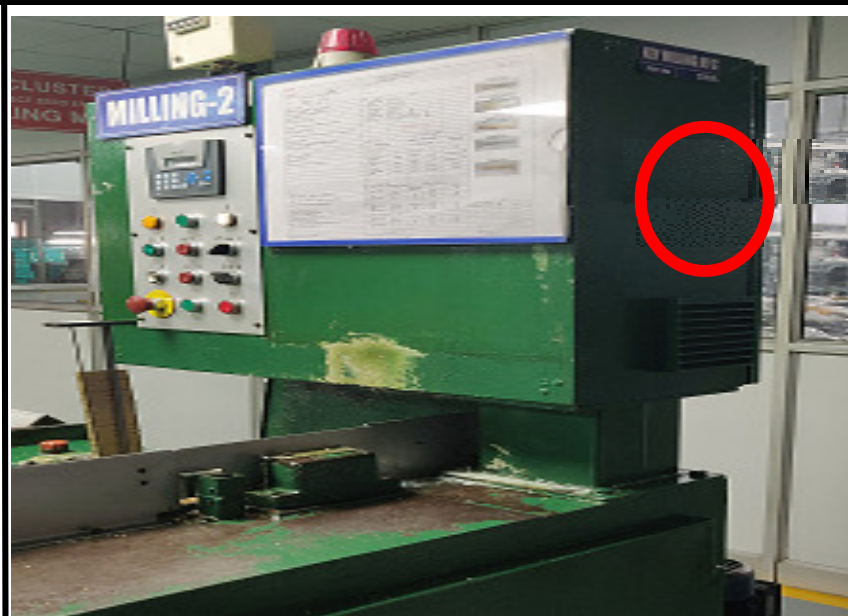
Before



After

Relay added in Each machine for getting production count , up time and running detail of each machine.

For Breakdown Data – All Machine



Before



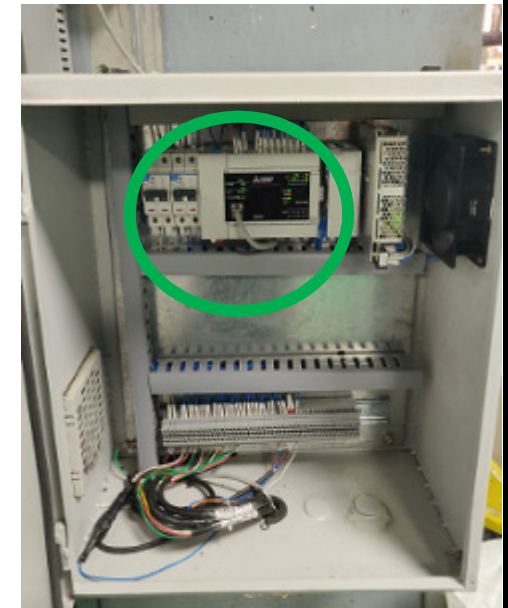
After

- 2 Nos. Push Button added for monitoring of down time
- 1- Unplanned Down time - Breakdown Alert
 - 2- Planned down time – Tool Changeover

