Developing a Robust PSM Framework at DuPont

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David Guss
PSM Solution Architect, EMEA
DuPont Sustainable Solutions
Objective

To provide an understanding of the DuPont Process Safety Management System and why the system works.
Introduction – David Guss

- Chartered Electrical & Mechanical Engineer
- Experienced Operations Leader
- 28 years in the industry
- Behavioural and Process Safety Consultant for 10 years in DSS
- Committed to helping organisations and facilities achieve zero process safety incidents and to improve viability and sustainability
Safety is a DuPont Core Value

Core values:

- Safety & Health
- Environmental Stewardship
- Ethics
- Respect for people

$38 Billion revenue in 2011, six business segments covering markets such as food, agriculture, nutrition, transportation, energy, construction

Over 175 facilities around the world

Worldwide reputation for industrial safety

DuPont applies a single Process Safety Management system worldwide
How DuPont Manages Safety and Risk - Step 1

Management Leadership and Commitment - Responsibilities

- Establish Policy
- Commit Resources
- Provide for and Encourage Employee Involvement
- Establish Clear Accountability
- Verify Compliance
- Participate Personally
Management Leadership and Commitment is Essential

“Safety is a line management responsibility. If we can’t do it safely - we won’t do it at all”

E.I. DuPont  (circa 1817)

“Management must demonstrate their commitment by articulating a clear message on the importance of process safety and matching that message both with the policies they adopt and the actions they take.”

Baker Panel Report  (January 2007)
Leadership Accountability

- Leaders must have a clear vision of the ultimate goal of the company’s process safety management efforts
- Leaders must set the goals and strategic objectives
- Leaders delegate specific responsibilities and tasks to individuals in the organization
- Leaders must hold their line organization accountable for implementation and results
- Leaders must recognize and reward accomplishments
How DuPont Manages Safety and Risk - Step 2

*Build a Strong Safety Culture – The Goal is Zero*
How DuPont Manages Safety and Risk - Step 3

Develop & Implement a Process Safety Management Program

1. Management Leadership & Commitment

2. Build a Safety Culture

3. Implement PSM Program
How DuPont Manages Safety and Risk – Step 4

**Deliver Excellence Through Operational Discipline**

1. Management Leadership & Commitment
2. Build a Safety Culture
3. Implement PSM Program
4. OD

- Everyone doing the job right…every time
- A strong culture of following procedures
Operational Discipline - Characteristics

Operational Excellence

- Leadership by Example
- Excellent Housekeeping
- No Shortcuts
- Practices = Procedures
- Up-To-Date Documentation
- Shared Values
- Strong Teamwork
- Active Communications
- PSRM Resources
- Employee Involvement
- Organizational Pride
Performance is a function of the Management Systems and the Level of Execution

\[
\text{State of Safety Standards} \times 60\% \quad \times \quad \text{State of Implementation} \times 30\% = \text{State of Operational Effectiveness} \times 18\% 
\]
Why the Model Works - A single Governance Process

- Common corporate metrics
- Common risk classification protocol
- Common audit protocol
- Common incident investigation / classification approach
- Continuously upgraded via global networks
- A common goal of Zero Operational Incidents
DuPont PSM Governance

Line Management

- Ultimately accountable for safety and loss prevention performance
- Starts with the Board of Directors and the CEO
- Business and Operations Leaders are judged based on adherence to core values. Safety is #1
- Safety becomes part of every employee's condition of employment; our first core value
- A common goal of zero incidents

Corporate Competency

- EVP Sustainability reports to CEO
- PSM Competency Leader provides SME and guidance to Line Management
- Supported by extensive networks of practicing SME's
- Establishes and maintains current ~15 Corporate PSM Standards
- Oversees 2nd and 3rd Party Auditing Processes. Report results to Line Management
Why the Model Works – Flexible & Adaptable to Many Processes & Industries

- Used in wide range of DuPont operations
- Currently in use in industries as diverse as Chemicals, Upstream and Downstream Oil & Gas, Power Generation, Food Processing, Mining (Surface and Sub-surface), Metals Processing (Alumina, Steel, Gold, Nickel, Coal) and Pipelines/Storage.
- Also, is being incorporated in Major Projects processes that construct these same facilities.
Why the Model Works – Integrated Into All Business Processes

- Resource allocation & prioritization
- Capital projects planning and execution
- Personnel succession planning
- Performance management
- Training and development
- Contractor selection / retention
- Acquisition due diligence
The PSM Dilemma: Behavioural vs. Technical

- Fatality
- Major Incident
- Minor Loss Incident
- Near Miss
- First Aid Incidents
- Unsafe Acts and Conditions

People risks (slips, trips, falls, working at heights, PPE misuse etc.)
Man-Machine Interface risks (loading/unloading, product changes, Control room etc...)
Integrity Risks (Mech. Int., QA, interlock, vessel, relief valves etc.)

