

## GexCon is Growing & New CEO

Over the past 3-4 years the number of employees at GexCon has doubled, and new offices have been established in the USA, UK, Australia and soon in Italy. While the growth is seen in most fields of activity, the good news for the FLACS<sup>®</sup> users is that the growth has been particularly strong within the

GexCon R&D department. This should ensure a good momentum developing and maintaining FLACS<sup>®</sup>. Sturle H. Pedersen was engaged as new CEO of GexCon this September, and he has promised the owners and employees that GexCon shall continue growing and to deliver (see Page 2).



Representatives from GexCon R&D Department at a recent social event.

## FLACS<sup>®</sup> Obtains US Approval For LNG

On October 7, 2011, The Pipeline and Hazardous Materials Safety Administration (PHMSA) of the U.S. Department of Transportation issued a final approval letter for FLACS<sup>®</sup> to be used in LNG vapour dispersion modelling scenarios according to federal regulations (49 CFR 193.2059). The approval culminates a multi-year effort which included the validation of FLACS<sup>®</sup> against a total of 33 dense gas dispersion experiments, as specified in the Model Evaluation Protocol.

FLACS<sup>®</sup> is currently the only approved model for the simulation of all LNG vapour dispersion scenarios required for the siting of an onshore LNG facility in the United States. The scenarios that can be modeled using FLACS<sup>®</sup> include:

- Dispersion from regularly- or irregularly-shaped LNG pools;
- Dispersion from LNG spills into impoundments of any shape and aspect ratio;
- Dispersion from LNG spills into trenches of any shape and aspect ratio;
- Dispersion from releases in any direction, including flashing, jetting, venting, vent stacks and pressure relief discharges;
- Dispersion from multiple coincident releases, including multiple release locations that may influence each other;
- Dispersion over obstructions, large and small.



FLACS<sup>®</sup> is now approved used for LNG siting studies according to US regulations.

PAGE

## Contents

2	Message from GexCon's CEO
2	Editorial
3	International Development
3	Publications
4	FLACS <sup>®</sup> -Related R&D
5	Career at GexCon?
5	FLACS <sup>®</sup> and GexCon Courses
6	FLACS <sup>®</sup> Release Schedule
7	Status GexCon Offices
	- USA, UK and Australia
8	FLACS <sup>®</sup> Users Group (FLUG)
8	GexCon Calendar

### Seasons Greetings to all of our Customers

GexCon appreciates your business and looks forward to continue working with you in 2012.



### Interested in FLACS<sup>®</sup>?

Contact us for information about FLACS<sup>®</sup> training courses.

Register for a 3-day beginner's course and obtain a free evaluation period afterwards.

## Message from GexCon's CEO

Dear Customer,

First of all, I will use this opportunity to thank you all for a successful year. As I look at the growth over the last years, I am extremely proud of what GexCon has achieved, and even more excited about our outlook for an equally promising future. Our team of competent and dedicated people has successfully transitioned from a small niche enterprise to become not only a respected firm, garnering business from across the world, while earning our clients' trust along the way, but also to be an instrumental participant in gas & oil safety.

GexCon is today entering a strong global expansion phase and we are eagerly pursuing our aim to strengthen the current organization with more than 20 new experienced and dedicated people in our R&D, consulting and software divisions. GexCon has continued to open new offices in 2011, to better service our clients. The new addition to our global network this year has been Houston in the USA, which will together with our office in Washington DC, increase our presence in the market to the benefit of our long standing clients. Also Milan in Italy was opened this year, and will be fully operational 1st of April 2012. More offices will be opened in 2012 in an effort to service you.

FLACS® is today a leading CFD consequence modelling software and we are very excited about the future prospect for our new versions/releases that will be launched next year. It will have many new features and improvements that I am sure many FLACS® users have been waiting for and will appreciate. GexCon is as mentioned reinforcing its R&D team in 2012 to be both able to reduce the lead time and launch new and state of art features that will improve the

overall performance and user-friendliness of FLACS®.

It is very satisfying to know that GexCon is able to help our FLACS® clients to increase safety and operate pivotal aspects of their business more efficiently and economically. Customer satisfaction is the hallmark by which we at GexCon measure our performance. We are every day held to the highest standards of quality by our customers, owners - and within the organization.