For Data Collection — Each Section Milling, Biting and Moulding



Before



After

PLC Panel installed

For CBM Data – Motor Working Milling Machine –1



Before



After

Current transducer and Energy Meter added for Motor working Monitoring

- 1- Cutter Motor
- 2- Slider Motor

For CBM Data – Lubrication Oil level Milling Machine –1



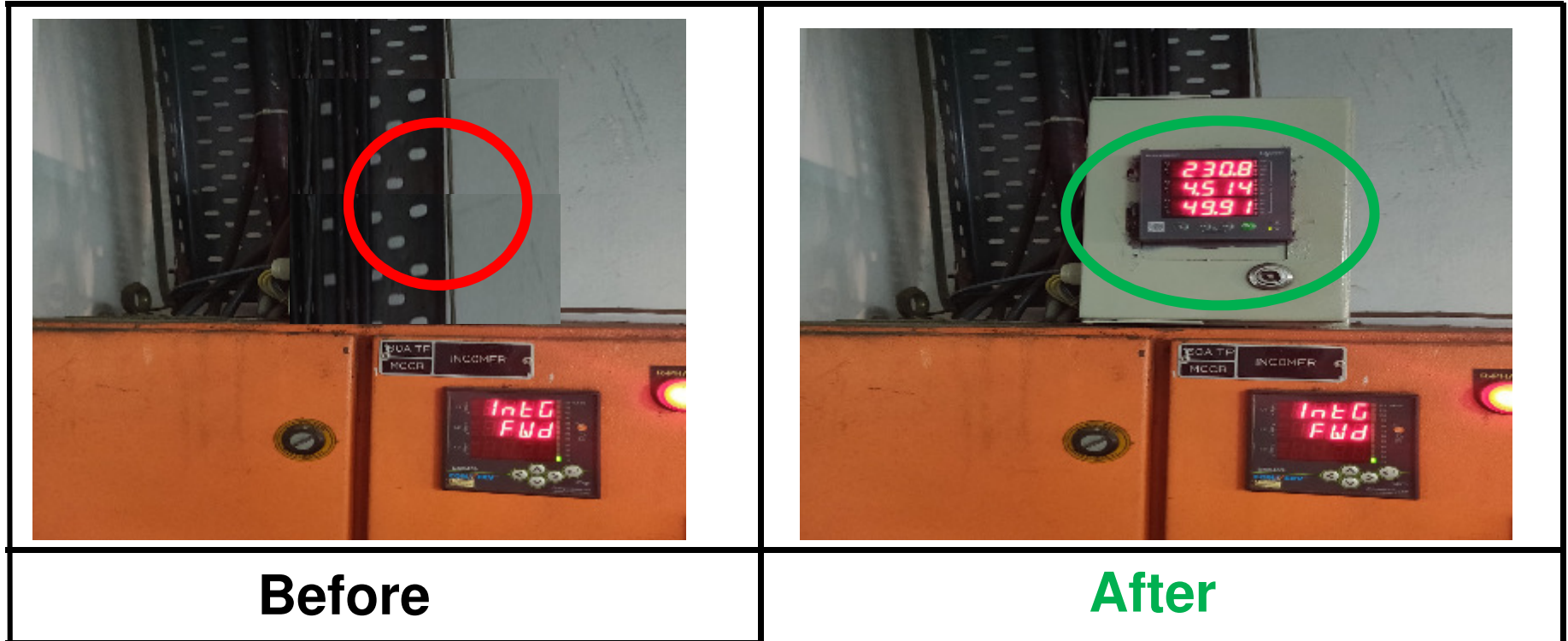
Before



After

Capacitance level sensor installed for lubrication oil level monitoring

For CBM Data – Biting Section Voltage and Current



The electrical parameters that Energy Meter will measure are Voltage, Current and frequency



Sandhar Automotives

SANDHAR
Growth . Motivation . Better Life

Go live on 15th April.19



8/31/2019



Motivational Section Live Dashboard

Sandhar Initiative Section Dashboard

Jul 17th, 2019
Wed, 12:27:05 IST

Workcenters

Cell	Workcenter	Part	Prod Qty	OEE	Status	Achiever
Moulding	Moulding-1	P-16 Amba (C Type)	541	89.44%		
	Moulding-2	P-16-Hero (C Type)	497	84.74%		
	Moulding-3	KVHG (C Type)	563	91.70%		
	Moulding-4	MAHINDRA & MAHINDRA (A Type)	568	91.90%		
	Moulding-5	KZNA-Hero (A Type)	447	78.46%		
	Moulding-6	KWAG-Hero (C Type)	598	97.41%		

Legends

Machine running with achieved OEE Target of 90%

Machine stop due to planned downtime

Machine running below OEE Target of 90%

Machine stop due to unplanned downtime



Alerts / Notifications on real time basis

Machine breakdown E-mail to Maintenance

Sandhar Initiative
Operator name on Breakdown
notification slip



FILE

MESSAGE



Tue 09-04-2019 08:14

Datonis <datonis@altizon.com>

Moulding-3 is Under Breakdown : Operator - Gopal

To raghvendra.singh@sandhar.in; shubham.raai@sandhar.in; rashmi.tripathi1@sandhar.in

Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

Moulding-3 is Under Breakdown : Operator - Gopal - Message (HTML)



A rule [Push Button 1 Pressed Alert for Breakdown](#) was triggered at 2019/04/09 08:13:41. You can access details [here](#).

Thing Details

Thing key	ec61b9d578
Name	Moulding-3
Thing Template	Moulding
Thing details	https://www.datonis.io/things/ec61b9d578



Preventive Maintenance Alert

Workcenter Name	Health Remaining	Maint. Threshold (hours)	Last Maint. Time	Likely Maint. Due Time	Actions
Milling-1	386.29 hours	1650	2019/03/28 14:00	2019/08/20 10:46	
Milling-2	1427.60 hours	1650	2019/07/01 20:00	2019/10/26 07:36	
Milling-3	803.36 hours	1650	2019/05/02 08:15	2019/09/27 19:55	
Milling-4	353.57 hours	1650	2019/03/23 10:00	2019/08/18 04:52	

1

Showing Page 1 of 1

Workcenter Name	Health Remaining	Maint. Threshold (hours)	Last Maint. Time	Likely Maint. Due Time	Actions
Bitting Feeder Line	NA	NA	NA	NA	
Bitting-1	1462.31 hours	1650	2019/03/03 18:00	2022/06/09 11:23	
Bitting-2	1246.32 hours	1650	2019/06/16 17:20	2019/10/20 16:04	
Bitting-3	1297.87 hours	1650	2019/06/18 17:45	2019/10/31 16:05	
Bitting-4	1113.25 hours	1650	2019/06/09 17:35	2019/10/03 22:34	

