WHITE PAPER

Managing Process Safety in Supplier Networks

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In today's world of specialized manufacturing and just-in-time supplies, a process safety incident at any point along the supply chain can jeopardize production. This means that it's not enough for companies to have good process safety procedures and practices at their own sites. To prevent production losses effectively, the entire network of sub-suppliers must be equally committed to high standards in process safety procedures and practices.

Changes in Manufacturing, Changes in Safety Management

Manufacturing today, whether the product is automobiles, machinery, household appliances, electronics or even pharmaceuticals, has become an industry of assemblers more than makers. What this means, is that manufacturers increasingly optimize production by applying a combination of specialization, outsourcing and just-in-time delivery. The automotive sector is a good example of the evolution that has taken place, from the pre-Ford factories, where cars were actually built by the company's employees starting from steel bars and plates, to today's plants, where employees assemble large parts produced on demand by external suppliers.

Along the path of "assembling more than making" that the manufacturing industry has been following, process safety concerns have receded into the background, and occupational safety has taken its place. What has happened, in fact, is that the manufacturing industry has outsourced their process safety risks to the supply chain, along with production. Nowadays, it is the vast network of suppliers who actually use hazardous materials (flammable, toxic, corrosive, harmful for the environment), which are reduced to a minimum at the assembly lines. As a very natural result, the manufacturing industry has become complacent regarding process safety risks, while concentrating on improving their occupational safety performance.

Figure 1: Manufacturers Optimization Factors for Production

However, when your assembly line depends on the just-in-time delivery of parts to continue operating, ensuring that your network of suppliers is properly **managing process safety** is a necessity. This is especially true since the potential damage of an incident can be much more serious for the manufacturer than for the supplier, as it is often disproportionate to the value of the goods being supplied. Manufacturing industries, therefore, have a vested interest in vetting and maintaining the process safety performance of their supply chain.

A Case Study Catastrophe

To illustrate this point, let's turn again to the auto industry. Envision yourself at the helm of a car manufacturer where you have gone to great lengths to ensure that your quality, health, safety and environmental (QHSE) procedures and practices are world-class. Furthermore, you have a very rigorous supplier qualification program in place, according to which you carefully analyze potential suppliers' quality assurance programs, as well as their HSE performance. As an additional continuous improvement measure, you carry out internal QHSE audits, and your procurement department keeps a permanent eye on the suppliers, so that any deviation from your acceptance standards can be immediately detected and corrected. Finally, you have a consistently updated dashboard showing your QHSE performance that is periodically reviewed at directors' meetings. The figures have been consistently good for years–what could go wrong?

On November 19, 2019, at around 11:19 p.m., firefighters were alerted of a fire at the Abrera (Barcelona) plant of Faurecia, a company making automobile parts for the nearby SEAT plant, a car manufacturer in the Volkswagen group. While the root causes have not been made public, the fire reportedly originated in a paint cabinet, where the presence of flammable materials is not at all uncommon. In any case, a fire in an industrial plant is a good example of what we know as a process safety event, or an incident caused by a deviation from the desirable **process conditions of hazardous materials** and energy sources. The fire was declared extinguished in the early hours of November 20th, but it caused severe damage to the plant and an interruption in the supply of parts to SEAT.

The immediate consequence was the shutdown of all the assembly lines at the SEAT Martorell (Barcelona) site. The incident propagated quickly to other suppliers, who had to stop production when SEAT could not absorb the fallout, and to transport companies as well. It is estimated that the event ultimately affected 70,000 workers. Despite efforts by all parties to restore normal production, the lines remained shut down for over ten days, and production losses reached more than 14,000 units. This is an example of how lapses in supply chain process safety can drastically impact large manufacturers.
Sadly, this case is not unique. In 2017, a large fire forced the shutdown of a Recticel factory in Most (Czech Republic). As a second-level producer of plastic components for the automotive

industry, Reticel's production standstill impacted almost every European car manufacturer. Direct losses were estimated at several million euros, but the total impact is estimated to be 1.200 million euros. Similarly, in 2018, two Meridian Magnesium plants suffered explosions and fires within six months of each other: Strathroy (Ontario, Canada) and Eaton Rapids (Michigan, USA). The total impact on the American car manufacturing industry was estimated at 1.700 million US dollars.