In this continually evolving marketplace, our clients are more informed than ever about their options. Even so, our customers continue to choose GexCon/FLACS® as their partner of choice because of our experience, commitment to quality and unparalleled competence, and our integrity.

When conveying GexCon's successes, I like to return back to three guiding principles - each of which has helped define who we are today:

1. Focus - Safety First
2. Talented People
3. Honest Perspective

On behalf of GexCon I like to thank you for your support in 2011 and also want to wish you and your families a really nice holiday and the best wishes for a prosperous and happy New Year!

Best regards,  
GexCon

Sturle H Pedersen  
CEO & President



## Editorial - CFD and Colourful Fluid Dynamics

GexCon has been involved in several CFD benchmarking activities with FLACS® in recent years and has generally performed well. Usually the goal of a benchmark is to simulate one or more experiments, either wind, dispersion or explosion, and there may be one, a few or many modellers and softwares participating in the exercise. We have seen that the outcome of such studies strongly depends on whether the experimental test results are known up-front or not. If all modellers know the experimental test results prior to simulating, we have seen a strong tendency that they all manage to "predict" the physics quite well. On the contrary, when the benchmark is performed blind, so that the modellers do not know the desired result, there tends to be a significant scatter among different models, and even among different users of the same software.

Intuitively it should be positive for the acceptance of FLACS® that we perform well in a blind benchmark. What we have seen in the past, however, is that industry pays more attention to the fact that there is a significant scatter among the different models, and concludes that CFD is too unreliable.

Since practically all FLACS® work has the character of blind predictions, simulating real life scenarios where no experi-

ments exist, it is crucial that good results can be expected. To achieve this we therefore do our best to define good validation based user guidelines and document these in manuals, develop good training courses, including a FLACS®-II advanced course which is under development, and aim at offering quick and competent support to users.

On this background we very much support the approach applied by US PHMSA/DoT for LNG studies, where a CFD tool is evaluated against an extensive set of experiments in a model evaluation protocol before being reviewed and eventually accepted.

In our opinion this is a concept that should be considered e.g. for onshore dispersion and explosion consequence studies, a field where current industry practice using simplified models can be very non-conservative.

The disadvantage is that it requires interested and competent authorities.

Enjoy the holidays

Olav Roald Hansen  
Product Director GexCon



## FLACS® - International Development

In 2011 the FLACS footprint has become bigger, with 19 new users from 9 nations: China, Czech Republic, Italy, Malaysia, Norway, Republic of Korea, Russia, United Kingdom and the USA. We have entered a partnership with Korea Gas Safety Corporation, and established our presence in Russia through our partner, LLC Research Institute for Fire Safety (RIFFSP). One main challenge in Russia for 2012 is to get FLACS® accepted by the authorities.

The FLACS® software department is a core team of four people in charge of FLACS® sales, support and training. In addition resources at GexCon R&D department as well as international agents contribute to the goals of the software department. Entering 2012 we are happy to announce that we will recruit four new people to our team – covering positions in all these three areas. Strengthening our support and training group will mean that we plan to offer more courses and more documentation. Together with the launch of the new parallelized FLACS® version, we are looking forward to enhance our offerings even more in the new year. We are happy to hear from you at [flacs@gexcon.com](mailto:flacs@gexcon.com) at any time!



*Director Sergey Komarov from the Research Institute for Fire Safety (RIFFSP) and Kees van Wingerden, Senior Vice President of GexCon AS signing a partner agreement.*

## FLACS® Related Publications and Conference Papers

GexCon and other FLACS® users have this year produced numerous publications related to process safety and FLACS®. Below is a list of published journal papers in 2011 related to FLACS® with contributions from GexCon. In addition to this GexCon has presented papers at numerous con-

ferences, among these 7th AIChE GCPS, Mary K O'Connor Symposium, ICSH4 (for an overview of all publications in recent years, see <http://www.gexcon.com/archive>). We would also like to thank several other FLACS® users who have published or presented their work.