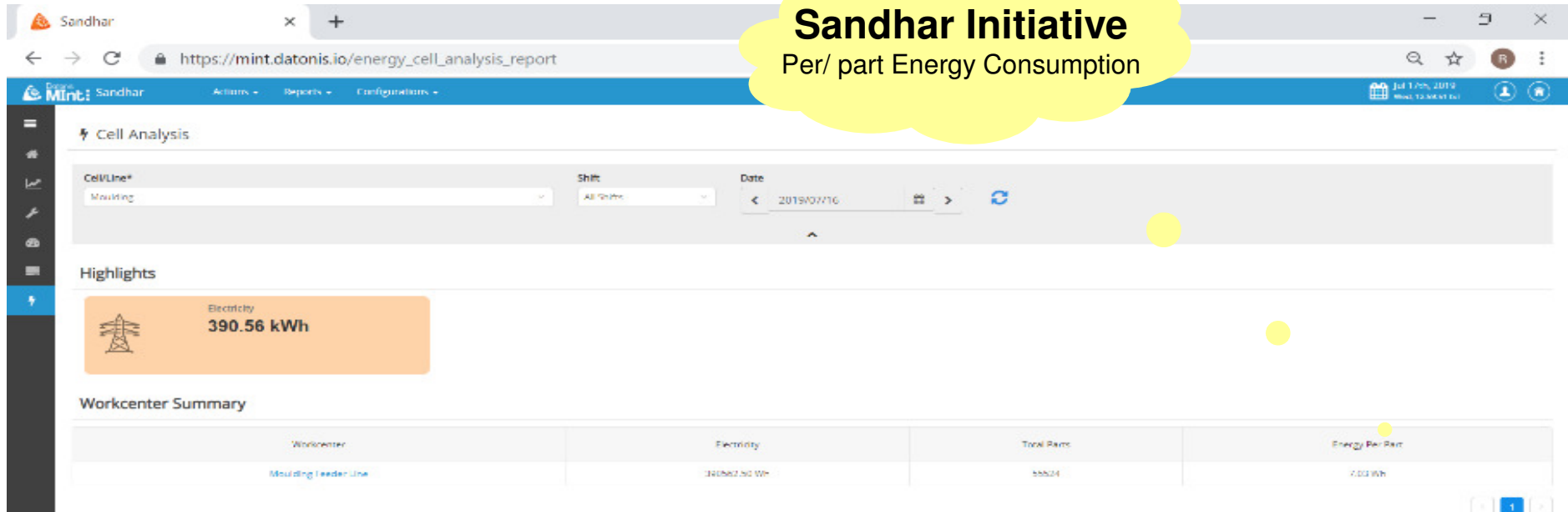
1

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Daily Energy Consumption

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Per/ part Energy Consumption

