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MINUTES OF MEETING

Meeting	**:**	**FLACS USER GROUP**
Venue	**:**	**Gaz de France Research Centre, St. Denis - Paris, France**
Date	**:**	**October 16-17, 2003 (workshops and meeting)**
Prepared by	**:**	**Idar E. Storvik, Olav R. Hansen**

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Olav R. Hansen	GexCon AS
Ørjan Stien	GexCon AS
Idar E. Storvik	GexCon AS
Ahmed Bentaib	IRSN
Abdelhamid Nazih	IRSN
Jerome Richard	IRSN
David Spring	Kidde
Catherine Gueguen	Rhodia
Anette Urheim	Safetec
Bernt Natvig	Scandpower
Thomas Magnussen	Statoil
Jens Kristian Holen	Statoil
Fabiola Arellano	TotalFinaElf
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Introduction

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

1) Dispersion workshop
2) Internal combustion workshop
3) FLUG meeting

The minutes cover the three parts in separate chapters.

1. Dispersion workshop

2003-10-16, 12:00, Gas de France Research Centre, St. Denis - Paris

Olav R. Hansen (GexCon) wished welcome to the ”Dispersion workshop”, and the participants around the table presented themselves briefly.

Olav R. Hansen described the purpose of the workshop (dispersion studies using FLACS) afterwards. For the evening GexCon invited the participants to dinner.

Idar E. Storvik (GexCon) presented a quick overview of “state-of-the-art” FLACS (from basic functionality to advanced possibilities). Olav R. Hansen continued on the topic with more details on the FLACS models for atmospheric dispersion. Henri Tonda (Total) expressed an interest in getting the presentation on the FLUG site, GexCon would have to check with DuPont about this.

Bernt Natvig (Scandpower) gave a presentation on how FLACS and other CFD tools are used by Scandpower:

- Comparing FLUENT v.s. FLACS
- Using Kameleon FireEx for fire and dispersion studies
- Using FLACS for hydrogen dispersion, trying to develop an alternative method to Q5
- Wishes for future FLACS: make graphics during simulation like in Kameleon

Fabiola Arellano (Total) gave a presentation on how FLACS was used to simulate gas dispersion and explosion in a blockhouse, pointing out some problems and difficulties experienced:

- Using symmetry B.C.: monitor points are moved to "inside grid"
- Would prefer an error message for items "outside grid"
- Wall adjusted to grid line (GexCon needs the files to check this out)
- Wind stabilisation: when is it important?
- Simulation of accident scenario: blockhouse, damage estimate indicate
- 4 barg, FLACS gives 0.5 barg (ethylene reactor)
- Problem with full disk when using casd, want better error messages

Ørjan Stien (GexCon) gave a presentation on how FLACS was used to simulate gas dispersion on a full size North Sea site:

- Gas dispersion on a North Sea rig,
- Exposure of gas on a nearby flotel (living quarters)
- Finding: Intuitive guesses on where gas will migrate based on wind direction and density of gas differ strongly from what is found in simulations.

A few comments/wishes were given in conjunction to this presentation:



Bernt Natvig:
- Wants multiple monitor regions with user specified flammability limits
- PMAX is available, also wants PDYNMAX, and 'projected' PMAX for flowvis

Ørjan Stien:
- Wants meters instead of indices for plot domain

Henri Tonda:
- Wants to use line detectors

2. Internal explosion workshop

2003-10-17, 09:25, Gas de France Research Centre, St. Denis - Paris

Olav R. Hansen wished welcome to the “Internal explosion workshop”.

2.1 Presentations from FLACS users (including GexCon)

Olav R. Hansen presented “Use of FLACS for confined explosions”.
- In flacs2.2.6 SL as function of P, T, O2 has been revised
- A better model for these corrections implemented
- There are still some problems: too low O2 may give negative SL!
- CO + H2: CO is overrepresented

Comments from the audience:
Interaction between water-mist and flame propagation is of interest (Jerome Richard, IRSN)

David Spring (Kidde) presented “FLACS, a novice's view”.
- Many areas of interest for use of FLACS
- Showed a comparison of FLACS simulations with experiments in a 6.3m^3 vessel (1.6m diameter, approx. 3m long, 4.02 % propane in air), good results!
- Also showed a comparison of a two-chamber test: time offset, but very good results

Olav R. Hansen presented “Spray-dryer simulations with FLACS”.
- Simulations of spraydryer experiments in which maize starch is represented with a modified gas. Quite good results (some of them blind predictions) were achieved.