Lessons Learned

The lesson learned from the SEAT, Reticel and Meridian Magnesium incidents is that it is not sufficient to have good process safety performance at your own site–you are ultimately only as safe as the weakest link in your supply chain. Unfortunately, supply chains (or, better, supply pyramids) are so extensive today that manufacturers cannot completely and accurately trace them. In fact, a recent *Baromètre* [1] report issued jointly by KYU Associés and Arts et Métiers concluded that 65% of manufacturing industries are unaware of the exact cartography of their supply chains, and 55% don't even know the precise location of their suppliers' factories. This is true despite the fact that the average annual cost of supply chain upsets is calculated at 3 million euros per company, with only 35% of those upsets caused by first-level suppliers. Industrial risks (or, in other words, process safety risks) were identified in the same report as the fourth cause of supply chain upsets, after quality, planification and capacity.

As a corollary, it's important for manufacturers not to conflate process safety with occupational safety, which are distinct disciplines requiring their own assessment methods and KPIs. Large manufacturers focused on assembly may shift their attention to occupational safety for the reasons mentioned above, but they should not forget that KPIs for occupational safety reveal nothing about process safety. In fact, there is a long record of severe process safety incidents in plants with very good occupational safety records.

Expert Solutions

Faced with the complexity of modern-day manufacturing structures, calling in the experts for guidance on supply chain process safety is a solid business decision. **DEKRA's Organizational Process Safety (DOPS)** tool was specifically designed to support clients on their journey towards process safety excellence. DOPS is the result of the combined expertise of its consultants and experts, together with the experience and lessons learned from countless assessments and audits.
Our Organizational Process Safety tool is:

- Universal; that is, applicable no matter the business area or the risk level associated
- Designed to include cultural and organizational elements.
- Objective, precise and consistent.
- Minimally intrusive in the day-to-day activities at the site or organization.
- Able to provide not only a current picture of the process safety status quo, but an optimized roadmap for improvement as well.

The DOPS methodology is an ideal tool to ensure that the risk of a process safety incident in a network of suppliers is commensurate with the damage that such an event could cause to assembly lines. When applied to the supply chain, DOPS can help protect manufacturers from significant financial damage by boosting process safety throughout their supplier network.

1 Baromètre 2019. Risques Supply Chain.

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Dr. Arturo Trujillo is Global Director of Process Safety Consulting. His main areas of expertise are diverse types of process hazard analysis (HAZOP, What-if, HAZID), consequence analysis and quantitative risk analysis. He has facilitated more than 200 HAZOPs over the last 25 years, especially in the oil & gas, energy, chemicals and pharma industries.

DEKRA Process Safety

The breadth and depth of expertise in process safety makes us globally recognised specialists and trusted advisors. We help our clients to understand and evaluate their risks, and work together to develop pragmatic solutions. Our value-adding and practical approach integrates specialist process safety management, engineering and testing. We seek to educate and grow client competence to provide sustainable performance improvement. Partnering with our clients we combine technical expertise with a passion for life preservation, harm reduction and asset protection. As a part of the world's leading expert organisation DEKRA, we are the global partner for a safe world.

Process Safety Management (PSM) Programmes

- Design and creation of relevant PSM Programmes
- Support the implementation, monitoring, and sustainability of PSM Programmes
- Audit existing PSM Programmes, comparing with best practices around the world
- Correct and improve deficient Programmes

Process Safety Information/Data (Laboratory Testing)

- Flammability/combustibility properties of dusts, gases, vapours, mists, and hybrid atmospheres
- Chemical reaction hazards and chemical process optimisation (reaction and adiabatic calorimetry RC1, ARC, VSP, Dewar)
- Thermal instability (DSC, DTA, and powder specific tests)
- Energetic materials, explosives, propellants, pyrotechnics to DOT, UN, etc. protocols
- Regulatory testing: REACH, UN, CLP, ADR, OSHA, DOT
- Electrostatic testing for powders, liquids, process equipment, liners, shoes, FIBCs

Specialist Consulting (Technical/Engineering)

- Dust, gas, and vapour flash fire and explosion hazards
- Electrostatic hazards, problems, and applications
- Reactive chemical, self-heating, and thermal instability hazards
- Hazardous area classification
- Mechanical equipment ignition risk assessment
- Transport & classification of dangerous goods

We have offices throughout North America, Europe, and Asia.
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