



## IoT opportunities for industry 4.0

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**14<sup>th</sup> October, 2019**





# Industry opportunities and challenges





## Mining

Estimated worldwide **88,000** mining equipment in use

Data volume are up **500** folds over past 10 years

Only **20%** of network capacity industry need in 2020 exist today

**62%** of workforce think having mobile access to application helps to do better job

Working mine or cluster might be next door or **halfway across world**



**Vs**



## Autonomous Vehicles

**110Mn** uber users across the world

Handles **3Mn** drivers around different parts and timelines of world

With 110Mn uber users, **only** caters **69%** of US market

**Completely App and IoT** based operations

Operates in **80** countries and **400** cities across globe



# Industry challenges



We are mature and proactive org, but  
**89%** Loss time are not time based

Average in a week  
**40%** working hours are lost due to inefficient communication

**Working hazards and mitigation of safety risks**

We know asset failure is often random; however, we don't have a better set of diagnostic tools

We want to be **data-driven**, but...  
**85%** of the effort is in gathering and aggregating the data



IT & OT data sources are diverse and siloed, resulting in limited visibility across an enterprise

We need to **cut costs**, but...  
**don't know which cuts** push us over our **risk tolerance**

Less **Innovation and investment** as compared to other sectors

Care for **Environment and natural resources**

We don't know where to cut or where the point of diminishing returns resides

**UNNECESSARY UNPLANNED DOWNTIME**

**EXCESSIVE MAINTENANCE COST**

**Operational Silos**

**Reactive or Break / Fix Maintenance Culture**

**Organizational Knowledge Loss**

**Data Not Accessible or Proactively Analyzed**

**LOST REVENUE**

**LOWER PROFITABILITY**

**PEOPLE**

**PROCESS**

**TECHNOLOGY**





# Hindustan Zinc Limited and usage of PI System capabilities



# World's 2<sup>nd</sup> largest integrated Lead & Zinc mining operation, 4<sup>th</sup> largest smelting operations and 9<sup>th</sup> largest silver producer scattered in 8 different geographical location