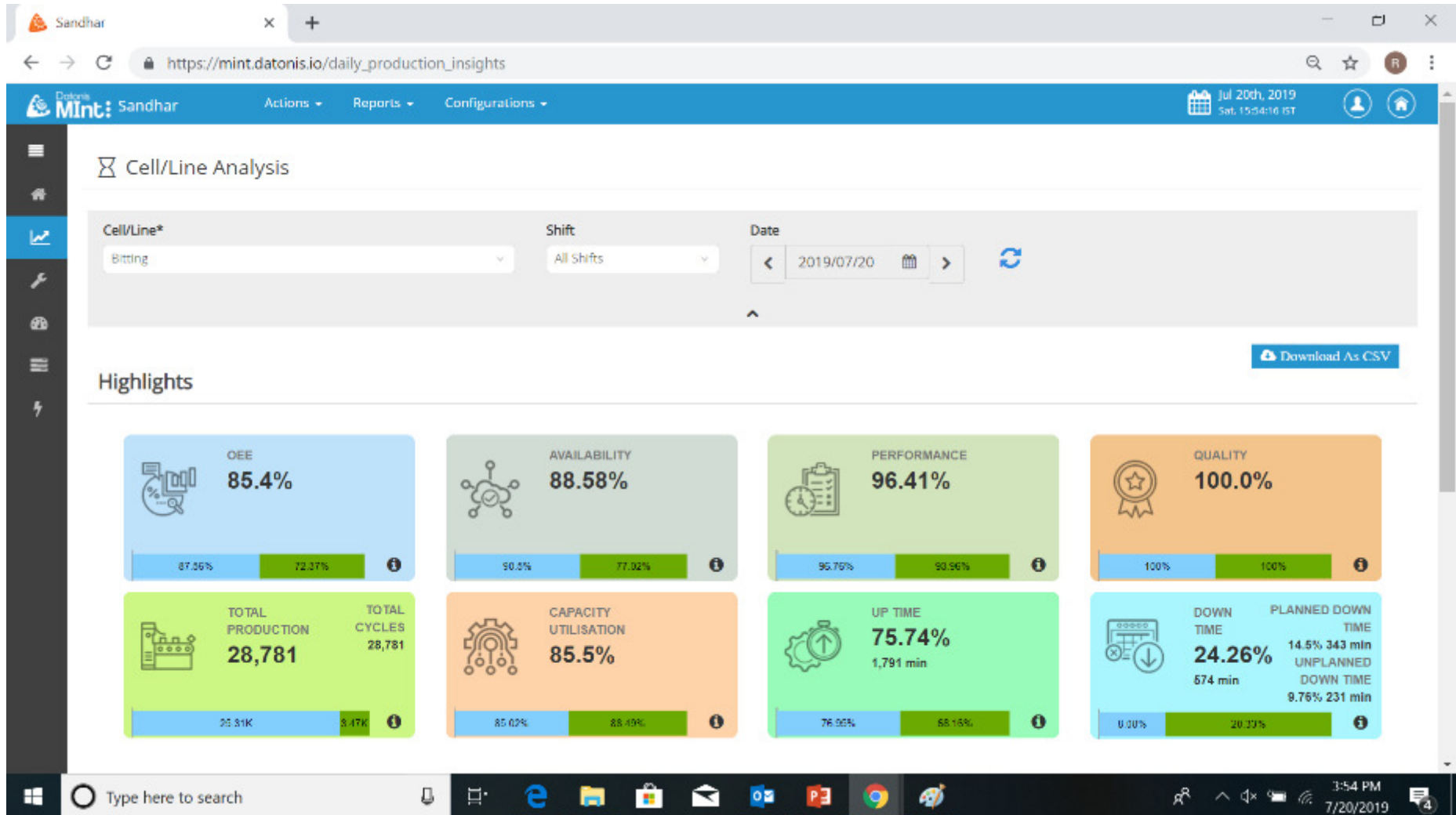


Section wise Hourly Electricity Consumption



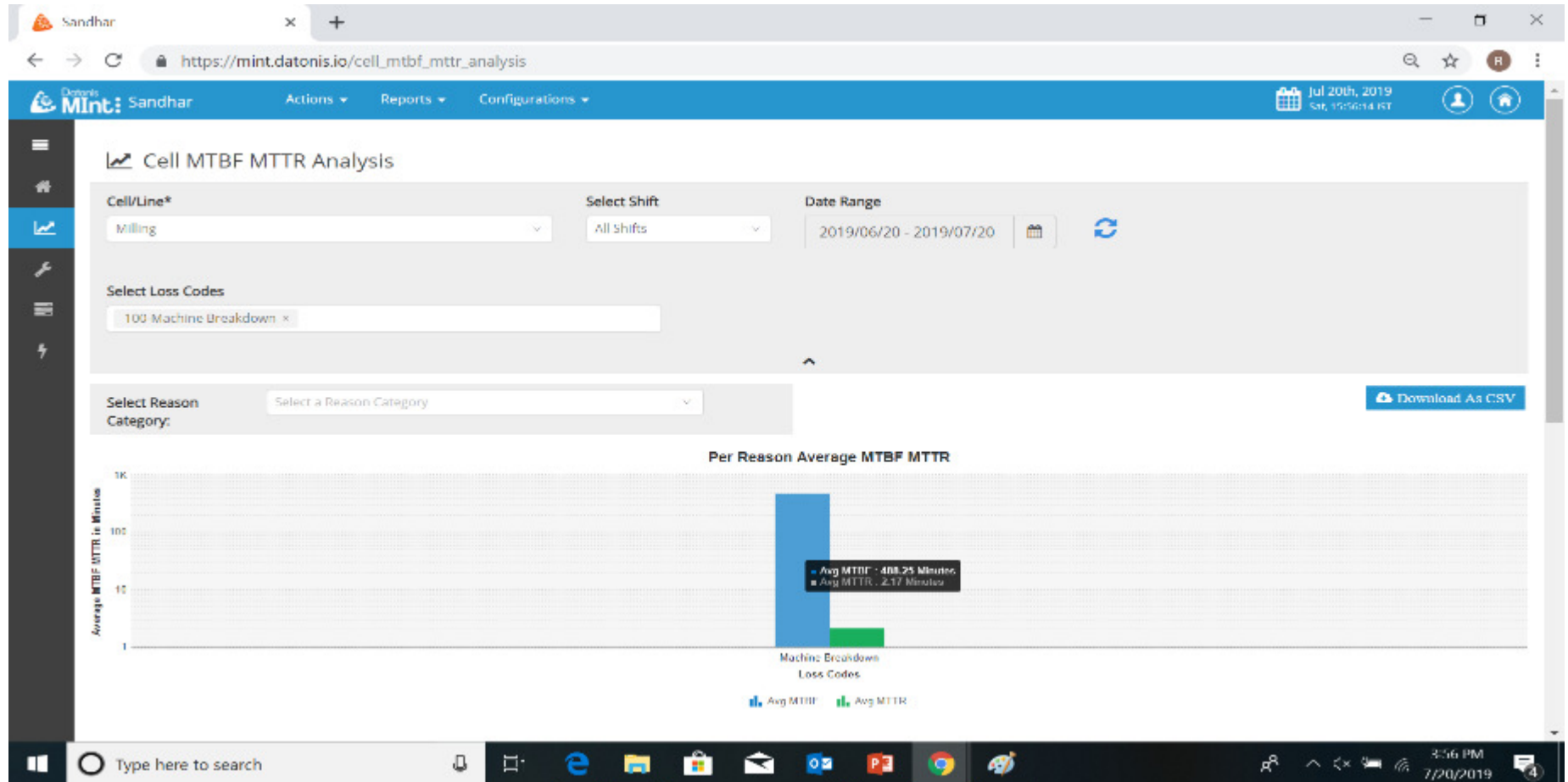


Section Wise Report





Section wise MTBF / MTTR report



MTBF

MTTR



Machine Wise History Card

Sandhar Initiative
Machine History Card

Machine History Card

Workcenter*: Bitting-3 Date Range: 2019/01/23 - 2019/01/22

Highlights

Machine Name	Description
Bitting 3	ACS 2011

Maintenance History

Show 10

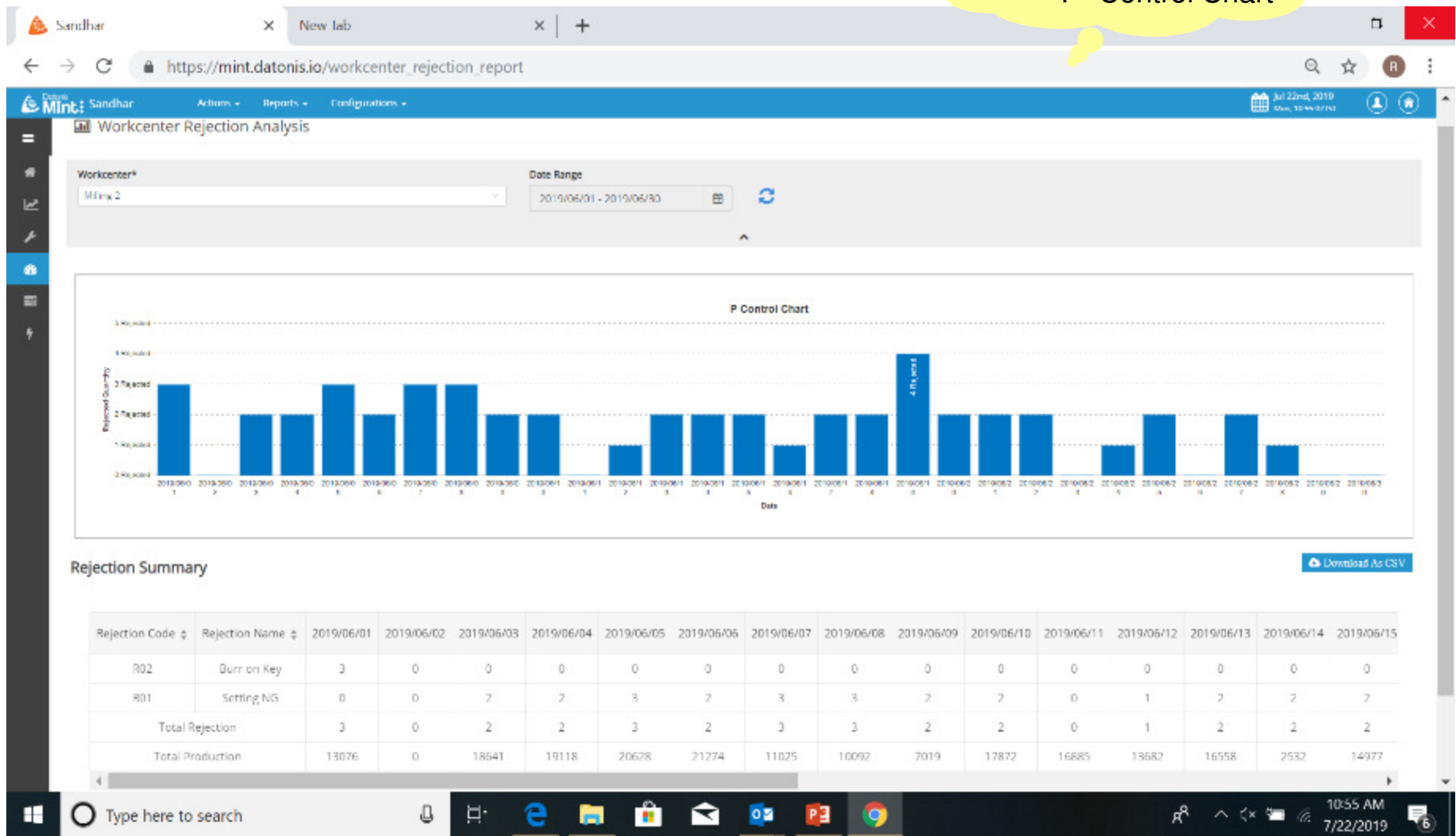
Maint. Start Time	Maint. End Time	Maint. Duration (hours)	Maint. Threshold (hours)	Maint. Details	Maint. Done By	Problem Details	Work Done	Spare Used
2019/06/18 16:40	2019/06/18 17:45	1.08	1650	Preventive Maintenance	Sukhender, Sanjeet		1- All sensors checked and tightened 2- Servo motor Checked and chuk-nut Tighten 3- FRL unit cleaned 4- Electrical panel cleaned with blower and checked 5- Marking unit checked	
2019/02/26 16:30	2019/02/26 17:20	0.83	1210	Preventive Maintenance	Dharmpal		1- Voltage and Current of Motor Checked 2- Boaring Check 3- Air Pressure Checked 4- Nut and Bolt Tightening 5- Greasing	