Comments from the audience:
Bernt Natvig: suggests improved geometry modelling (bends etc.) This could perhaps be done within object classes in casd.

3. FLUG meeting

2003-10-17, 13:50, Gas de France Research Centre, St. Denis – Paris

Welcome

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

Adoption of agenda

The agenda was adopted without any comments.

Minutes of previous meeting

Idar E. Storvik went through the minutes of the previous meeting.



Actions from previous meeting

- Finalize the FLACS guidance document or "best practice"-manual.
- List of FLACS files. Verify the list found in the FLACS manual, update if necessary.
- Next FLUG meeting: May 6-7th, 2004 at GexCon's offices, Bergen, Norway.

Comments on actions:
Best practice manual will instead become a best practice web-area, with downloading of example runs and step-by-step guidance. This will be presented at next FLUG-meeting.

Presentations by GexCon

Olav R. Hansen presented "Current FLACS R&D roadmap".

- FLACD 'babies': reason for offering specialised versions: better adapted to marked (capture interest and being cost optimal)
- Short description of each product
- Price structure mentioned, S&M price increased
- Full FLACS is 100 kEURO
- Description on current activities within different areas, dispersion, source modelling, hydrogen, dust explosions, virtual reality project, as well as potential future projects on more efficient generation of geometries and more.

Idar E. Storvik presented "FLACS hardware&software roadmap".

- Currently supported platforms: Linux, sgi, sun, hp
- Future change: sun and hp are depreciated, what are the users needs?
- Porting casd and flowvis to QT, estimated costs 2 MNOK
- Known problems:
  - casd5, sgi-OpenInventor problems, contact GexCon
  - ImageMagick: install standard rpm's
  - casd grid stretching (stops responding)

There were some comments/discussions around FLACS bugs:

- GexCon should provide recommendations for NVIDIA etc. graphics cards (Henri Tonda)
- GexCon should check that the flowvis / ImageMagick works ok
- GexCon has some experience that grid stretching may freeze casd (Olav R. Hansen)

Presentation by FLACS users

An example showing what has been done so far on the "Best practise manual" was presented. The need for realistic geometries was expressed: Statoil and Scandpower were willing to provide some.

The user perspective (15:10): presentations by the FLACS users were already done previous day so there was no purpose of repeating those presentations, instead the meeting continued into the discussions and questions phase.

Henri Tonda hade some questions:
What will be the development of FLACS for the next year (until the next FLUG meeting in about 6 months)?
Release schedule: when will the next release (2.2.6) be available?



GexCon's answer: Bug fixes are made gradually, testing is in progress.
Has GexCon performed any validation of dispersion of LPG or LNG? GexCon could write a proposal on this.
GexCon's answer: Limited validation available, but we would very much improve capabilities in this area. Project proposal likely to be generated first half 2004.

Bernt Natvig had some more wishes:
Wishes for scripts (e.g. cofile like), GexCon should make some suggestions.
A problem when using commands for View->Grid should be fixed.
Set home position for view also wanted in casd4.

Christophe Daux had some comments:
Development of models for BLEVEs and liquid phase phenomena (condensation etc.) are of some interest.

David Spring had a question:
Has GexCon the intention to include modelling of DDT either in FLACS or in a 'small' utility programme?
A development of DDT-Detonation models is planned, in the beginning for hydrogen for which it may be more frequent than for NG.

Jens K. Holen expressed some concerns:
Regarding the hydrogen explosion experiments showing that the external explosion is not being well simulated using FLACS. There is also a concern regarding grid resolution 1m v.s. 0.5m that Bernt Natvig talked about.

New actions

1. Send dbfutil1.3 to Safetec.
2. Continue work on the best practice web-area

Next meeting

Agreed to be held in Bergen, May, one and a half day starting at lunchtime 6-7 May 2004.