GexCon US

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President

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Professional Profile

Olav Roald Hansen is President of GexCon US Inc., a subsidiary of GexCon AS (Norway). Mr. Hansen started the company in September 2008. GexCon US offer FLACS CFD-software sales and support, risk and safety studies (dispersion, explosion, fire), accident investigation, R&D services as well as experimental testing.

Before joining GexCon US, Mr. Hansen was GexCon's R&D Director and Manager of the Software department from 2001-2008, responsible for R&D, validation and sale of the FLACS CFD simulator. FLACS is a world-leading CFD-tool for gas dispersion and explosion analyses for offshore safety, as well as other application areas like hydrogen safety. When joining GexCon in 2000, he had 8 years of explosion research experience at CMR, and was Assistant Manager of the Process and Safety group. In this work, Mr. Hansen was also responsible for various JIPs, which included experimental R&D work in the areas of explosion and dispersion (e.g. offshore safety, aerosol explosions, transformer safety, hydrogen safety). He has also been central in model development work (e.g. water deluge, sub-grid flame folding, multiblock blast solver, porosity routines, dust explosions) and validation efforts (explosion, dispersion, hydrogen, LNG) to develop FLACS into a leading CFD tool for process safety.

Mr. Hansen developed and implemented the structure of the 3-day FLACS-I training course in 1997. Since this time, Mr. Hansen has instructed over 300 people in this training course.. He has also been invited to lecture at expert seminars in India (1998), Malaysia (1998), Philippines (2000), Taiwan (2000) and Brazil (2002), on the subjects of gas explosions, far-field blast propagation, water mitigation, explosion venting and explosion risk assessments. Mr. Hansen has served as chairman at several conferences. Since 1998 he has lectured and instructed CFD-workshops at the annual explosion course at Leeds University.

Mr. Hansen has been responsible for the global sale and support of FLACS software from 2002 until 2008. In this period the number of commercial companies using FLACS increased from around 15 to 60. He has also been instrumental in organizing FLACS user group meetings twice a year.

Mr. Hansen has been a project leader or has significantly contributed to a variety of consulting and research projects, including accident investigations. He was central in developing the probabilistic explosion QRA-methodology applied by GexCon. Recent focus has been on aerosol explosions, dust explosion modelling (DESC project), hydrogen safety (NoE HySafe, IEA Task 19 expert group) and dispersion (LNG, atmospheric dispersion, Manhattan tracer gas modelling, expert advisor for DARPA/DTRA/DHS projects coordinated by Dr Steve Hanna).

Academic Credentials

Sivilingeniør (M.SC.) Dep. of Physics 1992, Norwegian Inst. of Techn. (NTH), Trondheim, Norway
Diploma thesis in numerical modeling at Aerodynamishes Inst., RWTH Aachen, Germany 1991-1992

Languages

Norwegian, English, some German

Publications and Conference Proceedings

Hansen is author or co-author for a range of papers on modelling of dispersion, explosions, validation, blast propagation, water mitigation, hydrogen safety, oil mist explosions, dust explosion modelling and QRA-methodology. Some of the papers presented or published since 2004 are listed below.

Papers 2010

J. García, D. Baraldi, E. Gallego, A. Beccantini, A. Crespo, O.R. Hansen, S. Høiset, A. Kotchourko, D. Makarov, E. Migoya, V. Molkov, M.M. Voort, J. Yanez (2010). An intercomparison exercise on the capabilities of CFD models to reproduce a large-scale hydrogen deflagration in open atmosphere. International Journal of Hydrogen Energy (In Press doi:10.1016/j.ijhydene.2010.02.011)

Prankul Middha, Olav R. Hansen, Joachim Grune and Alexei Kotchourko (2010). CFD calculations of gas leak dispersion and subsequent gas explosions: Validation against ignited impinging hydrogen jet experiments. Journal of Hazardous Materials (article in press, doi:10.1016/j.jhazmat.2010.02.061)

Davis, S.G. & Hansen, O.R. (2010). New investigation findings on the 2006 Danvers, MA explosion. Journal of Loss Prevention in the Process Industries,23 (2) 194-210

Papers 2009

Baraldi, D., Kotchourko, A., Lelyakin, A., Yanez, J., Middha, P., Hansen, O.R., Gavrikov, A., Efimenko, A., Verbecke, F., Makarov, D. & Molkov, V. (2009). An inter-comparison exercise on CFD model capabilities to simulate hydrogen deflagrations in a tunnel. International Journal of Hydrogen Energy, 34 (18): 7862-7872.