Showing Page 1 of 1



P- Control Chart

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P- Control Chart





SPC

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Sandhar

https://mint.datonis.io/spc_report

SPC Report

Workcenter*
Timing?

Date Range
2019/07/08 - 2019/07/11

Part*
COSMMK0130002 - P-60 (A Type)

Inspection Policy*
SPC - Timing (Area for Depth Dimension D1)

Policy Parameter*
Depth

Quality Control Limits

Part Name	Part Number	Characteristic	Specific Dimension				Instrument	UCL	LCL
			USL	LSL	UWL	LWL			
P-60 (A Type)	COSMMK0130002	Depth Dimn.	0.85	0.75			Profile Projector	0.82	0.80

Process Capability

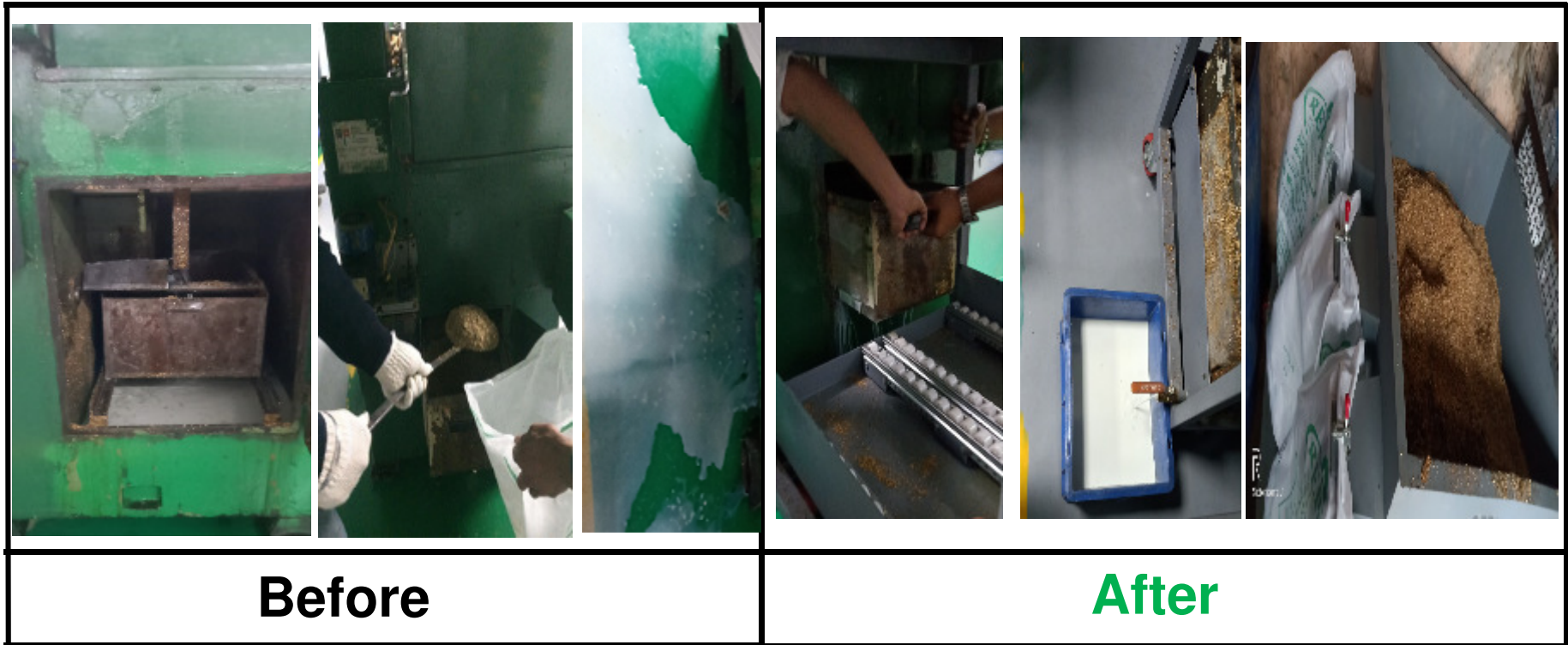
Name	Value
Cp	1.72
Cpk (Upper)	1.37
Cpk (Lower)	2.06
Cpk (Hnal)	1.97
UCLx	0.82
LCLx	0.80
UCLR	0.04564
LCLR	0