### GexCon Publications 2011

- Davis, S.G., Hinze, P.C., Hansen, O.R., van Wingerden, K., Does your facility have a dust problem: Methods for evaluating dust explosion hazards, *Journal of Loss Prevention in the Process Industries*, Volume 24, Issue 6, November 2011, Pages 837-846
- Gavelli, F., Davis, S.G., Hansen, O.R., Evaluating the potential for overpressures from the ignition of an LNG vapor cloud during offloading, *Journal of Loss Prevention in the Process Industries*, Volume 24, Issue 6, November 2011, Pages 908-915
- Middha, P., Ichard, M. & Arntzen, B.J. (2011). Validation of CFD modelling of LH2 spread and evaporation against large-scale spill experiments. *International Journal of Hydrogen Energy*, 36: 2620-2627.
- Middha, P., Engel, D. & Hansen, O.R. (2011). Can the addition of hydrogen to natural gas reduce explosion risk?. *International Journal of Hydrogen Energy*, 36: 2628-2636.
- Venetsanos, A.G. et al. (2011). On the use of hydrogen in confined spaces: Results from the internal project InsHyde, *International Journal of Hydrogen Energy*, 36: 2693-2699.
- Hansen, O.R., Davis, S.G. & Gavelli, F. (2011). Use of CFD in onshore facility explosion siting studies. HAZARDS XXII, 11-14 April 2011, Liverpool, UK. IChemE Symposium Series No. 156: 20-27.
- Mahgereteh, H. et al. (2011). CO2PipeHaz: Quantitative hazard assessment for next generation CO2 pipelines. Poster presented at HAZARDS XXII, 11-14 April 2011, Liverpool, UK. IChemE Symposium Series No. 156: 606-610.
- Ham, K. et al. (2011). Benchmark exercise on risk assessment methods applied to a virtual hydrogen refuelling station. *International Journal of Hydrogen Energy*, 36: 2666-2677.
- Jordan, T. et al. (2011). Achievements of the EC network of excellence HySafe. *International Journal of Hydrogen Energy*, 36: 2656-2665

## Ongoing FLACS<sup>®</sup> Related R&D Activities at GexCon

GexCon R&D department has had a busy year in 2011. The main ongoing R&D activities with external funding within the department have included:

- JIP 2011 and Beyond (ExxonMobil, IRSN, Statoil and Total) developing the incompressible solver, parallel version of FLACS<sup>®</sup>, and a number of improvements within dispersion and explosion modelling.
- NORCOWE (Research Council of Norway, RCN) developing FLACS<sup>®</sup>-WIND prototype for optimization of windparks, also important contributions to incompressible/parallel version of FLACS<sup>®</sup>.
- CO<sub>2</sub>PipeHaz (EU FP7) studying potential CO<sub>2</sub> releases from pipelines. Shall lead to more accurate CO<sub>2</sub> release source terms and better dense gas dispersion in terrain.
- IEA HIA Task 31 (RCN), a hydrogen safety expert group where GexCon works with other key players in the world.
- Two industry PhDs (RCN) are working with two-phase release models and explosion combustion modeling.

In addition to the activities receiving external financial support GexCon also has ongoing activities based on maintenance funds from FLACS<sup>®</sup>-users, currently some of the main activities are:

- Model improvements and bug-fixes aiming at June 2012 release. This includes evaluating interaction between sub-grid geometry, turbulence models and combustion.
- New scenario menu in CASD, giving more flexibility and a better user experience.
- More efficient handling of huge geometries in CASD.

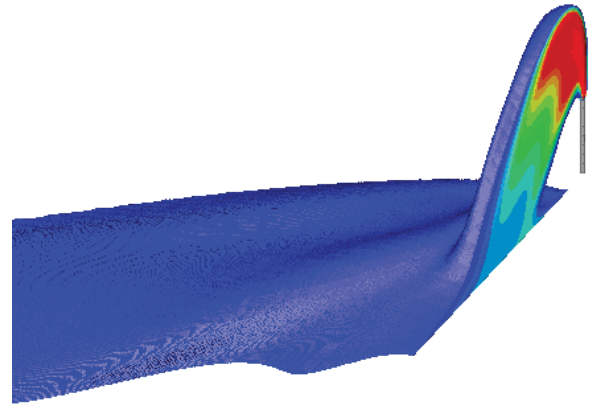
In addition internal funding is invested for additional development tasks, including:

- The development of FLACS<sup>®</sup>-FIRE (JIP to be proposed)
- Development of new generation postprocessor Flowvis (Main work at Christian Michelsen Research, CMR).
- New geo2flacs CAD-import utility (Main work at CMR).
- Methodology and model development to improve offshore and onshore dispersion and explosion studies, as well as fire studies.