Davis, S.G. & Hansen, O.R. (2009). Lessons learned from the 2006 facility explosion in Danvers, MA. Forty-third Loss Prevention Symposium, 26-30 April 2009, Tampa, Florida

Hanna, S.R., Hansen, O.R, Ichard, M. & Strimatis, D. (2009). Computational fluid dynamics (CFD) model simulations of dispersion from railcar releases in industrial and urban areas. Atmospheric Environment, 43: 262-270.

Hansen, O.R., Hinze, P., Engel, D. & Davis, S.G. (2009). Using CFD for blast wave predictions. Twelfth Annual Symposium, Mary Kay O'Connor Process Safety Center, 27-28 October 2009, Texas A&M University, College Station, Texas: 674-685.

Hansen, O.R., Ichard, M. & Davis, S.G. (2009). Validation of FLACS for Vapor Dispersion from LNG Spills: Model Evaluation Protocol. Twelfth Annual Symposium, Mary Kay O'Connor Process Safety Center, 27-28 October 2009, Texas A&M University, College Station, Texas: 712-743.

Ham, K., Marangon, A., Middha, P., Versloot, N., Carcassi, M., Hansen, O.R., Schiavetti, M., Papanikolaou, E., Venetsanos, A., Engebø, A., Saw, J.L., Saffers, J-B., Flores, A. & Serbanescu, D.

(2009). Benchmark exercise on risk assessment methods applied to a virtual hydrogen refuelling station. Third International Conference of Hydrogen Safety (ICHS), 16-18 September 2009, Ajaccio, Corsica, France, Paper ID 246

Ichard, M., Hansen, O.R. & Melheim, J.A. (2009). Modelling of flashing releases around buildings. Eighty-ninth American Meteorological Society (AMS) Annual Meeting, Eight Symposium on the Urban Environment, 11-15 January 2009, Phoenix, USA, Paper J14.2: http://ams.confex.com/ams/pdfpapers/147092.pdf

Jordan, T., Adams, P., Azkarate, I., Baraldi, D., Barthelemy, H., Bauwens, L., Bengaouer, A., Brennan, S., Carcassi, M., Dahoe, A.E., Eisenreich, N., Engebø, A., Funnemark, E., Gallego, E., Gavrikov, A., Håland, E., Hansen, A.M., Haugom, G.P., Hawksworth, S., Jedicke, O., Kessler, A., Kotchorko, A., Kumar, S., Langer, G., Ledin, S., Makarov, D., Marangon, A., Markert, F., Middha, P., Molkov, V., Nilsen, S., Papanikolaou, E., Perrette, L., Reinecke, E-A., Schmidtchen, U., Serre-Combe, P., Stöcklin, M., Sully, A., Teodorczyk, A., Tigreat, D., Venetsanos, A., Vervondern, K., Versloot, N., Vetere, A., Wilms, M. & Zaretskiy, N. (2009). Achievements of the EC network of excellence HySafe. Third International Conference of Hydrogen Safety (ICHS), 16-18 September 2009, Ajaccio, Corsica, France, Paper ID 197

Makarov, D., Verbecke, F., Molkov, V., Roe, O., Skotenne, M., Kotchourko, A., Lelyakin, A., Yanez, J., Hansen, O.R, Middha, P., Ledin, S., Baraldi, D., Heitsch, M., Efimenko, A. & Gavrikov, A. (2009). An intercomparison exercise on CFD model capabilities to predict a hydrogen explosion in a simulated vehicle refuelling environment. International Journal of Hydrogen Energy, 34 (6): 2800-2814.

Middha, P., Engel, D. & Hansen, O.R. (2009). Can the addition of hydrogen to natural gas reduce the explosion risk? Third International Conference of Hydrogen Safety (ICHS), 16-18 September 2009, Ajaccio, Corsica, France, Paper ID 114

Middha, P. & Hansen, O.R. (2009). Using computational fluid dynamics as a tool for hydrogen safety studies. Journal of Loss Prevention in Process Industries, 22 (3): 295-302.

Middha, P. & Hansen, O.R. (2009). CFD simulation study to investigate the risk from hydrogen vehicles in tunnels. International Journal of Hydrogen Energy, 34 (14): 5875-5886.

Middha, P., Hansen, O.R. & Storvik, I.E. (2009). Validation of CFD-model for hydrogen dispersion. Journal of Loss Prevention in the Process Industries, 22: 1034-1038.

