A multinational, blue chip oil and gas operator invited ABB to carry out a full assurance study on their existing relief, blowdown and flare systems for two onshore and six offshore assets.

The need for this study arose from the operator’s global requirements for each of its assets to meet with corporate safety standards.

The aims of the study were to:

- Capture and document the design rationale of the existing relief and blowdown systems for current operations and overpressure relief scenarios
- Provide a full validated Aspen Flare System Analyser model for each flare header system
- Identify gaps between the current flare system design on each asset and the corporate standard
- Check further flare system key criteria including: ice and hydrate assessment, acoustic induced vibration assessment, flare KO drum sizing and flare purge

Our client recognised the safety critical nature of the work and chose ABB to deliver the project, a factor of our leading expertise and track record in this area.

ABB project management had successfully devised a bespoke strategy that aligned the deliverables and milestones to meet the client’s project budget.

“Great support from you and your team during all these years a pleasure to work with ABB”

Regional Safety Process Engineer, Global Oil and Gas Operator

Solution
ABB has a wealth of experience within the field of pressure relief, blowdown and flare system. ABB used the following working model to deliver the customer project objectives.

Risk based approach
Due to the extensive scope of this project in terms of the number of relief systems to be considered, ABB broke the sources of pressure relief and blowdown into 3 levels of priority: high, intermediate and low risk. This served two purposes. Firstly, the high risk pressure systems were identified and reviewed in order of risk. Secondly, the low risk systems were excluded by agreement from the project scope in order to minimise costs.
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**Workshops with client**
ABB worked closely with the client in all stages, particularly during:

- **Stage 2**, collaborative workshops between ABB and the client were set up to identify the relief scenarios for individual pressure and blowdown sources. The credibility of each scenario was discussed and recorded, as were the applicable process conditions.
- **Stage 4**, further workshops were held to identify any new scenarios arising from simultaneous operation of multiple relief streams to the relief header and flare system.
- **Stage 7**, a final workshop held to risk rank the preliminary observations and identify mitigation measures.

**ABB in-house software**
For this particular project, ABB developed bespoke software to automate elements of the Flarenet model build. This minimised human error and significantly reduced the time required to build the models, realising substantial cost savings for the client. ABB also used its own in-house software PEL to efficiently perform pressure relief calculations and fluid flow modelling.

**Stringent validation process**
ABB’s methodology contained stringent validation processes. During Stage 3 an Independent Process Engineer (IPE) verified the checked relief and blowdown calculations by confirming the scenarios, governing case, relief conditions and calculation methodology. During Stage 4 a further peer review was conducted to validate the Flarenet models.

**Interaction with client project management**
ABB proactively engaged with the client’s project team to keep it informed of progress and any issues as they arose on the project. Technical queries were raised promptly when ABB required further information or clarification from the client with regards to scope and the modelling methods to be adopted. ABB provided the client with weekly progress reports which contained spend to date and earned value analysis.

**ABB proven 4Q process**
ABB used its 4Q improvement methodology during the project to improve its internal project execution processes with the following benefits to the project:

- **Streamlined process for scenario identification review**
- **Structured calculation process**, including process maps and checklists to encourage consistent approach and good communications
- **Daily team ‘huddle’** using visual management tool as a focal point to communicate progress and flag any performance issues

**Enhanced support**
In addition to the verification of the relief and blowdown systems, ABB also performed ice & hydrate analysis, acoustic vibration assessments, knock-out drum sizing and purge gas flow calculations. We also provided ongoing technical support following the project handover to the client.

**Benefits**
The benefits of this project to the client were as follows:

- **Delivery of the project to the tight timescale**
- **Assurance of compliance with corporate and international standards**
- **Prioritised action plans** generated from the gap analysis which were ranked according to the level of risk
- **Provision of a complete and validated AspenTech Flarenet model** for each flare header system that can be used by the client to assess future changes
- **Information generated from the study** that could be used to close out HAZOP study findings effectively