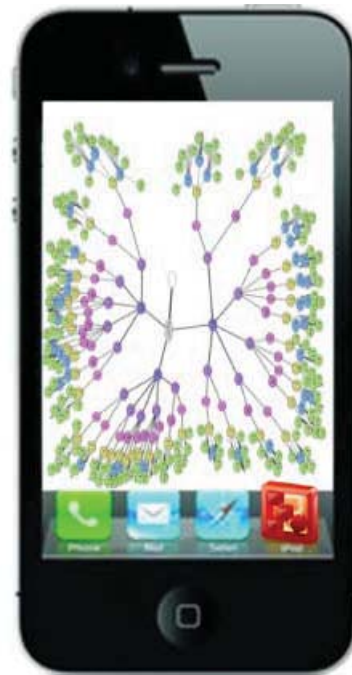
With the increasing number of modellers and activities, it has been necessary to implement better tools and systems for version control and error handling, which we expect will lead to an increased efficiency and better quality of the product.

Other interesting R&D initiatives are also being considered, and these are subject to a continuous prioritization based on input from stakeholders, possibilities for external funding, technical challenges and importance for the product FLACS<sup>®</sup>. One very interesting ongoing initiative GexCon is involved in through our parent company CMR, is an application to establish a Norwegian centre of excellence within safety and security (NORCESS).

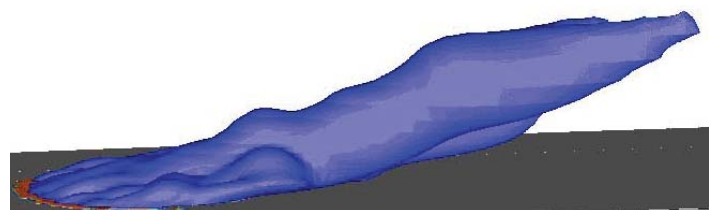
Finally we will encourage FLACS<sup>®</sup> users and other stakeholders in the industry or elsewhere to give us feedback on and suggestions for possible improvements and new models in FLACS<sup>®</sup>. This can help us improve and make FLACS<sup>®</sup> a more attractive tool.



*Stack release simulations (above) and most other dispersion scenarios can be performed 5-10 times faster using the incompressible solver, and very urgent simulations another 3-4 times faster using the parallel version of FLACS<sup>®</sup>. Also for high pressure gas releases, typically studied in probabilistic explosion studies, only marginal differences have been seen between the compressible and incompressible solvers.*



*iPhone FLACS<sup>®</sup> App with a Run Manager to look after 100s of simulations? Good idea, but not currently prioritized...*



*A surface leak functionality has been developed and will be included in future FLACS<sup>®</sup> versions. This way users can better specify source terms for subsea release scenarios (above) as well as ventilation systems with large cross-sections.*

## Would You be Interested in a Career at GexCon?

GexCon is currently building up a more powerful international organization. In this process we are seeking talented and motivated candidates for positions in various areas.

For the main office in Norway the GexCon R&D team is planning to recruit 2 new CFD-modellers within fire modeling, one junior researcher (expected to enter an Industry PhD program) and one senior programmer.

The consulting department in Norway is looking for safety consultants to perform FLACS®-based risk and consequence studies as well as candidates with a good background within process safety and technical safety.

The Labs department performing experimental testing have ambitious plans increasing the size of our full scale test site and facilities next year, and will also be looking for one additional colleague to be working on the test site.

The FLACS® software department is planning to hire one sales person, one support engineer, one person to be responsible for FLACS® training courses as well as one person to be responsible for coordinating global marketing.

At the UK office a FLACS® consulting activity will be started up, and there is a plan to hire FLACS® CFD modellers.