Venetsanos, A.G., Adams, P., Azkarate, I., Bengaouer, A., Brett, L., Carcassi, A., Engebø, E., Gavrikov, A.I., Hansen, O.R., Hawksworth, S., Jordan, T., Kessler, A., Kumar, S., Molkov, V., Nilsen, S., Reinecke, E., Stöcklin, M., Schmidtchen, U., Teodorczyk, A., Tigreat, D. & Versloot, N.H.A. (2009). On the use of hydrogen un confined spaces: results from the internal project InsHyde. Third International Conference of Hydrogen Safety (ICHS), 16-18 September 2009, Ajaccio, Corsica, France, Paper ID 217

Venetsanos, A.G., Papanikolaou, E., Delichatsios, M., Garcia, J., Hansen, O.R., Heitsch, M., Huser, A., Jahn, W., Jordan, T., Lacome, J-M., Ledin, H.S., Makarov, D., Middha, P., Studer, E., Tchouvelev, A.V., Teodorczyk, A., Verbecke, F., van der Voort, M.M. (2009). An inter-comparison exercise on the capabilities of CFD models to predict the short and long term distribution and mixing of hydrogen in a garage. International Journal of Hydrogen Energy, 34 (14), 5912-5923.

Papers 2008

Hansen, O.R., Middha, P. , 2008, CFD-based risk assessment for hydrogen applications, Process Safety Progress, 27(1), 29-34.

Hansen, O.R., Melheim, J.A., Storvik, I.E. (2008). Validating the data. *LNG Industry*, Spring 2008 Issue: 103-108.

Middha, P., Hansen, O.R., 2008, Predicting deflagration to detonation transition in hydrogen explosions, Process Safety Progress, 27(3), 192-204.

Middha, P. & Hansen, O.R. (2008). Blind prediction of dispersion and explosion experiments using CFD. Eleventh Annual Symposium, Mary Kay O'Connor Process Safety Center, 28-29 October 2008, Texas A&M University, College Station, Texas: 647-653.

Middha, P., Hansen, O.R., Using Computational Fluid Dynamics as a Tool for Hydrogen Safety Studies, Under Review in Journal of Loss Prevention in Process Industries (Special Issue: CFD).

Middha, P., Hansen, O.R., 2008, Hydrogen Safety Research at GexCon, Norwegian Hydrogen Seminar, Bergen, September 25-26, 2008.

Skjold, T., van Wingerden, K., Hansen, O.R. & Eckhoff, R.K. (2008). Modelling of vented dust explosions – empirical foundation and prospects for future validation of CFD codes. HAZARDS XX, 14-17 April 2008, Manchester, UK. IChemE Symposium Series 154: 838-850.

van Wingerden, C. J. M., Middha, P., Hansen, O. R., 2008, On the possibility of DDT in vapor cloud explosions. Presented at 42nd Annual Loss Prevention Symposium, New Orleans, USA, April 6-10, 2008.

van Wingerden, K., Skjold, T., Hansen, O.R. & Siwek, R. (2008). Simulation of dust explosions in spray dryers. Sichere Handhabung brennbarer Stäube, 11-13 March, Nürnberg, Germany

Hansen established the FLACS Newsletter in 2003 (2 issues a year) and has been its editor until 2007. (http://www.gexcon.com/index.php?src=flacs/newsletter.html)

Papers 2007

Hansen, O.R. and Middha, P., Validation of CFD model for hydrogen dispersion, World Conference on Safety of Oil and Gas Industry, Gyeongju, Korea, April 11-13, 2007.

Middha, P. and Hansen, O. R., Estimating the consequences of Deflagration to Detonation Transition (DDT) in hydrogen explosions. Paper presented at 41st Annual Loss Prevention Symposium, Houston, USA, April 22-26, 2007.

Hansen, O.R and Middha, P., CFD-based Risk Assessment for Hydrogen Applications, Paper presented at 41st Annual Loss Prevention Symposium, Houston, USA, April 22-26, 2007.

Hansen, O.R., Melheim, J.A. and Storvik, I.E.,CFD-Modeling of LNG Dispersion Experiments. Paper accepted for presentation at AIChE Spring Meeting, Natural Gas Utilization Topical Session, Houston, USA, April 22-26, 2007.

Middha, P, Hansen, O. R., Groethe, M., and Arntzen, B. J., Hydrogen Explosion Study in a Confined Tube: FLACS CFD Simulations and Experiments. Paper submitted at 21st International Colloquium of Dynamics of Explosions and Reactive Systems, Poitiers, France, July 23-27, 2007.

