GexCon®
A company in the CMR Group

MINUTES OF MEETING

Meeting : **FLACS USER GROUP and workshops**

Venue : **GexCon, Fantoftveien 38 - Bergen, Norway**

Date : **May 6-7, 2004 (workshops and meeting)**

Prepared by : **Idar E. Storvik, Olav R. Hansen, Hans-Christen Salvesen**

Participants:

Chris Savvides	BP Amoco Ltd.
David Stickland	BP Amoco Ltd.
Murray Shearer	BP Amoco Ltd.
Vincent Tam	BP Amoco Ltd.
Francesco Chille	CESI
Simen R. Armond	Det Norske Veritas
David D. Herrmann	Dupont
Torgeir Nærø	GexCon AS
Are Bratteteig	GexCon Consulting
Jan Roar Bakke	GexCon Consulting
Jerome Renoult	GexCon Consulting
Solveig R. Ryum	GexCon Consulting
Olav R. Hansen	GexCon Software
Hans-Christen Salvesen	GexCon Software
Trygve Skjold	GexCon Software
Idar E. Storvik	GexCon Software
Ole Jacob Taraldset	GexCon Software
Bjørn J. Arntzen	GexCon Software / UIB
Stian Høiset	Hydro ASA
Abdelhamid Nazih	IRSN
Jerome Richard	IRSN
Michael V. Hasson	MMI
Catherine Gueguen	Rhoditech
Jean-Luc Revel	Rhoditech
Anette Urheim	Safetec
Bernt Natvig	Scandpower
Jo Wiklund	Scandpower
Jens Kristian Holen	Statoil
Henri Tonda	TotalFinaElf
Daniel Aelbrecht	Tractebel

Additional distribution: ***FLUG mailing list***

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Introduction

This event was a combination of two FLACS related workshops and a regular FLUG meeting.

1) Hydrogen workshop
2) Explosives workshop
3) FLUG meeting

The minutes cover the three parts in separate chapters.

In the morning of May 6, the group visited GexCon's experimental site at the island of Sotra outside Bergen. As a contest the participants were asked to make a guess about the explosion pressure in the two scenarios tested.

1. Hydrogen workshop

2004-05-06, 13:00, *GexCon*, Fantoftveien 38 - Bergen

Olav R. Hansen (GexCon) wished welcome to the ”Hydrogen workshop”, and the participants around the table presented themselves briefly. Olav described the purpose of the workshop (Hydrogen explosion safety), and presented the agenda for the workshops and FLUG meeting. For the evening GexCon invited the participants to dinner.

Presentation by Olav R. Hansen, GexCon:

Olav presented current work on hydrogen safety at GexCon, and talked about FLACS limitations (reminder from FLACS guidance). Explosion scenarios involving several geometries were presented (MOGELEG, 3D-corner (small-scale), detonation tubes). Video recordings visualising flame acceleration in tubes and simulations in the FLAME facility were also shown.

Presentation by Vincent Tam, BP:

Vincent presented a real scenario containing commercial usage of H_2 for transportation (buses), and showed FLACS simulations with H_2 dispersion in a pilot station for H_2 filling.

Presentation by Francesco Chille, CESI:

Francesco presented scenarios involving transformer explosions, looking at failure rates, videos showing real incidents, and animations of FLACS simulation results.

Presentation by Stian Høyset, Norsk Hydro:

Stian presented studies made by Norsk Hydro regarding accidental releases in a H_2 electrolysis unit. The results of FLACS simulations were shown.

Presentation by Bernt Natvig, Scandpower:

Bernt presented part of a presentation from the previous dispersion workshop (Paris) where a release of synthesis gas (H_2+CO_2) in an open/unconfined plant was studied.

Discussions and comments:

– Guidance – details: should aim to be more specific.

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- Liquid H_2 pool evaporation is of interest.
- One way to represent pool evaporation could be to use existing spill models to calculate the evaporation rate and apply it as a leak in FLACS.
- Presentations from the workshop should be made available on the FLUG web site. *(Author's comment: it is possible to do this, but it should be up to each company to decide what they make publicly available)*
- The email address for the participants should be shown on the FLUG web site. *(Author's comment: this is in place, see http://www.gexcon.com and find the FLUG page)*
- Guidance on wind profile: send small example setup-file, or "how-to" on email

2. Explosives workshop

2004-07-05, 08:30, *GexCon*, Fantoftveien 38 - Bergen

Olav R. Hansen wished welcome to the "Explosives workshop", and presented the winners of the 'guessing explosion pressure competition'; Jean-Luc Revel from Rhoditech came first just ahead of Vincent Tam from BP.

