“Improve process safety analysis and culture at TATA Steel with BowTie Server"
Tata Steel Group

One of the world’s most geographically-diversified steel producers

- 11th largest global steel producer
- Annual crude steel capacity of more than 27.5 million tonnes
- Around 74,000 employees
- Manufacturing operations in 26 countries across five continents

Agreement for the formation of a joint venture with the European steel activities of Thyssenkrupp.
Tata Steel Group

A global network serving demanding markets worldwide
Tata Steel in IJmuiden

Raw materials - Pig iron - Steelmaking - Casting - Rolling - Coating
But there are also hazards...

### Drivers for Process Safety

<table>
<thead>
<tr>
<th>World Industry</th>
<th>Steel Industry</th>
<th>Tata Steel</th>
<th>Tata Steel local</th>
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</thead>
<tbody>
<tr>
<td>Piper Alpha (167†)</td>
<td>Macondo Well (11†)</td>
<td>Bophal (20,000+ †)</td>
<td>Texas City (15†)</td>
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<td>Furnace explosion (4†)</td>
<td>Ternium Steel (10†)</td>
<td>CSN, Brazil 2006</td>
<td>China steel ladle (32†)</td>
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<td>BF 5 explosion (3†)</td>
<td>GH explosion (1†)</td>
<td>BF hot blast line</td>
<td>PT ladle drop</td>
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<td>BF bleeder valve</td>
<td>Pickling line fire</td>
<td>Coke Gas heating alley</td>
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What is Process Safety?

*In essence: keeping control of identified Safety and environmental Major Hazard scenarios - low frequency of occurrence / major consequences.*

It’s a tough subject:

- Difficult to predict;
- Hard to imagine;
- Difficult to keep the overview. (e.g. Macondo incident *)

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* Prof. Andrew Hopkins; "Disastrous Decisions", may’12.
ISBN 978 1 921948 77 0
Companies must ask 3 questions*:

1. Do we know what can go wrong?
2. Do we know what barriers we have to ensure that it doesn’t go wrong?
3. Do we know that our barriers are effective and working properly?

* REGULATOR’S REACTION TO BUNCEFIELD
Mission, Vision and Strategy

**Mission:**
Eliminate all major process safety events by controlling all Major Hazard scenario’s within Tata Steel Europe, through the thorough application of our process safety management framework.

**Vision:**
This will be achieved, among other things, by:
The thorough application of Barrier Management to manage Process Safety Critical Equipment and Process Safety Tasks (PSCE & PSCT)

**Strategy:**
- BowTie Server - improve risk communication / encourage to learn from each other;
- BowtieXP template - keep high standard to identify PSCE and PSCT / speak the same language.
- AuditXP framework - Develop standards to report on the barrier health status.
Implementing the strategy

Back to the primary process:

“The art of steelmaking starts with conversation”
Challenges

Language:

How to relate the phases of process safety and align the approaches:

SIMPLIFIED

Server in ‘rekencentrum’ IJmuiden:
A BowTie / HAZID / AUDIT tool to execute barrier Management.

DELIVERS HAZARD CONTROL: APPROACHABLE TO ALL ORGANIZATIONAL LEVELS
The 3 level barrier approach of Tata Steel

1 Barrier:
Passive, Active, Procedural or Mix

2 Barrier component:
detect | decide | final (act)

3 SMS Element:
Performance Standard Operation or Equipment
Execution of maintenance, instructions, Assurance of Safety Instrumented Functions or Operational Interventions
Change in practice

Cokes Factory 1 Pilot

Current situation:

• HAZOPs are performed
• There is an upfront with the first Process Hazard studies, preparing for the barrier management approach.

Pilot Goals:

• Enabling ownership of the analysis process to the factory assisted by the local PS experts.
• Enabling the plant to use their bowties in operator involvement AND management involvement for risk reducing actions.
• Preparing for barrier health checks

Intermediary results:

• Old data is reused and imported in BowTieServer
• Crews are involved and enthusiastic
• Ramping up for the improvement cycle
Culture and strategy

What do we learn from marketing

‘Culture eats strategy for breakfast’
- Peter Drucker
Learning points | the way forward

Influencers for success:

• Interaction between individuals
• Culture | Politics
• Changes
• Management commitment
• Compliance pressure
• User acceptance of and onboarding of the tools

Next steps in closing the circle:

• Barrier health checks (focus on the elements and components)
• Incident learning – what scenario’s did we miss, what control mechanisms did work and which didn’t?
• Focus on what works – bringing it back to simple.
Topics to tackle in the next steps of risk ownership

Tata Steel barrier approach:
• The model is a choice and has up- and downsides.

Ownership of hazards
• Defining the best approach.

Implementing risk reducing actions
• Defining good practices combining other action tools.
• Defining good practices combining other improvement actions protocols considering e.g. CAPEX and OPEX decisions.