Middha, P, Hansen, O. R., Schneider, H., 2007, Deflagration to Detonation Transition (DDT) in Jet Ignited Hydrogen-Air Mixtures: Large Scale Experiments and FLACS CFD Predictions, Proceedings of the 12th International Loss Prevention Symposium, Edinburgh, UK, May 22-24, 2007.

Middha, P, Hansen, O. R., Groethe, M., Arntzen, B. J., 2007, Hydrogen Explosion Study in a Confined Tube: FLACS CFD Simulations and Experiments, Presented at 21st International Colloquium of Dynamics of Explosions and Reactive Systems, Poitiers, France, July 23-27, 2007.

Middha, P., Hansen, O. R., Grune, J., Kotchourko, A., 2007, Validation of CFD calculations against ignited impinging jet experiments, Presented at 2nd International Conference of Hydrogen Safety, San Sebastian, Spain, September 11-13, 2007.

Hansen, O.R., Middha, P., 2007, CFD simulation study to investigate the risk from hydrogen vehicles in tunnels, Presented at 2nd international conference on hydrogen safety, San Sebastian, Spain, September 11-13, 2007, Under Review in International Journal of Hydrogen Energy.

Venetsanos, A. G., Papanikolaou, E., Delichatsios, M., Garcia, J., Hansen, O. R., Heitsch, M., Huser, A., Jahn, W., Jordan, T., Lacome, J-M., Ledin, S., Makarov, D., Middha, P., Studer, E., Tchouvelev, A. V., Teodorczyk, A., Verbecke, F., van der Voort, M. M., 2007, An inter-comparison exercise on the capabilities of CFD models to predict the short and long term distribution and mixing of hydrogen in a garage, Presented at 2nd international conference on hydrogen safety, San Sebastian, Spain, September 11-13, 2007, Under Review in International Journal of Hydrogen Energy.

Jordan, T., Xiao, J., Middha, P., Travis, J., Garcia, J., Hansen, O. R., Molkov, V., Verbecke, F., Venetsanos, A. G., Results of the HySafe CFD validation Benchmark SBEP-V5, Presented at 2nd international conference on hydrogen safety, San Sebastian, Spain, September 11-13, 2007.

Middha, P., Hansen, O.R., 2007, Hydrogen risk studies using FLACS, Presented at 1st Process Safety Technical Exchange Meeting, Al Khobar, Saudi Arabia, November 6-7, 2007.

J.E. Flaherty*, K.J. Allwine, M.J. Brown, W.J. Coirier, S.C. Ericson, O.R. Hansen, A.H. Huber, S. Kim, M.J. Leach, J.D. Mirocha, R.K. Newsom, G. Patnaik, and I. Senocak, EVALUATION STUDY OF BUILDING-RESOLVED URBAN DISPERSION MODELS, Seventh Symposium on the Urban Environment, 10-13 September 2007, San Diego, CA

Papers 2006

Skjold, T., Larsen, Ø. and Hansen, O.R., Possibilities, Limitations, and the way ahead for dust explosion modeling, paper 67 presented at the XIX Hazards conference, Manchester, March 28-30, 2006.

Hanna, S.R., M.J. Brown, F.E. Camelli, S.T. Chan, W.J. Coirier, O.R. Hansen, A.H. Huber, S. Kim, and R.M. Reynolds, 2006: Detailed simulations of atmospheric flow and dispersion in downtown Manhattan. Bulletin Am. Meteorol. Soc., 87:12, 1713-1726.

Skjold, T., Arntzen, B.J., Hansen, O.J., Storvik, I.E. & Eckhoff, R.K. (2006b). Simulation of dust explosions in complex geometries with experimental input from standardized tests. J. Loss Prev. Proc. Ind., 19, 210-217.

Middha, P, Hansen, O. R., and Storvik, I. E., 2006. Prediction of deflagration to detonation transition in hydrogen explosions. Proceedings of the AIChE Spring National Meeting and 40th Annual Loss Prevention Symposium, Orlando, FL, April 23-27, 2006.

Hansen has also been editing and writing significant parts of the Chapter on Mitigation of the Biannual report on Hydrogen Safety (a HySafe Network of Excellence Effort), http://www.hysafe.org/BRHS

Papers 2005

Hansen, O.R., Storvik, I.E. and Renoult, J., 2005, Hydrogen R&D at GexCon, Experiments and Simulations, Fire Bridge Second International Conference, Belfast, Northern Ireland, UK, May 2005.

Hansen, O.R., Renoult, J., Sherman, M.P. and Tieszen, S.R., 2005, VALIDATION OF FLACS-HYDROGEN CFD CONSEQUENCE PREDICTION MODEL AGAINST LARGE SCALE H2 EXPLOSION EXPERIMENTS IN THE FLAME FACILITY, proceedings International conference on Hydrogen Safety, Pisa, September 2005.