2.1 Presentations from FLACS users (including GexCon)

Presentation by Idar E. Storvik, GexCon:

Idar presented a new version of FLACS aimed at simulating blast wave propagation from high explosive charges. The so-called FLACS explo tool consists of a scenario template allowing explosives to be easily defined in Casd, and a specialised simulator that treats the explosive as a spherical region with high pressure and temperature.

Presentation by Trygve Skjold, GexCon:

Trygve presented the DESC code, which is a simulator based on FLACS used for studying dust explosion scenarios. In the current version the dust is represented as a heavy gas with thermodynamic and combustion properties adapted to match the behaviour of real dusts.

Discussions and comments:

- Translucent objects wanted in Flowvis, example from Techplot.
- Guidance for FLACS explo could be made available on the FLUG web.

3. FLUG meeting

2004-07-05, 13:00, GexCon, Fantoftveien 38 - Bergen

Welcome

Jens K. Holen (Statoil) wished welcome to the FLUG meeting

Adoption of agenda

The agenda was accepted without changes.

Minutes of previous meeting

Jens K. Holen went through the minutes of the previous meeting. The minutes were accepted.

Actions from previous meeting and comments:

- Discussion on updating the manual; list of files, further comments.
- Chris: The manual should be updated.
- Vincent: Casd should contain good explanations for each scenario item.
- Anette: Will check if she received hp/dbfutil1.3

Presentation by Olav R. Hansen, GexCon:

Olav talked about FLACS products or so-called 'FLACS babies': the reason for offering specialised versions is that they can be better adapted to the marked (capture interest and being cost optimal). The discussion following the presentation showed a great interest in this topic.

Presentation by Hans-Christen Salvesen presented, GexCon:

Hans-Christen talked about supported platforms for FLACS (currently being: Linux, sgi, sun, and hp) and the questionnaire sent out some time ago. The results from the questionnaire showed that most users have Linux, and that many want Windows as well.

Discussions and comments:

- Chris: Casd & Flowvis lacks the flare of more modern graphical software.
- Bernt: Quite satisfied with what was done with V8 Casd & Flowvis.
- Olav: GexCon has plans for QT based GUI.
- Vincent: FLACSCOM recommendations – could use a 3rd party visualisation package.
- Bernt: General XML format (ref. Work at ComputIT).
- Olav: Good to have Casd & Flowvis because other tools may be expensive.
- Vincent: Does GexCon want to specialise in CFD/explosions or visualisation?
- Olav: GexCon will consider what to do (of course considering the alternatives).
- Bernt: When does the next release come and what will it contain?
- Murray: Wants to extend the macro possibilities. Also interested to have Q5 also during explosion (to see how it changes due to mixing etc.)
- Jo: Wind gust BC is wanted also in standard FLACS.
- Olav: Work done for DuPont, but also in the LICOREFLA EXTENSION project.
- Vincent: LNG, H_2 – points out the need to further develop the physical models in FLACS. GexCon should come up with some proposals.
- Michael Hasson: Interested in the possibility to flag CVs where DDT might occur.
- Francesco: Would GexCon work further on the 'oil mist' models? Answer = yes.
- Abdelamid: IRSN needs sun.
- Chris: FAQ, could it be directly accessible from Casd, just an idea?

Presentation by David Stickland, BP:

David presented BP's view on using "equivalent gas clouds" in FLACS studies. What would be the best method to use?

1) >LFL volume converted to equivalent volume at ER=1

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2) Q5 volume converted to equivalent volume at ER=1
3) [LFL:UFL] volume converted to equivalent volume at ER=1

Discussions and comments:

- GexCon has done some similar studies, many factors may be important.
- Chris: Has GexCon the intention to try to improve the Q5 method?
- Jens: Surprised to see that Q5 seems to under-predict as much as BP shows. GexCon has earlier presented better results.
- Olav: We should check this out (ignition, confinement, size, etc.).

Presentation by Stian Høyset, Norsk Hydro:

Stian presented Norsk Hydro's view on using "equivalent gas clouds" in FLACS studies. Equivalent "stoichiometric" clouds, could be ok for CH_4 where ERtop=1.1, but for H_2 the ERtop=1.8 and this may be a problem.

Discussions for further development:

- Bernt: PMAX is good to have, DRAGMAX etc. also of interest.
- Simen: Wants Casd5 on laptop with view-only license.
- Michael: Wants VRML export from Casd5, also results (GLview).
- Chris: What about old wishes and suggestions that have not been realised?

Finally Jens expressed thanks to GexCon for hosting the workshops/meeting and for the good dinner.

New actions

1. GexCon to work further on manual and best practise guidelines.

Election of new chairman:

Bernt Natvig was elected as the new chairman, to take effect from next meeting.

Next meeting

Agreed to be held in Bruxelles (Tractebel would be the host), October, one and a half day starting at lunchtime 21-22 October 2004.

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