

INDUSTRY 4.0

**It matters for Heat Treatment
Facilities – Why ?**



The better the question. The better the answer.
The better the world works.

Our Efforts

- Four Distinct Examples
 - Heat Treatment Furnaces
 - Electroplating Industry
 - Electric Arc Furnaces
 - Vegetable Oil Refining

Heat Treatment Furnaces

- Started with 22 Furnaces
- Today (25/04/2018) – 52 Furnaces
- Adding another 8 Furnaces by December 2018

Data Collected

- Minute by minute data on all parameters such as Temperatures, Carbon Potential, Gas Inflow, Quench Medium Temperatures, Processing Stage etc.

Instrumentation

- ✓ PLCs such as Siemens, LG, Delta etc. – 24 in number
- ✓ Various Models of Controllers from Delta, Eurotherm, Yokogawa
- ✓ More than 100 Controllers of various makes
- ✓ MMIs such as Red Lion

Plant Data

- Started with 22 Furnaces, reaching 60 soon
- Started with 109 parts, today over 600 types of parts to be Heat Treated
- Over 120 type of Fixtures
- Monitoring and control of various stages of operation such as Temperature Rise, Carburizing, Diffusion, Hardening Soak, Nitriding

Part Number Details

- Name
- Customer
- Material
- Case Depth and Strength
- Core Hardness
- Surface Hardness
- Core Depth and Strength
- As Quenched Strength
- Diameter
- Surface Carbon
- Weight

Involvement with customer

- Over 25 types of Reports
- End Customer involved in design of reports
- Graphical information : present and past
- Continuous Support

Data Analytics

- Data collected for nearly 2 years
- A new algorithm developed - see publication :
“Data Driven Models and Optimization Technologies to Optimize Production Schedules and Facility Productivity, Stephanides, Andreas and Prabhakar Sastri“

*Automation, Control and Intelligent Systems, 2016;
4(1): 1-9*

Link [Data Driven Models and Optimization Technologies to Optimize Production Schedules and Facility Productivity](#)

Advantages

- Optimized Planning
- Better Furnace Utilisation, Lower Downtime, Better OEE, Higher Productivity and Cost cutting.

ROI on Investment for Industry 4.0 is less than 2 years

| Parameter | %age Increase | %age Decrease | Current Value, Pieces/year | Value Per Piece, Rs | Total Benefit, Rs |
|------------------------|---------------|---------------|----------------------------|---------------------|-------------------|
| Increased Production | 3.5 % | | 100,000,0000 | 200 | 70,00,00,000 |
| Quality Loss Reduction | | 3.5 % | 100,000,0000 | 200 | 70,00,00,000 |
| Energy Savings | | 5 % | 100,000,0000 | 5 | 2,50,00,000 |
| Fuel Savings | | 5 % | | | Please Add |
| Customer Satisfaction | 10 % | | | | Please Add |
| Total Annual Benefit | | | | | 142,50,00,000 |

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