MINUTES OF MEETING

FLACS User Group (FLUG) meeting

Venue: Technip, Paris, France
Meeting: 8-9 November 2016
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List of participants

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Alexander Tadesse	Gexcon US
Alexandre Lebas	MES International
Anaïs Dubois	Technip
Anousone Champassith	Technip
Cedric Leber	Technip France
Champassith Anousone	Technip
Chris Savvides	BP
Coralie Lecoq	DNV GL
Daniel Mahoney	Atkins
David Quintero	MES-International
Dean Simrick	Abbott Risk Consulting
Dimitrios Kostopoulos	Total E&P Norge AS
Dirk Roosendans	Total
Djurre Siccama	Gexcon
Antoine Dutertre	Total SA
Elena Vyazmina	Air Liquide
Emily Leach	Atkins

Name	**Company**
Eric De Carvalho	Technip France
Etienne Guinot	Saipem SA
Fanny Coulon	Bureau Veritas
Franz Zdravistch	Gexcon
Gordon Atanga	Gexcon
Guillaume Lecocq	INERIS
Jerome Hocquet	Technip
Joassard Ouerdane	Technip
Johnathan Green	BMT Fluid Mechanics
Laurent Paris	Technip France
Marc Henrio	IRSN
Maria De Stefano	EDF
Phillipe Montrocher	SAIPEM
Yvon Mouilleau	Technip
Nicolas Bal	Technip
Nicolas Daudey	EDF SA
Nicolas Salaün	Gexcon
Olav Roald Hansen	Lloyd's Register
Olav Sæter	Statoil
Pascal Le Gal	Gexcon
Pierre Quillatre	ENGIE
Prankul Middha	Independent
Ronan Abiven	Gexcon
Sajad Mozaffari	AIPCECO
Simon Jallais	Air Liquide
Steve Howell	Abercus
Sune Solberg	Gexcon AS
Sunil Lakshmipathy	Gexcon
Tim Jones	MMI Engineering
Trygve Skjold	Gexcon
Vincent Blanchetière	ENGIE
Yves Dagba	SAIPEM SA

FLUG meeting 8-9 November 2016

FLUG chairman: Olav Sæter (Statoil)

Day 1: Tuesday 8 November 2016

Welcome

Pascal Le Gal (Gexcon Software) welcomed the participants to the FLUG meeting and summarized some of the ongoing activities at Gexcon Software, including FLACS-Risk, FLACS-VR and the certification program for users of FLACS.

Hélène Gauthey (Technip) welcomed the participants to the FLUG meeting and presented Technip Process and Technologies.

Agenda

Olav Sæter (chair) presented the agenda for the meeting and the minutes of meeting from the meeting in Bergen on 31 May – 1 June 2016. There were no comments to the minutes from Bergen.

Presentations from Gexcon

Djurre Siccama (Gexcon Software) commented on selected technical questions from the meeting in Bergen on 31 May – 1 June 2016.

Djurre presented the Knowledge Base that was later published on the FLACS User Portal on 11 January 2017.

Djurre presented on-going activities at the Application Development department, and summarized some plans for the future.

After the coffee break, Trygve Skjold (Gexcon Software) summarized the on-going R&D activities at Gexcon, and presented results from the EU-funded HySEA project and JIP MEASURE. In HySEA, Gexcon conducts full-scale hydrogen explosion experiments in 20-foot ISO containers. The experimental campaign in 2016 focused on homogeneous mixtures, whereas the campaign in 2017 will explore realistic releases and inhomogeneous mixtures. The HySEA project (www.hysea.eu) receives funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 671461. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme and United Kingdom, Italy, Belgium and Norway. Gexcon is about to complete JIP MEASURE, and a prototype of FLACS with improved turbulence and combustion models will be delivered to the sponsors (Statoil, Total, ENGIE, DNV GL, ExxonMobil and BP. Olav Roald Hansen (LR) commented that flame propagation in cable ducts may have influenced the results for the RIGOS experiments. Trygve replied that DNV GL had eliminated this possibility by filling the cable ducts with sand in the MEASURE experiments. Olav Sæter asked when the updated model system from JIP MEASURE will be made available to all commercial FLACS users. Trygve responded that this depends on the sponsors, but the aim is to release a beta version already in 2017.

Sunil Lakshmipathy (Gexcon Software) presented the status for the integrated validation framework for FLACS, including 'two-pagers' for selected validation cases in the database. He presented updated parabola plots, where Gexcon proposed to favour over-prediction (i.e. conservative results) over under-prediction. Olav Sæter commented that he preferred symmetric parabola plots, and after a brief discussion it was concluded that Gexcon should proceed with symmetric parabola plots in the validation framework. Trygve commented that Gexcon also intends to split the category for spatial scale in two: one for *relative scale* (full-scale relative to actual system, downscaling by a factor 2-5, etc.), and one for absolute scale (e.g. > 1000 m^3, 1000 m^3 > V > 100 m^3, etc.). This will make it easier for users of the software to relate the experimental results to their particular application, and hence to evaluate the relevance of the validation cases in the database.