GexCon US will be hiring consultants for the newly estab-

lished Houston office, and GexCon Australia is also looking for new people.

If you, or somebody you know, may be a candidate for one of the mentioned positions, or you have a very attractive competence and a demonstrated performance in one of our key areas, we would be glad to hear from you. Information and an online application for these and other positions will be found at <http://gexcon.com/vacancies>.



*Group of GexCon-colleagues swimming in the Blue Lagoon, Iceland, during a social event in November 2011.*

## FLACS® and Explosion Safety Courses

In the year 2011, GexCon offered a wide range of courses in the field of gas and dust explosions. The diverse course offering comprised of a total of 5-6 explosion science courses (including topics on both gas and dust explosions) in the UK and Norway, two courses on gas explosion hazards in offshore facilities (in Bergen, Norway and College Station, Texas), an LNG explosion hazards course (Doha, Qatar), a course on Explosion Modelling and Blast Resistant Design and Analysis (Perth, Australia) and a course on Management of Drilling Major Accident Hazards (Singapore). The Gas Explosion Hazards in Offshore Facilities course in Bergen included a large-scale explosion demonstration at GexCon's explosion test site outside of Bergen while the same course in College Station in cooperation with Mary Kay O'Connor Process Safety Centre included an LPG fire demonstration at the TEEEX fire testing facility. Additionally, an open industry seminar on the use of CFD tools for risk assessment was held in Milan, Italy. GexCon participated in the Gas Safety Seminar organized by Korea Gas Safety (KGS) in Seoul and a seminar titled "CFD – Future of Safety Technology" outside of Munich, Germany. GexCon has also for many years been contributing with a FLACS® workshop on the Explosion Hazards Course at the Leeds University, and will continue to do so in 2012 (March 19-23).

Several FLACS® training courses were organized. This included courses in our offices in Norway, UK, USA, and Australia as well as places like Paris, Seoul, Beijing, College Station (Texas, USA) and Ostrava (Czech Republic). The FLACS® training courses had about 150 participants in



*Offshore course participants waiting to watch and feel the blast from a real gas explosion at GexCon's test site.*

all. We also offered an advanced FLACS® training course in 2011 after a gap of several years. This was appreciated by the participants and we hope to develop the FLACS®-II advanced course concept further and make this a regular part of the FLACS® course calendar (<http://gexcon.com/FLACScourse>).

The course schedule for 2012 will include more courses at more locations. If you consider attending a course you should keep an eye on the GexCon course calendar (<http://www.gexcon.com/coursesandseminars>) and contact us in case you would like to join any of these courses. If your organisation would be interested in a dedicated course from GexCon, please contact us.

## June 2012 FLACS® Release And New Annual Release Schedule

In 2011 commercial customers of FLACS® would have noticed that GexCon has released no main upgrades, only a couple of bug-fix releases. The explanation to this is that the R&D department at GexCon has been very busy with important FLACS® development tasks.

The first bug-fix release, flacs9.1r3, was initiated due to a problem highlighted by our customers. When importing a CAD-geometry, there can be duplicates of geometry elements like piping which are difficult to see for the user. The FLACS® subgrid handling of geometry would still see two small pipes instead of one, and therefore accelerate the flames too much. While for most CAD-imported geometries this would not be very important, there were cases where it could lead to significantly higher pressures. The solution was an algorithm to remove pipe elements inside pipes.

At the end of December, 2011, the second bug-fix release, flacs9.1r4, will be issued. The main features are 64-bit versions for the Flacs simulator on Windows and Linux, less memory use for Flowvis postprocessor, which will give faster handling and better stability for very large jobs, and removing a porosity model error for GTC-type objects (general truncated cone) as well as rotated (not aligned to axes) boxes and cylinders.

In addition to the commercial bug-fix releases there have been some project related R&D releases, including FLACS®-WIND and FLACS®-JIP versions, both with improved functionality or performance that will mostly be found in future commercial releases.