## **Rampura Agucha Mine**

Reserves & Resources : 96.5 Mt  
Ore Production Capacity : 6.15 Mtpa

## **Kayad Mine**

Reserves & Resources : 8.3 Mt  
Ore Production Capacity : 1.2 Mtpa

## **Sindesar Khurd Mine**

Reserves & Resources : 126 Mt  
Ore Production Capacity : 6.0 Mtpa

## **Rajpura Dariba Mine**

Reserves & Resources : 60 Mt  
Ore Production Capacity : 1.08 Mtpa

## **Zawar Mining Complex**

Reserves & Resources : 100.5 Mt  
Ore Production Capacity : 4.0 Mtpa

## **Chanderiya Smelting Complex**

Pyrometallurgical Lead Zinc Smelter: 105,000 tpa Zinc and 35,000 tpa Lead

Hydrometallurgical Zinc Smelter: 420,000 tpa Zinc

Ausmelt™ Lead Smelter: 50,000 tpa Lead

Captive Power Plant: 234MW

## **Dariba Smelting Complex**

Hydrometallurgical Zinc Smelter: 220,000 tpa Zinc

Lead Smelter: 100,000 tpa Lead

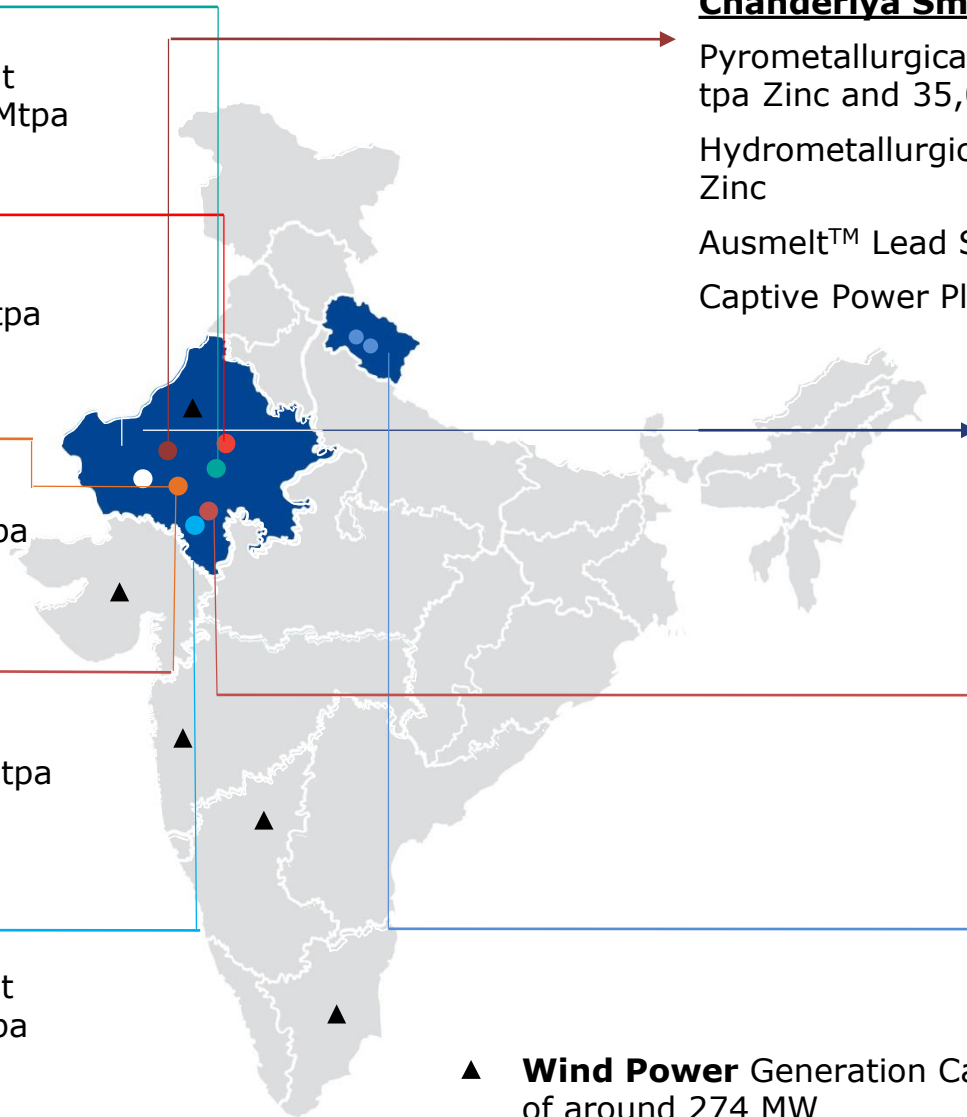
Captive Power Plant: 160MW

## **Zinc Smelter Debari**

Hydrometallurgical Zinc Smelter: 88,000 tpa Zinc

## **Pantnagar & Haridwar**

Processing & Refining of Zinc, Lead & Silver



▲ **Wind Power** Generation Capacity of around 274 MW



# Data Sources and working platforms





## Efficiency

- Single source of truth
- Quicker response
- Automated shift reports
- Event based email notifications
- Easy to communicate with various DCS and ERP platforms to have end to end business visibility
- Mobility capability



## Asset

- Data & Analysis Based RCA
- Model based predictive maintenance and material planning
- Improved safety and reduction in unscheduled breakdown



## People

- Data based live feed discussions
- Manpower engagement to value added work and future prospects
- Performance monitoring & training identification
- Analytical based capability measurement and appraisals



## Cost

- Real Time Consumables tracking
- Cost control – Real Time
- Consumables optimization
- Building cost consciousness to bottom most layer





