Electric Arc Furnace-Operation

Safety First
An electric arc furnace (EAF) is a furnace that heats charged scrap, iron ore by means of an electric arc. This furnace consists of refractory-lines vessel, water cooled upper shell panel and refractory lined roof, graphite electrodes. Scraps is melted at 2500°F with help of electrical power and chemical process by blowing oxygen and carbon in the furnace. Safe and reliable furnace operation is always challenging. Many fatal accidents happened in the past due to explosion in furnace and one of the root cause was due to water leakage in furnace shell panels.

We now try to understand how Ken, the operation manager of one of this type of electric arc furnace, handled the emergency situation during the scrap melting process.

On June 25th, Ken was in meeting when he received call from operator about high furnace panel temperature.


2. Ken discussed with team and found due to water leakage in one of the panel, cooling water flow is reduced and resulted in high panel temperature.

3. After finishing supervision of panel repair works, Ken normalized the production and analyzed condition. Prepared breakdown report including cost to company and submitted to management.
Persona: Electric Arc Furnace Operation

Ken
The Operation Manager

I like effectively utilize production and technical resources to achieve business goal

Responsibility:
- Complete responsibility of Electric Arc Furnace profit center including Operation, Maintenance activities

About:
- Metallurgy Engineer
- Master in Business Administration
- 20+ years of experience in metal industry
- Six Sigma Black Belt Champion
- Lead internal auditor for ISO quality
- Member of Safety Committee

Main Goal:
- Safety of people
- Furnace uptime by 99%
- Reduce yield and improve productivity
- Timely communications with stakeholders

Needs:
- To know furnace critical operating parameters
- To know estimated time to repair and actual time to repair
- To know planned shutdown activities
- Proper and timely communication with all stakeholders

Pain Points:
- Lots of time wasted in gathering related information.
- Proper and timely communication to all concerned stakeholders
Point Of View (POV) : Electric Arc Furnace Operation

Ken
The Operation Manager

Need a way to:
- Reduce the time wasted in gathering related information.
- Proper and timely communicate to all concerned stakeholders about furnace abnormal condition

So that :
- Reduce time for non productive work and have more focus on people’s safety and furnace productivity
- Timely communication reduce the cost of unutilized resources like power and timely internal – external customers are informed.
# User Experience Journey: Electric Arc Furnace Operation - As-IS process

<table>
<thead>
<tr>
<th>Ken</th>
<th>The Operation Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACTIONS</strong></td>
<td></td>
</tr>
<tr>
<td>Information from operator – furnace temp high</td>
<td>Information to Maintenance crew to start repair work</td>
</tr>
<tr>
<td><strong>MINDSET</strong></td>
<td></td>
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<tr>
<td>- What is furnace temperature?</td>
<td>- What is the estimated time to repair</td>
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<tr>
<td>- What is difference between incoming and return line water flow in panel?</td>
<td>- Is Safety of people working on floor assured?</td>
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<tr>
<td>- What is furnace power and oxygen parameter?</td>
<td>- What is estimated production loss and contingency planning</td>
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<tr>
<td>- Can we utilize the downtime to other shutdown activities?</td>
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<tr>
<td><strong>FEELING</strong></td>
<td></td>
</tr>
<tr>
<td>😞 Sad</td>
<td></td>
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<tr>
<td><strong>TOUCH POINTS</strong></td>
<td></td>
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<tr>
<td>Phone, Computer-Email</td>
<td>Phone, Computer-Email</td>
</tr>
<tr>
<td>Computer-draft report/notes</td>
<td></td>
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</tbody>
</table>
Operation summary: Important process parameters, Notifications, Furnace present view
Mockups: Electric Arc Furnace Operation

Operation important process parameters details

Communication with stakeholders and reports

Build Me link (Use Google Chrome to view)

https://standard.build.me/prototype-editors/api/public/v1/snapshots/a075a51b3fa728de0e170a0b/artifacts/latest/index.html#/launch_page