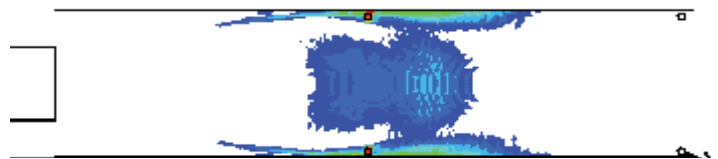
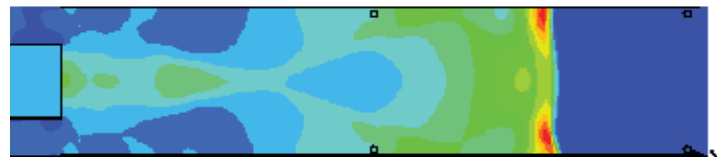
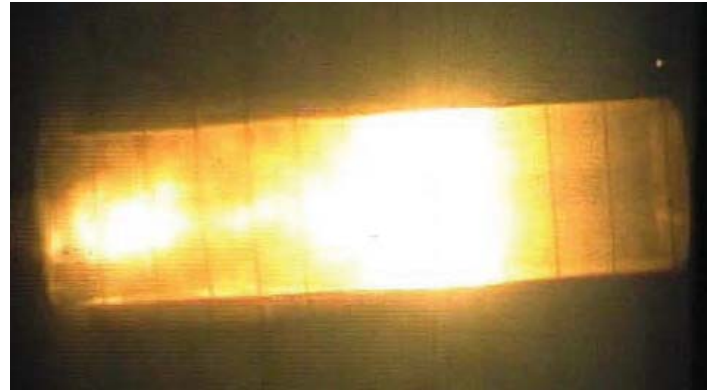
### Annual Release Cycle from 2012

From 2012 GexCon has decided to introduce a more regular commercial release cycle with one major release in June every year and a main bug-fix release in December. In addition to this there may be further bug-fix releases and R&D releases. We expect that this change will be well received among our commercial customers.

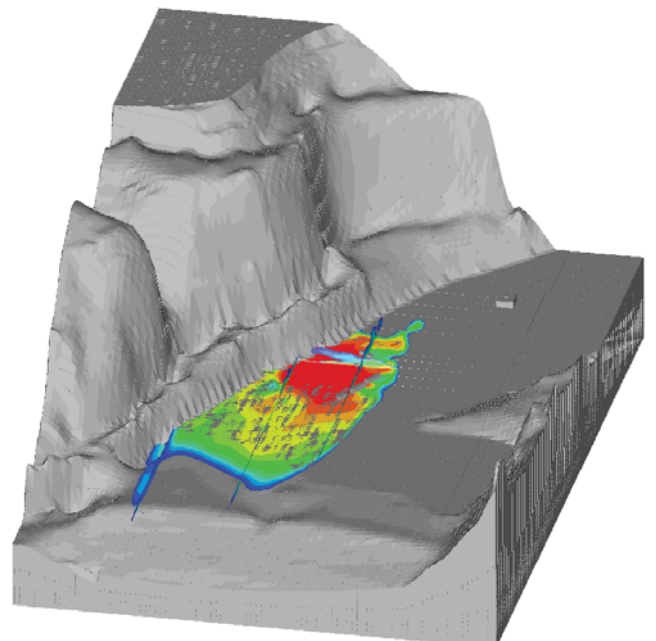
### FLACS® Release June 2012

Early 2012 GexCon will start focusing on the next major release of FLACS® with a target release date in June 2012. The main planned new features include the following (will be finally confirmed at FLUG-meeting in Bergen in May 2012):

- Parallel version & incompressible solver developed with support from JIP and NORCOWE will be made available to new FLACS® users as well as existing perpetual customers provided they agree to adopt new price list.
- Deflagration-to-Detonation-Transition (DDT) prediction functionality.
- Homogeneous Equilibrium Model (HEM) for simulating flashing releases (two-phase model).
- Selected bug-fixes and improvements.
- Improved handling of sloping terrain.
- Other JIP functionality: Area-leaks, pipeline release, etc.
- New CASD scenario-template.
- New improved geo2flacs which can import DGN-v8 files.
- New Flowvis test version (together with existing Flowvis)
- Updated documentation.