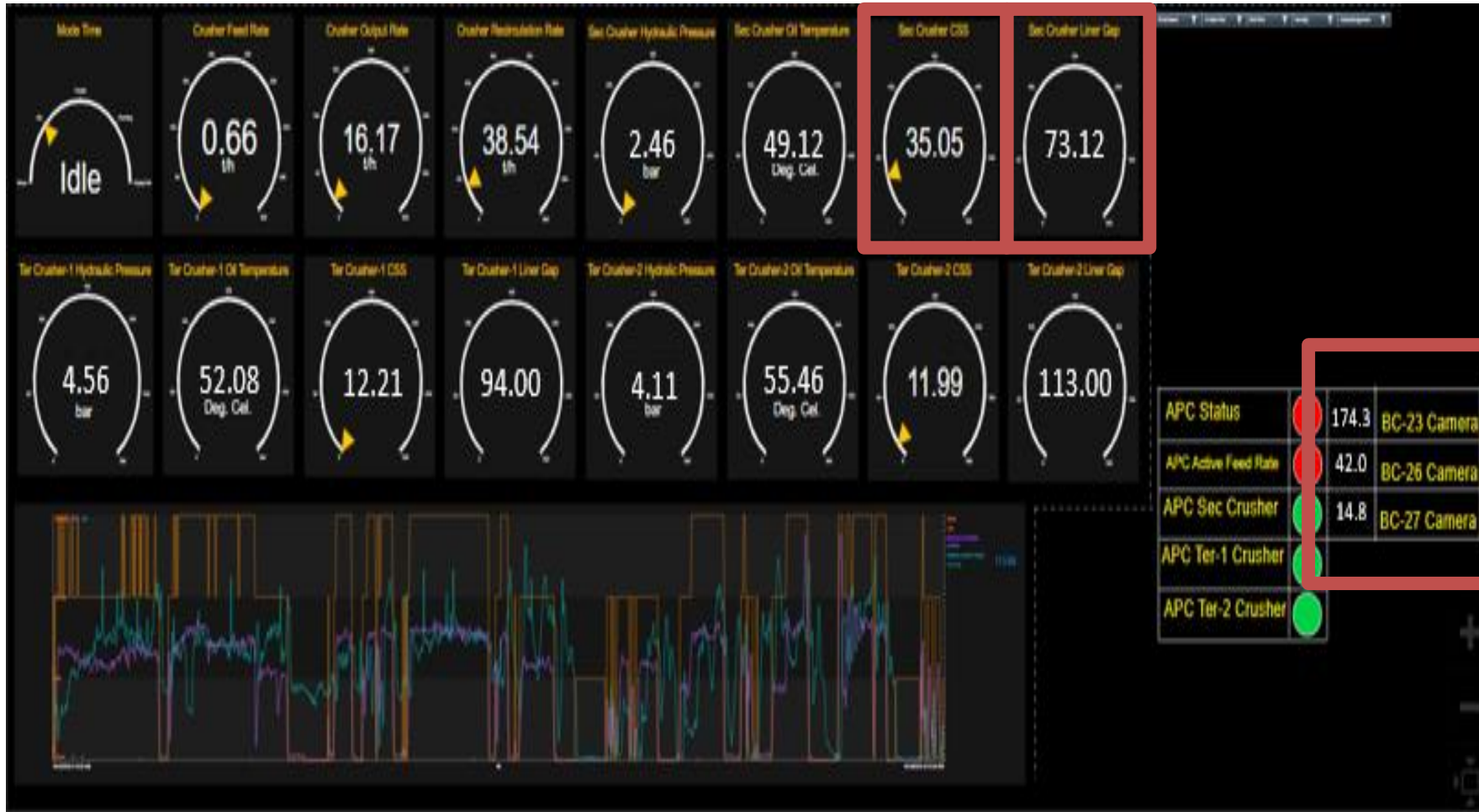
# Real time monitoring – Soft Sensor capability



Based on data history and dependent variable soft sensor can be developed

- For instruments not installed in process
- For continuous online calibration of existing instruments





- Crusher liner and screens replacements from panel data, physical inspections and time based to real time condition based monitoring
- Captures trends of replacement and enables to communicate with OEMs in better way for further opportunities
- Improved inventory planning



# Real time monitoring – Predictive maintenance planning



- Enabled to track comprehensive KPI and compare different assets
- Condition based sequencing of fleet for maintenance resulting in effective use of maintenance bay and improved productivity
- Historical data of asset health and maintenance helps in standardizing SOPs, SMPs & RCAs