Pro-active
Reactive
Developing a Robust PSM Framework at DuPont

Process Safety Management Leadership Model

Cat A PSM Incidents: Goal zero
Cat B PSM Incidents: Goal zero
Cat C PSM Incidents/Near misses/
Key Learnings

Metrics & Recommendations
from Incidents, PHA & Audits

Lagging Indicators

Leading Indicators

Trained, Knowledgeable, Capable People in all roles
Adequate resources
Financial Support
Knowledge Management

Leadership
Safety Culture, Commitment, Accountability, Resources, Involvement

Foundational
PSM From Beginning to End of a Facility

START-UP

DuPont Sustainable Solutions

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Process Safety Information (PSI)

PRINCIPLE

The Process Safety Information package provides a description of the process or operation. It provides the foundation for identifying and understanding the risks involved - the first steps in the process safety management effort. The PSI package generally consists of three parts:

- Hazards of materials
- Process design basis
- Equipment design basis

This step also designates which equipment is PSM Critical
Process Hazard Analysis (PHA)

PRINCIPLE

Process risk analysis is used to methodically identify, evaluate, and develop methods to control significant risk in the process.

APPLICATION

- Existing Installations
- New installations
- Decommissioning
PHA Implementation Activities

1. Planning and Preparing
2. Hazards Identification
3. Process Hazards Evaluation
4. Consequence Analysis
5. Human Factors
6. Facility Siting
7. Risk Assessment
8. Recommendations
9. Documentation of Recommendations
10. Management Response
PHA Methodologies

Both Qualitative and Quantitative

Use alone or in combination, depending on individual PHA

Qualitative techniques

- What If / Checklist
- Failure Mode and Effect Analysis (FMEA)
- Hazard and Operability Study (HAZOP)
- Structured What / If (Combines What / If with HAZOP)

Quantitative techniques

- Fault Tree Analysis (FTA)
## Overall Risk Classification

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<th>Likelihood Category</th>
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Consequence Category

Increasing Consequence
Risk Responses

I. Extreme Risk and Intolerable. Significant and urgent action required; risk to be reduced to at least Level III. Sr. V.P. is informed and tracks mitigation/controls implementation.

II. High Risk and Undesirable. Controls are required to reduce risk to at least Level III. Responsible V.P. is informed and tracks mitigation/controls implementation.

III. Moderate Risk and Tolerable With Controls. Management monitors/audits controls to make sure they are in place and effective. Additional action may be required.

IV. Low Risk and Tolerable As Is. No mitigation is required. Monitoring to insure situation does not change is expected of management.
Auditing

PRINCIPLE

Audits are important tools in the establishment, measurement, maintenance, and continuous improvement of PSM performance. Audits compare performance versus established standards.

- Audits done at 1st Party and Second Party Level
- Audits are scored and reported to corporate management
- Recommendations are tracked to closure
- Management held accountable for audit performance & action closure
Features of a Well-Implemented PSM System

- PSM is integrated into the other business processes
- There is a full understanding of all process hazards
- Everyone’s roles and responsibilities are well defined and executed well
- Sufficient commitment of resources; people and money
- Facility is designed, operated, and maintained at a world-class level
- Continuous improvement is achieved via the use of metrics, audits and ever strengthening standards
- A goal of zero process incidents is pursued by all
Risk Management Program Benefits

- Avoidance of catastrophic events that injure people, facilities, business and the environment
- Improved sustainability performance
- Improved productivity and reduced costs through reduced downtime; fewer incidents
- Sustained “right to operate,” as granted by the community, governments and other stakeholders
- Improved employee morale
- Improved credibility in the investment community
Conclusion

Successful leaders identify, evaluate and mitigate operational risks through:

- Implementing comprehensive, integrated management systems
- Fostering a positive, trusting and open culture
- Pursuing and achieving the goal of zero significant operational incidents

“It is imperative that leadership set the ‘tone at the top’ of the organization and establish appropriate expectations regarding process safety performance.”

Baker Panel Report (January 2007)