Franz Zdravistch (Gexcon Software) gave an update on FLACS-Fire. There was a request for new functionality for modelling 'frozen flames' in connection with risk studies.

After lunch, Pascal Le Gal presented a case study that entailed the use of virtual reality to safety training.

Djurre gave an update on FLACS-Risk and presented a case study involving a toxic release.

Presentation from NOROG

Olav Sæter (Statoil & NOROG) presented an initiative from Norwegian Oil & Gas (NOROG) aimed at reviewing and updating the current practice for probabilistic explosion studies.

Presentations from Gexcon (continued)

After the coffee break, Scott Davis (Gexcon US) presented methodology developed during the RP SEA project for evaluating the necessary congestion levels on offshore installations from concept phase to as-built.

Franz Zdravistch (Gexcon Software) presented selected validation and case studies for FLACS-Blast.

Ronan Abiven (Gexcon Software, on behalf of Gexcon Laboratories), presented on-going fire and explosion experimental work at Gexcon.

User presentations

Prankul Middha presented a review of research activities and progress in the field of hydrogen safety over the last five years, with particular focus on the use of CFD.

The first day of the meeting ended at 17:15 pm, and the participants were invited to the official FLUG dinner at the restaurant “La Fermette Marbeuf”.

Day 2: Wednesday 9 November 2016

User presentations (continued)

Nicolas Bal (Technip) presented a study on enhanced design fire load specification for equipment survivability with FLACS-Fire.

Laurent Paris (Technip) presented work on design explosion loads specification for large floating facilities.

Anousone Champassith (Technip) presented a study on the modelling of explosions with an equivalent non-stoichiometric cloud.

After the coffee break, Scott Davis (Gexcon US) presented results from the large-scale detonation testing in the RP SEA project. The results indicate that detonations are significantly more likely to occur on large spatial scales than previously assumed.

Scott continued with a presentation of the accident investigation after the West Texas explosion, including the use of FLACS-Blast to investigate blast wave propagation in the far-field.

Olav Roald Hansen (Lloyd's Register) described how DDT and detonation simulations can be of value. He also predicted that the recent and on-going cost reductions in the oil and gas industry will have negative impact on the accident statistics for 2016 onwards.

Lydia Ouerdane (Technip) presented a study on blast propagation with FLACS-Blast in buildings.

After lunch, Tim Jones (MMI Engineering) presented a study on dispersion modelling for explosion risk analysis.

Elena Vyazmina (Air Liquide) presented validation results evaluating the applicability of FLACS for vented explosion, including the effect of concentration, obstruction, vent area and ignition position.

Fanny Coulon (Bureau Veritas) compared far-field overpressure levels estimation with FLACS and the multi-energy method from TNO.

FLUG wishes

Djurre collected wished from the FLACS users.

Daniel Mahoney (Atkins) inquired whether Gexcon could implement a geometry filter based on the volume of instances, and keep a log file for objects that are filtered out during geometry import/handling.

Several users expressed interest in a filter for automatically removing objects with zero thickness (presumably limited to instances below a certain size).

Some users asked for the possibility to prevent selected monitor points from being displayed in Flowvis. It can be useful to be able to display only selected monitor points in Flowvis.

The automatic naming of monitor points can cause problems (e.g. automatically renaming all monitor points with higher numbers after deleting a monitor point). Separation of the automated (internal) re-numbering and a new feature that will allow users to defined names for monitor points could be useful.

Improved functionality for visualizing line monitors, for example for visualising line gas detectors.

There was a request to add vectors to the 3D cut-plane plots.

Olav Roald Hansen (LR) commented that Gexcon should harmonize the pool and HEM models for dispersion (these models should give the same results for the same scenario).

Tim Jones (MMI) inquired whether Gexcon could implement additional standard species in FLACS, such as N_2 and CO_2.

Steve Howell (Abercus) asked about adding functionality to project maximum results (e.g. cloud shape) onto the boundary planes.

Olav Sæter (Statoil) expressed a wish to have the 'two-pagers' from the validation cases available for the next release of FLACS.

Next meeting

Olav Sæter informed the participants that the next FLUG meeting would be organized by Gexcon in Bergen, either during the period 3-5 May 2017, or during the period 22-24 May 2017.

It has later been decided to organize the FLUG meeting in Bergen on **3-4 May 2017**.

Closing

Olav Sæter closed the meeting with a brief summary of the presentations from both days.