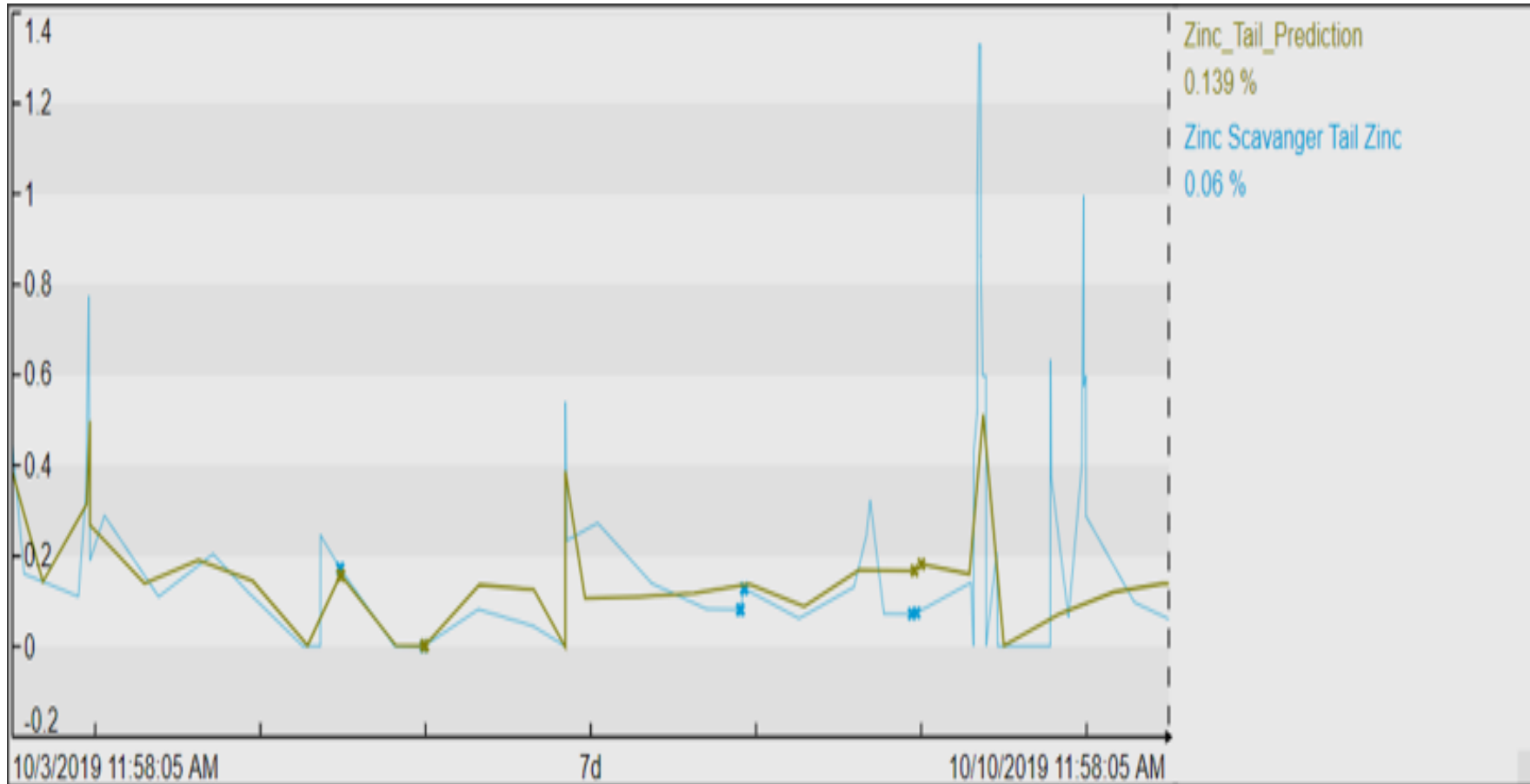




Truck ID	Operational		Engine										Hydraulics						Transmission				
	Machine Speed (kmph)	Payload	Coolant Temp.	Fuel Rate	RPM	Load	Oil Press.	Oil Temp	Cooler Pump Press.	Intake Manifold Press.	Intake Manifold Temp.	Coolant Level Low	Oil Temp.	Oil Level Low	Upbox Oil Lvl Low	Dropbox Oil Lvl Low	Dropbox Oil Temp.	Steering Pump Press.	Upbox Oil Temp.	Oil Temp.	Oil Press.	Output Oil Temp.	
TH601	0	31.30	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH602	0	51.10	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH603	19.00	48.47	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH604	16.00	43.48	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH605	0	81.81	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH606	0	12.11	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH607	16.00	Scan Off	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH608	0	65.66	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH609	0	16.95	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH610	0	5.17	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH611	0	Scan Off	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH612	15.20	47.91	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH613	0	61.98	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH614	0	65.74	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH615	0	79.06	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH616	0	61.93	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TH602	8.90	Scan Off	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

- Tracking operators and people performance based on respective asset performance or shift performance
- Identifying training and mentoring needs of people to improve their skill sets and productivity
- Data and analytical based appraisal system



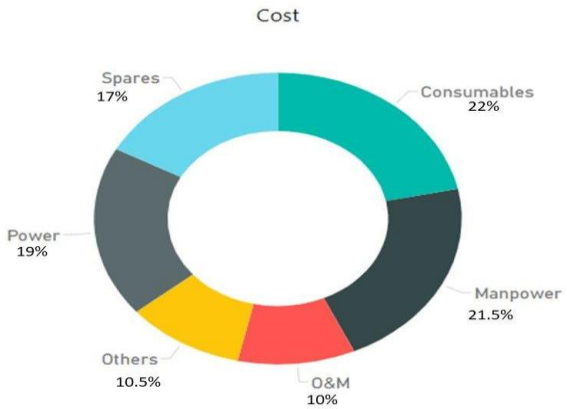


- Using advance analytics and history to **develop, refine and improve process predictive models.**
- Once required accuracy of model is achieved we intend to **feed this model to APCs to up our productivity**
- Planning to make **APCs smarter not only for process control but for better asset health too**