SPC norms for cpk	
Range	Status
Less than 0.05	Reject
0.50 to 0.99	Check
1.0 to 1.32	Needs Improvement
1.33 to 1.66	OK
More than 1.67	Excellent

Type here to search

4:51 PM
7/22/2019

Milling Brass Scrap Process- Scrap removal and filling

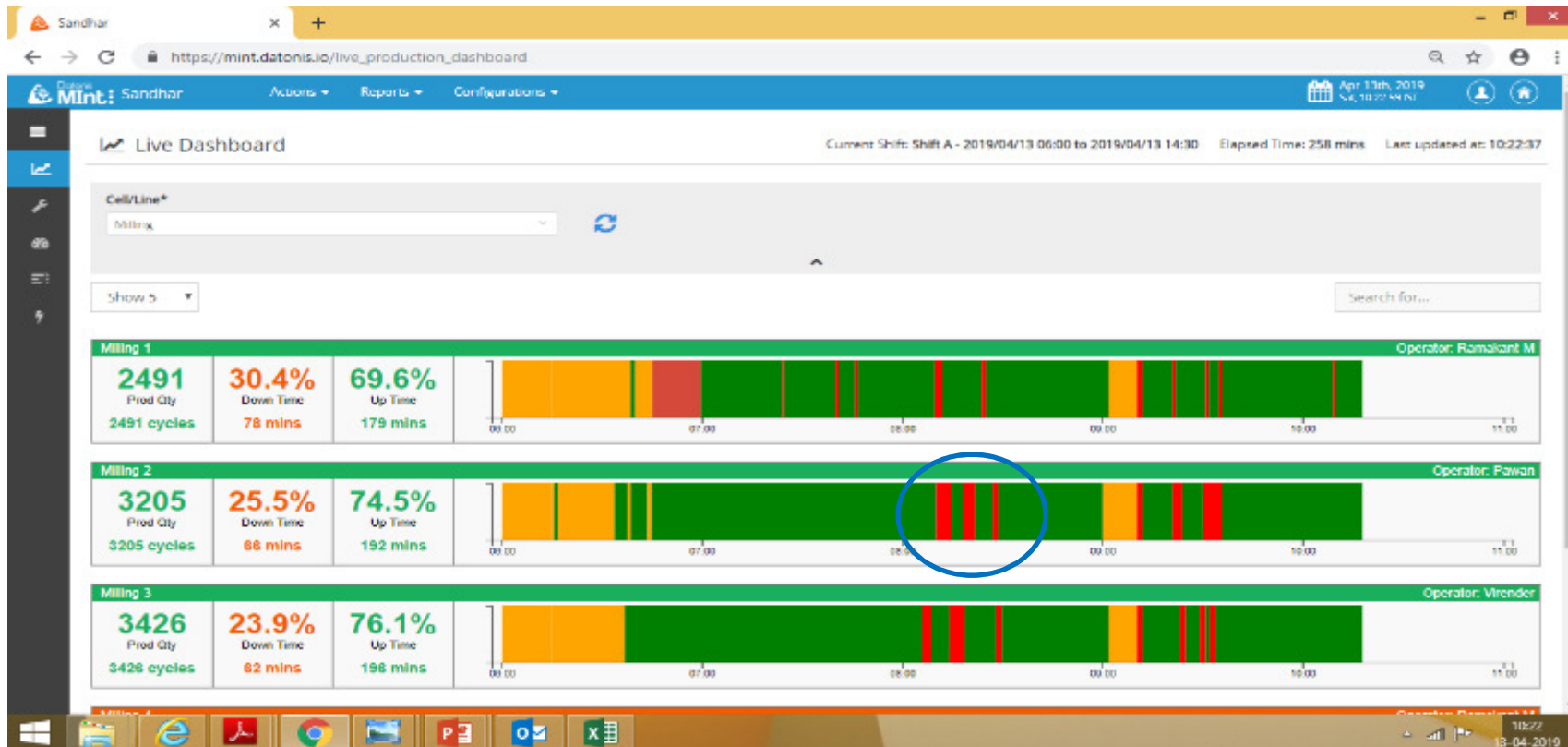


Pull the container
Filling of scrap on sack on machine
itself .
Coolant seepage on floor and waste
Machine stop

Pull the filled container on trolley.
Insert empty container on machine.
Coolant Collection from trolley
Filling of scrap on sack in scrap yard
through lifter
Machine not stop