*Models for predicting likely deflagration-to-detonation-transition (DDT) are planned included in the 2012 release of FLACS®. Above the simulation of a Fraunhofer-ICT hydrogen experiment experiencing a DDT can be seen, the simulation plots are showing pressure (top), flame (middle) and the DPD parameter indicating DDT potential (bottom).*



*Example of gas dispersion simulation study using models for improved handling of flows over sloping terrain.*

## News from GexCon Offices

### GexCon UK

Among many activities, one major focus area has been consultancy in relation to dust explosions concerning biomass applications. GexCon UK has extensive experience with dust explosions and is involved with biomass projects from small municipal heating systems to large power generation facilities for power companies such as DRAX Power Ltd and EDF Energy. This year our DESC software has been used to optimise the explosion protection for large bulk stores in excess of 10,000m<sup>3</sup>, empirical calculations normally used in accordance with various venting standards are not applicable for large volumes such as these. One recent study considered 6 x storage silos of 90,000m<sup>3</sup>. A more probabilistic approach to realistic dust cloud sizes and conditions is often required.

During 2012 GexCon UK plans to establish a UK team of FLACS<sup>®</sup> CFD engineers to assist with UK and International projects as part of the integrated CFD and risk capabilities and to support and train our FLACS<sup>®</sup> customers, further details can be found on <http://www.gexcon.com/vacancies>.

GexCon UK also offers explosion science courses at regular intervals as well as tailor-made explosion courses to larger companies.

### GexCon US

GexCon US is pleased to announce that they will open an office in Houston, Texas, starting January 2012. The office will be located in the Energy Corridor and will greatly facilitate our support for Houston-based clients. We are actively recruiting a Senior Risk Consultant with experience using FLACS<sup>®</sup>, more details about this can be found on webpages <http://gexconus.com/Careers>. We will be offering our first FLACS<sup>®</sup> training course in Houston on January 30-February 2, so please do not hesitate to sign up as space is limited.

2011 has been an exciting year for GexCon US as we have witnessed significant growth in accident investigations, dispersion & explosion safety consulting using FLACS<sup>®</sup>, and process safety in powder handling facilities. We are expanding our team in both the DC and Houston based offices, see our website for more details. In addition, FLACS<sup>®</sup> is now approved by PHMSA for LNG dispersion modeling under U.S. Federal Regulations. 2011 has also seen a significant increase in explosion safety related courses in the Americas and worldwide, where in 2012 GexCon US plans on providing a full range of courses, including those related to offshore and land-based petrochemical facilities, dust explosion hazards, LNG and custom tailored courses to governmental agencies and private companies.

To bolster and supplement our medium scale testing facility in Bergen Norway, GexCon US plans on implementing an exciting explosion research program through collaboration with the Mary Kay O'Connor Process Safety Center and other large scale test sites.



Several FLACS<sup>®</sup> training courses (above) and seminars were organized at GexCon UK offices in 2011.

### GexCon Australia

The GexCon Australia office has been moved to Australian oil and gas capital Perth this year. GexCon has in the past performed a number of safety studies for Australian oil and gas companies, and our presence in Perth has already resulted in new contacts and projects. As the safety case regime in Australia has many similarities to what is practised in the North-Sea, FLACS<sup>®</sup>-based risk and consequence studies are often requested. GexCon Australia is also offering training courses for FLACS<sup>®</sup> and explosion safety.



GexCon Australia was present at a recent event when Norwegian PM Jens Stoltenberg visited Perth to promote cooperation between Australian and Norwegian offshore industries.



Gas Explosion Hazards for LNG Facilities course given at Texas A&M University Qatar.