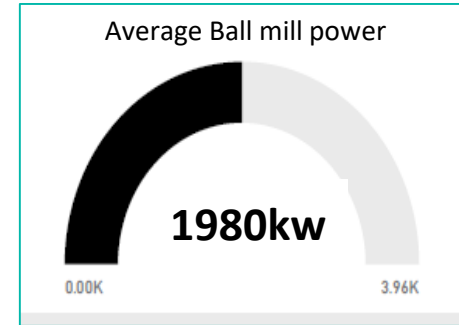


# Real time, customised dash boarding and reports generations through power Bi

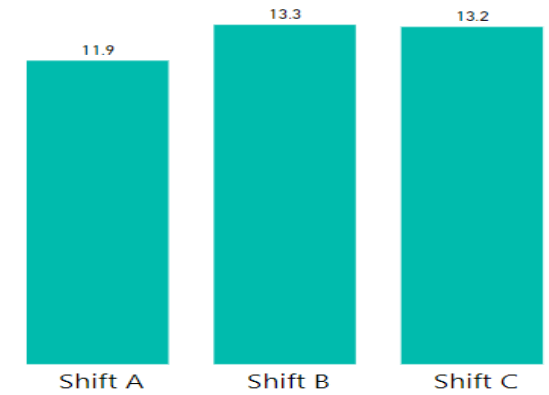


### Average Crusher Output (tph)

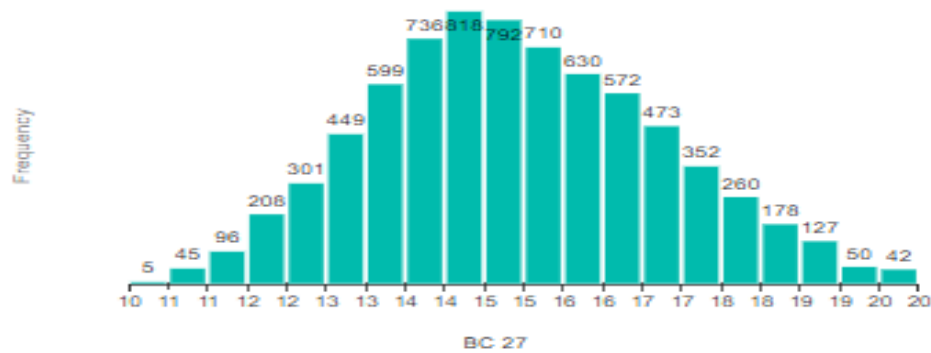
**223.03**  
AVCO



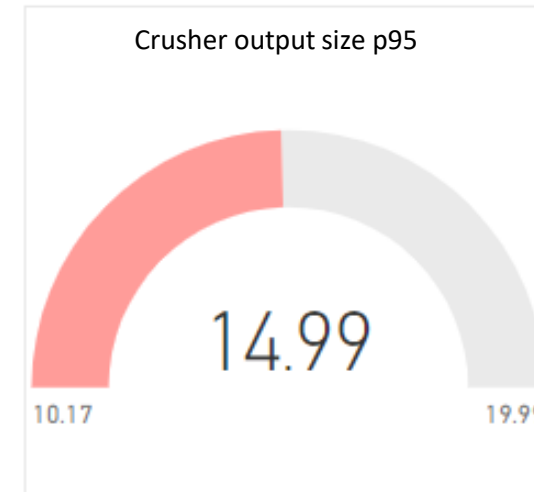
### Average p95 (Output) by Shift



### Minutes of mm Size p95



### Crusher output size p95



# Through digital transformation Industry can target benefits



5-10%

Efficiency



10-15%

Productivity



85%

Forecasting  
accuracy



10-15%

COP  
reduction



10-15%

OEE  
improvement





## Future expectations from OSIsoft PI System development



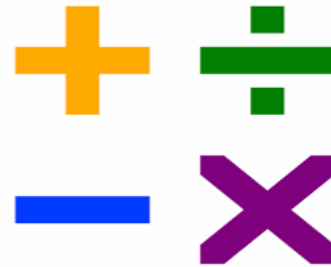




**Android, IOS and windows based App development**



**Notification counter**



**Easy arithmetic like avg, min, max enablement in PI Vision**



**Pareto capability in PI Vision**



**SPC/SQC on PI Vision**





Thanks

