

Process Safety Excellence

Forty-three services across eight disciplines — hazard identification, protection layers, consequence modelling, barrier management and regulatory demonstration.

Major Accident Prevention

AVC Engineering is a technical consultancy for asset-intensive operations across oil and gas, refining, petrochemicals, fertilisers, power, renewables and mining. We work from London, Aberdeen, Abu Dhabi and Cairo.

The eight sections follow the chain by which a major accident is prevented. Every service ends in an action, a limit, a specification or a demonstration with an owner — not in a report.

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SEC. 01

Process Safety Management Systems and Assurance

The system that makes process safety repeatable rather than dependent on individuals. These six services establish the framework, measure it honestly, and test whether it is working.

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| 01 | Process Safety Management (PSM) Framework Development |
| 02 | Process Safety Baseline, Maturity and Gap Assessment |
| 03 | Independent Process Safety Review and Audit |
| 04 | Process Safety Culture and Governance Review |
| 05 | Process Safety KPI Framework |
| 06 | Incident Investigation and Process Safety Root Cause Analysis |

SEC. 02

Hazard Identification and Process Hazard Analysis

The studies that establish what can go wrong. Everything downstream — protection layers, consequence modelling, the safety case — depends on the completeness of this work, and on it being kept current.

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| 07 | Hazard Identification (HAZID) |
| 08 | HAZOP Study and HAZOP Revalidation |
| 09 | Process Hazard Analysis — What-If, Checklist and Structured Reviews |
| 10 | Inherently Safer Design (ISD) Review |
| 11 | Major Accident Hazard Identification, Bowtie Analysis and Hazard Register Development |

SEC. 03

Protection Layers, Functional Safety and Human Factors

The layers that stand between a deviation and a major accident — instrumented, procedural and human — assessed for whether they are independent, adequate and capable of being delivered by the people relied upon.

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| 12 | Layer of Protection Analysis (LOPA) and Safety Integrity Level Determination |
| 13 | SIL Verification and Safety Instrumented Function Assessment |
| 14 | Alarm Management Philosophy and Rationalisation |
| 15 | Human Factors in Process Safety and Safety Critical Task Analysis |

SEC. 04

Operational, Transient and Change Risk

Most process safety systems are built around steady-state operation. These five services address the conditions where the majority of incidents actually occur — transients, temporary arrangements, concurrent activities and change.

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| 16 | Operational Risk Assessment |
| 17 | Simultaneous Operations (SIMOPS) Risk Assessment |
| 18 | Transient and Temporary Operations Risk Review |
| 19 | Management of Change (MoC) Risk Review |
| 20 | Procedure Criticality and Operational Safeguards Review |

SEC. 05

Consequence Modelling and Quantitative Risk

The quantified layer. Physical effects modelling and risk analysis that convert identified hazards into distances, loads, impairment frequencies and risk figures a design decision or a regulator can be held to.

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| 21 | Consequence Modelling — Flammable, Toxic and Smoke Dispersion |
| 22 | Fire and Explosion Risk Assessment (FERA) and Explosion Overpressure Analysis |
| 23 | Quantitative Risk Assessment (QRA) and Loss of Containment Risk Assessment |
| 24 | Escape, Evacuation and Rescue Analysis (EERA) and Temporary Refuge Impairment Study (TRIS) |
| 25 | Occupied Building Risk Assessment (OBRA) and Facility Siting Study |
| 26 | Dropped Object Study |

SEC. 06

Safety Systems, Relief and Fire Protection

The engineered layers of defence. These nine services verify that relief, depressurisation, detection, isolation and fire protection systems are adequate for the scenarios they will actually see, and that their impairment is controlled.

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| 27 | Relief and Blowdown Study and Pressure Relief System Design Basis Review |
| 28 | Emergency Depressurisation and Flare System Adequacy Study |
| 29 | Hazardous Area Classification and Ignition Source Assessment |
| 30 | Detection and Shutdown Philosophy Review |
| 31 | Isolation Philosophy Review |
| 32 | Passive Fire Protection and Fireproofing Adequacy Review |
| 33 | Active Fire Protection Philosophy and Firewater Adequacy Study |
| 34 | Safety System Impairment Risk Assessment |
| 35 | Emergency Response Basis of Design and Emergency Systems Review |

SEC. 07

Barrier Management and Safety Critical Elements

The system that turns identified barriers into named equipment with written performance standards, a verification scheme and evidence that they still work. Three services, and the backbone of any safety case regime.

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| 36 | Safety Critical Element Identification and Performance Standards Development |
| 37 | Barrier Management and Barrier Health Assurance Framework |
| 38 | Verification Scheme Development and Independent Competent Person Interface |

SEC. 08

Safety Cases and Regulatory Demonstration

The formal demonstration to a regulator, a board or a partner that major accident risk is understood and controlled. Five services covering the full safety case lifecycle, from first submission to gap closure and decommissioning.

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| 39 | Safety Case Development, Update and Revision |
| 40 | ALARP Demonstration, Formal Safety Assessment and Regulatory Compliance |
| 41 | COMAH and Onshore Major Hazard Safety Report, MAPP and Installation Dossier |
| 42 | Bridging, Combined Operations, Modification and Decommissioning Safety Cases |
| 43 | Safety Case Gap Closure Programme |

THE PART THAT FAILS FIRST

Traceability, both directions

A regulator, an insurer or a court will ask how a claim in the safety case is supported by the study beneath it, and how the safeguard that study credited is tested in the field. AVC builds that chain deliberately.

DELIVERED TO

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|-----------------------|---------------|
| CCPS RBPS | OSHA 1910.119 |
| COMAH / Seveso III | IEC 61882 |
| IEC 61511 | IEC 61508 |
| EEMUA 191 / IEC 62682 | API RP 754 |
| IOGP 456 | API 520 / 521 |
| ISO 15544 | NORSOK Z-013 |