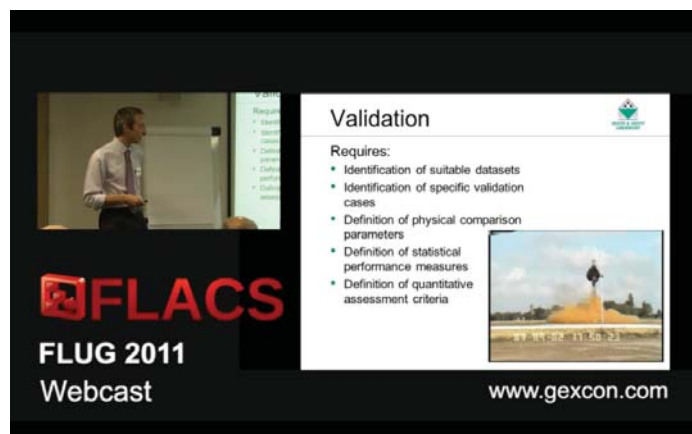
## FLACS® Users Group (FLUG) Update

The FLACS® Users Group meeting in Bergen 11-12 May was well attended. There were around 25 external participants, in addition to 10-15 GexCon representatives. The meeting started with the presentation of the SW department, including planned improvements, and overview of international offices. The Net Promoter Score survey was presented where the result indicated that 86 % of those responding would recommend FLACS®/GexCon to others. GexCon presented plans for an advanced FLACS® training course which was launched in December 2011 (see also earlier in the newsletter). R&D plans were presented next. The next generation of FLACS®, FLACS®-3 will gradually emerge from FLACS®-2. It will be increased focus on documentation, both internally describing technical details of the different models and guidance relevant for the general FLACS® user. More systematic validation work is also planned. The R&D department plans for fixed date releases of FLACS® (see page 6). There were several interesting user presentations on topics such as geometry modelling, gas explosion modelling, probabilistic explosion analysis, coupling of FLACS® results with structural analysis, DDT criteria, LNG spreading, and dispersion over sea. All the presentations are uploaded on the FLUG website.

The fall FLUG meeting was held in London 8-9 November. The meeting was also very well attended with over 35 external participants and around 8-9 GexCon representatives. One wish from the FLACS® users at the meeting in Bergen was whether those who could not travel to the FLUG meeting could also get access to the interesting presentations and discussions. With this in mind, the user presentations from day 1 of the London meeting were recorded on video and are available on the FLUG website as well as on YouTube (<http://www.youtube.com/user/FLACSfd>). Chris Savvides

(BP) was elected new chairman of FLUG replacing Jerome Taveau (IRSN). The FLACS® maintenance presentation described the upcoming bug-fix release that will be available December 2011 that includes several useful fixes. The R&D presentation described future prospects and opportunities as well as summary of the very interesting work carried out in the ongoing JIP. There were several interesting user and GexCon presentations on topics such as dispersion modelling, LNG spills and pool modelling, equivalent gas clouds, explosion in LPG bottles, dispersion from subsea releases, initial use of incompressible solver, etc.

Additionally, there were local FLUG meetings held for our Chinese users in Lijiang, China, in August as well as for our Korean users in Seoul in February. Both meetings were attended by about 10-15 participants and were much appreciated. GexCon plans to continue to hold FLUG meetings in locations outside Europe to reach a global customer base.



London meeting webcast is available at YouTube, above Matt Ivings, HSL, talks about the LNG Model Evaluation Protocol.

### Meet GexCon 2012 (More courses can be found at <http://gexcon.com/CoursesandSeminars>)

28-29 February	Houston, TX	Combustible Dust Explosion Course	<a href="http://psc.tamu.edu">http://psc.tamu.edu</a>
13 March	Rio, Brazil	Explosion Seminar	<a href="http://gexcon.com">http://gexcon.com</a>
13-14 March	Skelmersdale, UK	Explosion Science Course	<a href="http://gexcon.com">http://gexcon.com</a>
19-23 March	Leeds, UK	Expl. course & FLACS workshop	<a href="http://www.engineering.leeds.ac.uk/">http://www.engineering.leeds.ac.uk/</a>
1-5 April	Houston, TX	AIChE GCPS	<a href="http://www.aiche.org">http://www.aiche.org</a>
9-10 May	Bergen, Norway	Offshore Explosion Course	<a href="http://gexcon.com">http://gexcon.com</a>
15-16 May	Bergen, Norway	FLUG meeting	<a href="http://gexcon.com">http://gexcon.com</a>
23-25 October	College Station, TX	Mary K O Connor Symposium	<a href="http://psc.tamu.edu/symposia/2012">http://psc.tamu.edu/symposia/2012</a>
12-15 November	North West, UK	Hazards XXIII	<a href="http://www.icheme.org/events/">http://www.icheme.org/events/</a>

FLACS courses: A list of all planned courses can be found at <http://gexcon.com/FLACSCourse>

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