

SABIC Teesside plant and ABB work closely together to ensure process safety



For more than 20 years SABIC and ABB have worked together to improve process safety in the operations of their plants in Teesside, UK.

Background

SABIC is one of the world's leading petrochemical companies, operating in over 50 countries and employing over 33,000 people worldwide. It has operated at Teesside UK since 2006, through its subsidiary, SABIC UK Petrochemicals Limited. Many of the SABIC assets are over 40 years old and were originally owned by ICI. SABIC UK Petrochemicals Limited has manufacturing and storage facilities located at two nearby sites: Wilton International, and North Tees. The sites manufacture petrochemicals, the main product being ethylene, which is a building block for the many everyday materials and plastics that we have come to rely on in our modern world.

Challenges faced regarding process safety and changes in materials handled

Over the past few years the plant has gone through major changes by progressively moving from a naphtha-based feedstock to ethane. This shift to lighter feedstocks has changed the process hydrogen balance resulting in higher hydrogen concentration in certain streams, often at high pressure. It has also increased the hydrogen concentration in the fuel gas used in the plant.

These changes in the process are complex and have encompassed:

1. Installation of new equipment
2. Isolation of redundant equipment
3. Repurposing of existing items

Aside from the process technology implications associated with hydrogen, a key process safety concern is the high likelihood that hydrogen will ignite upon release.

Using a systematic, staged approach

The process changes have been implemented following a formal staged approach to Hazard studies. ABB has provided specifically accredited Hazard Study and SIL leaders covering Hazard Study stages 1, 2(HAZID) and 3(HAZOP). SIL determination has involved the updating of existing HAZANs and LOPAs and the creation of new LOPAs. (HAZAN = Hazard Analysis; LOPA = Layers of Protection Analysis; SIL = Safety Integrity Level study).

Cooperation has grown deeper over time

Since 2000 ABB has been engaged by the site to lead their Process Hazard Review (PHR) studies. SABIC has a very strong commitment to process safety and therefore values ABB involvement with their safety studies, due to ABB's long and deep expertise in this area. The PHR process involves proactively learning from internal and external incidents, assessing existing plant and management systems against Relevant Good Practice, confirming that previous PHR actions have achieved the desired risk reduction, and also reviewing all plant and organizational changes.

SABIC therefore conducts five yearly rounds of PHR / SIL / LOPA studies (a methodology originally developed by ICI in the 1990s). These studies help reduce the risk of incidents and demonstrate that risks are ALARP (As Low as Reasonably Practicable), which is a key requirement under the COMAH (Control of Major Accident Hazards) regulations.

Over the years since this SABIC-ABB safety cooperation began, in addition to providing pragmatic support and advice to ensure regulatory compliance and a demonstration of ALARP risk management, the teamwork has grown in terms of process safety, and now covers all aspects of risk assessment, COMAH, human factors, and SIL assessment.

The relationship is mutually beneficial for both sides, since ABB has a huge amount of experience in this area as part of the day-to-day jobs for its process safety team. SABIC are experts in running their industrial processes, but don't have on-site resource to deliver all aspects of process safety work. The collaboration with ABB greatly enhances SABIC's methodologies by bringing an independent viewpoint and external learning to their work, helping SABIC operate its plants as safely as possible.

What SABIC and ABB say about the cooperation

"SABIC owns and operates highly complex facilities, and the studies ABB is involved with get excellent support from SABIC's professional multi-disciplined teams of technical and operational experts. We are delighted to be supporting SABIC to ensure their operations are as safe as they possibly can be." explains Graeme Laughland, Principal Process Safety Consultant, ABB.

Future outlook

SABIC is a very forward thinking and proactive company with regards to both process safety and the environment. It is presently working to reduce its carbon emissions across its global sites and last year announced it would invest in Teesside to transform its operations, making its 'cracker' plant one of the lowest-emission crackers in the world. Depending on other regional developments, a subsequent project may see a feasibility study being conducted for carbon-neutral production, using hydrogen as a fuel source.

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"SABIC values the long-term relationship with ABB regarding process safety. This enables timely and pragmatic response to problems by ABB professionals who are familiar with the SABIC facilities, our staff, and the methodologies we have to manage process safety."

Richard Hodges, Senior Engineer, Process Safety Management, SABIC

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