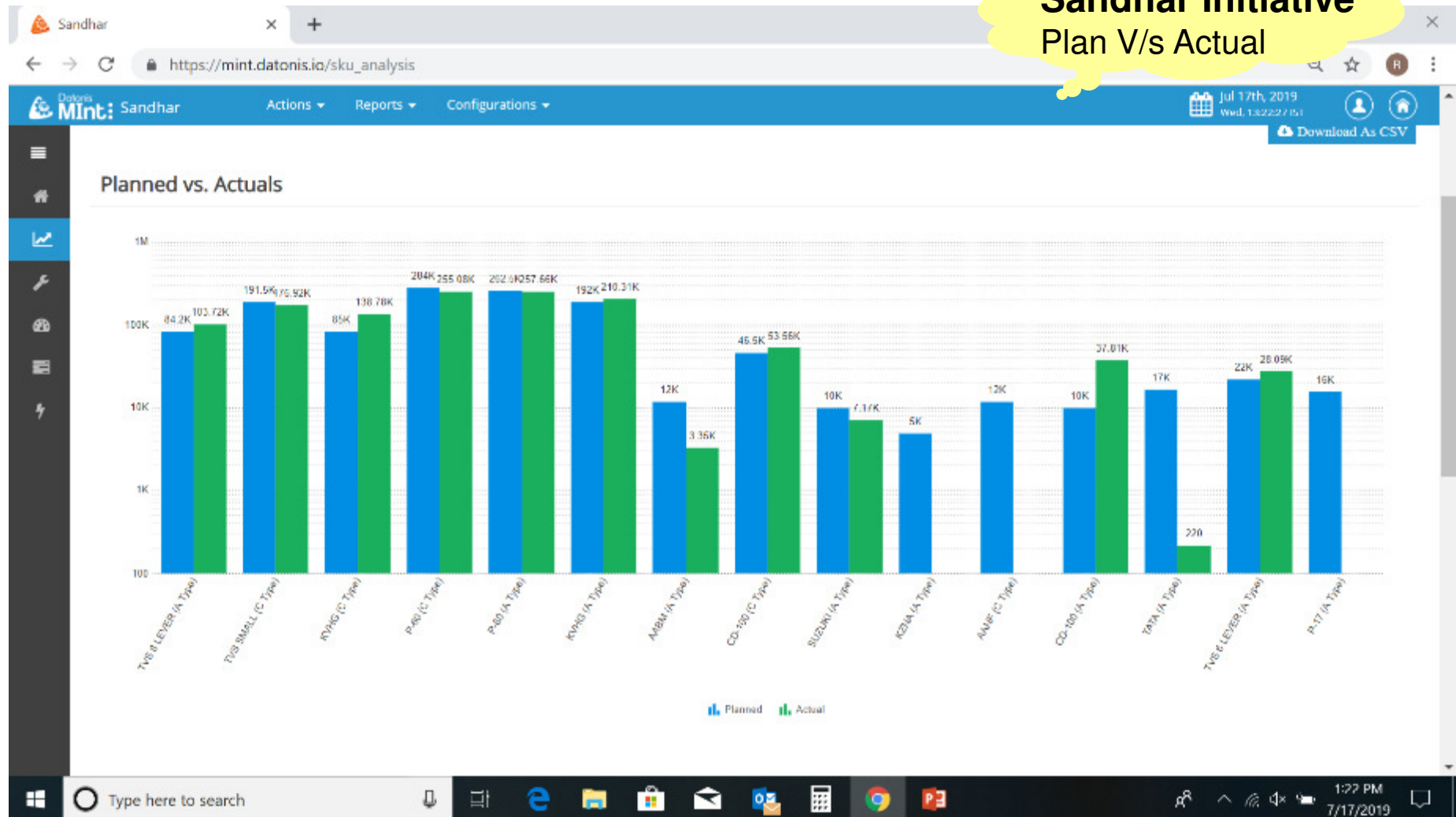
3-Visualization Benefit – Small time loss





4- Analytics Benefit – Planning Analysis

Sandhar Initiative
Plan V/s Actual

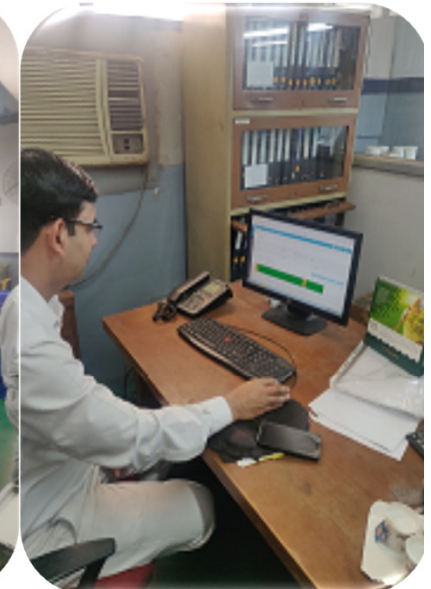
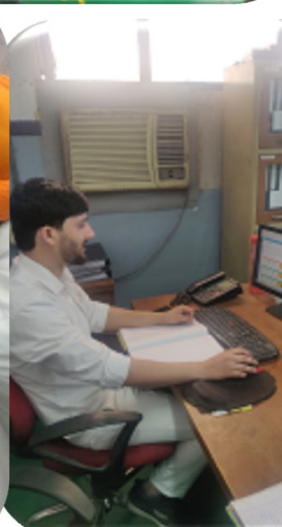


PLAN

ACTUAL



SSM Team Working





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- **Feedback**
- **Suggestion**
- **Query if any**

Thank You