Dharmavaram, S., Hanna, S.R. and Hansen O.R., 2005, Consequence analysis – Using a CFD-model for industrial sites, Process Safety Progress (Vol. 24, No.4), J.Wiley & Sons, Hoboken, NJ, December 2005

Skjold, T., Arntzen, B.J., Hansen, O.R., Taraldset, O.J, Storvik, I.E. and Eckhoff, R.K. (2005), Simulating Dust Explosions with the First Version of DESC, Trans IchemE, Part B, Process Safety and Environmental Protection, 83(B2): 151-160.

Skjold, T., Y.K. Pu, Arntzen, B.J., Hansen, O.J., Storvik, I.E., Taraldset, O.J. & Eckhoff, R.K. (2005). Simulating the influence of obstacles on accelerating dust and gas flames. Poster 20th Int. Coll. on Dynamics of Explosive and Reactive Systems (ICDERS), July 31 - August 5, Montreal, Canada.

Skjold, T. & Hansen, O.R. (2005). The development of DESC – A dust explosion simulation code. In International European Safety Management Group (ESMG) Symposium, October 11-13 2005, Nürnberg, Germany, 24 pp.

Hansen, O.R., Skjold, T. & Storvik, I.E. (2005). FLACS & DESC – the use of CFD-tools for evaluating explosion risks. In 2as Jordanas Internacionales de Seguridad Industrial: ATEX, Barcelona, 16-17 November 2005, 7-19.

Hansen is also co-author on two papers presented on HySafe CFD code benchmarks at Pisa conference 2005 on hydrogen safety.

Papers 2004

Hansen, O.R., Skjold, T. and Arntzen B.J. 2004. DESC-A CFD-tool for dust explosions, ESMG Symposium Nuremberg 16-18 March 2004, ISBN 3-9807567-3-4

Hansen, O.R. and Wilkins, B. 2004. An experimental study on oil mist explosions, ESMG Symposium Nuremberg 16-18 March 2004, ISBN 3-9807567-3-4

Snoeys, J., Going, J., Hansen, O.R. and Wilkins, B.A., 2004, Modeling of dust explosions in industrial processes, use of explosion simulations (FLACS, DESC) for explosion isolation design, 38th annual Loss Prevention Symposium, April 25-29, 2004, New Orleans, USA

R. Siwek, K. van Wingerden, O. R. Hansen, G. Sutter, Chr. Kubainsky, Chr. Schwartzbach, G. Giger, R. Meili 2004, Dust explosion venting and suppression of conventional spray dryers, Loss prevention symposium, Prague, June 1-3, 2004

Seshu Dharmavaram, Steven R. Hanna, and Olav R. Hansen, 2004, Atmospheric Dispersion Modeling – Development of a CFD Model for Industrial Sites and its Evaluation with Field Data, Loss prevention symposium, Prague, June 1-3, 2004

Hanna, S.R., Hansen, O. and Dharmavaram, S., 2004 : Evaluation of FLACS CFD model with MUST data. AMS meeting, Vancouver August 25-27, 2004

Hanna, S.R., Hansen, O. and Dharmavaram, S., 2004 : FLACS CFD air quality model performance with Kit Fox, MUST, Prairie Grass, and EMU observations. J Atmos. Environ., 38 (2004) 4675–4687

T. Skjold, B.J. Arntzen, O.R. Hansen, I.E. Storvik and R.K. Eckhoff, 2004, Simulation of dust explosions in complex geometries with experimental input from standardized tests, Fifth ISHPMIE, Krakow, October 2004.

Hansen, O.R., Dharmavaram, S. and Hanna, S., CFD Validation Study within atmospheric dispersion, paper presented at Major Hazards Onshore and Offshore, London 8-9 December, 2004

Prior Experience

R&D Director and Manager GexCon Software Department, Bergen; Norway (2001-2008)
Software developer and assistant Department Manager Gas Explosion Department, Christian Michelsen Research, Bergen, Norway (1993-2000)
Research assistant Norwegian Defence Research Establishment (FFI), Kjeller, Norway (1992-1993) during military duty

Peer Reviewer

Reviewer for Journal of Hazardous Materials, International Journal of Hydrogen Economy, Journal of Loss Prevention in the Process Industry, Process Safety Progress, Process Safety and Environmental Protection, Geophysical Research Letters and Journal of Atmospheric Environment.