



Superior Solutions for the Process Industry

- Process Safety
- Process Environmental
- Front End Design

At **Fleming Professional** we make your systems safer, cleaner, and more efficient.

We seek to eliminate rather than mitigate, giving better solutions and saving you money.

We focus on front end and conceptual development where we can add the most value.

We bring world class process safety, environmental, managerial, and process design capability to our clients.

HAZOP • LOPA • SIL • QRA • COMAH • HAC • Vent Collection Safety • Thermal Oxidation



Process Safety

We provide a full process safety service from hazard identification through to conceptual design. Our philosophy is to eliminate rather than mitigate, giving safer solutions and saving you money.

We facilitate HAZOP, LOPA and SIL reviews, utilising best practice methodology compliant with IChemE and other standards.

We utilise HAZOP Manager and PHA-Pro software and our own extensive statistical databases for incident frequency.

Our use of HSE derived safety targets minimises over- and under-specification and ensures consistency from HAZOP through LOPA, SIL and COMAH.

We hold a CFSE (Certified Functional Safety Expert) designation www.CFSE.org, the internationally recognised qualification for SIL, LOPA and other elements of the IEC 61511 safety lifecycle. Our range of process safety services includes:

- Risk Identification - HAZOP, HAZID
- LOPA, SIL, Risk Assessment (QRA)
- Functional Safety per IEC 61511
- Explosion Protection and ATEX
- Vent Collection Safety and Flashback Protection per TRbF20 and NFPA 69
- Seveso/COMAH, Major Accident Hazards (MAH)
- Reaction Hazards
- Hazardous Area Classification per IEC 60079 and IEC 61241

We also bring management consulting experience to bear on safety related systems and cultural issues.



Process Environmental

We are specialise in the areas of:

- Air Emission Collection and Abatement
- Air Emission Reduction
- Elimination at Source
- Incineration and Thermal Treatment
- Troubleshooting of Vent Collection Systems and trip events
- Specification and Troubleshooting of Thermal Oxidisers
- Specification and conceptual development of vent collection and abatement systems
- Vent Collection Safety & Flashback Protection per TRbF 20 and NFPA 69

Where possible, we eliminate the problem at source thereby eliminating the need for expensive abatement projects.

We have particular expertise in the design and troubleshooting of vent collection systems and the development of appropriate and cost effective bases of safety against flashback from abatement units.



Conceptual Development & Front End Design

We concentrate on front end chemical engineering consultancy where we can add the most value. We think outside the box to deliver the best solution at lowest cost and minimal disruption to your operations.

- Solvent Recovery
- Process Simulation
- Process Scale-Up
- Process Troubleshooting
- Process Optimisation
- Pilot Plant Design

Where necessary, we support the implementation of our recommendations through detailed design and installation.

Sample Projects

HAZOP

- New process involving thermally unstable materials and exothermic reactions. All operations from reaction to drying using ALARP based risk targets.
- New Grignard-based process from reaction to drying with significant reaction hazards.
- New project involving hydrogenation, pyrophoric materials, hydrogen evolution, water reactive chemicals, exothermic and gas evolving reactions, as well as flammable solvents and potent/high toxicity compounds. All operations from reaction to drying.
- All powder handling operations (drying, sieving, milling) in a facility involving 9 different products.
- New tank farm involving over 20 tanks and 14 different solvents.
- New Filter/Dryer project including cleaning and decontamination cycle as well as normal processing
- Update and Revalidation of HAZOP for spray drying facility in new location.
- Hydrogenation processes involving pyrophoric catalysts, exothermic reactions and water reactive chemicals
- Highly reactive process in a flexible pilot plant context
- Carbon Air Abatement System
- New Thermal oxidiser and Vent Collection System
- Utilities (chillers, purified water systems etc.

Layer of Protection Analysis (LOPA) & Safety Integrity Level (SIL)

- Review of Safety Integrity (SIL) methodology and practice on behalf of a major pharmaceutical facility. Revision of SIL methodology to ensure greater consistency with the HAZOP process.
- LOPA and SIL allocation study on scenarios involving thermally unstable materials and exothermic reactions.
- LOPA study on a Grignard process with scenarios involving significant exotherms and gas evolution.
- LOPA study of powder handling: charging, drying, sieving, milling etc. for St-3 and low MIE materials.
- LOPA study for scenarios involving explosive thermal decomposition during distillation

Seveso/COMAH

- Update of the Seveso Safety Report on behalf of bulk pharmaceutical manufacturer. Identification of major accident hazards (MAH's), selection and development of representative cases, consequence modelling and likelihood analysis, as well as update and review of entire document.
- Risk Assessment for major biopharmaceutical facility.
- Major Accident Hazard Identification for new Facility on Top-Tier Seveso site.

Thermal Oxidation

- Review of a proposed Thermal Oxidiser Project on behalf of a bulk pharmaceutical facility. Addressed sizing (including reduction at source), safety philosophy, and suitability of proposed technology.
- Review of an RTO system failing to meet TOC and odour emission specifications.

Vent Collection Safety & Vent System Trip Reduction

- Vent collection study for API manufacturer to determine the optimum safety and operational configuration for connection of an existing facility to a new Thermal Oxidiser.
- Revised safety philosophy and proposed reduction at source measures to avoid spurious safety system trips and to meet EPA concerns, based around German standard TRbF20 and NFPA 69.
- Reviewed design and safety philosophy of vent system and Regenerative Thermal Oxidizer to avoid spurious safety system trips. Proposed removal of interlocks shown to be unnecessary per NFPA 69, TRbF 20 and EN 12753.

Hazardous Area Classification

- Site wide Review of Hazardous Area Classification per IEC 60079 at a major bulk pharmaceutical facility.

Green Energy Technical & Economic Appraisal

- Proposed €15m Waste Plastic to Diesel Pyrolysis facility
- Major €100m Waste to Ethanol project involving Gasification and novel technology
- Waste to Methane and Compost

Other

- Review of safety incidents and development of an action plan for improvement of safety compliance at a major pharmaceutical facility.
- Assessment of the suitability of an existing scrubber for new chlorine scrubbing duty.