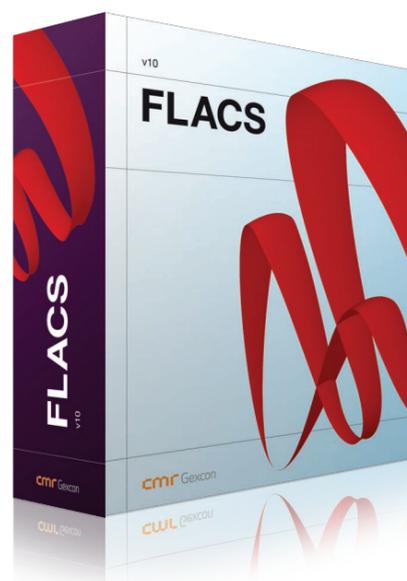


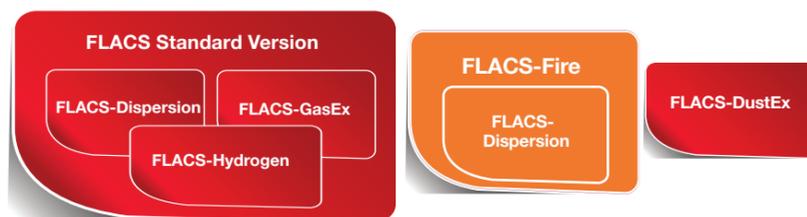
Licensing options and technical requirements



FLACS generally runs on all computers with AMD or Intel (x86, x64 or AMD64) processors. License available as:

- ▶ Stand-alone or network licenses
- ▶ Perpetual, annual or short term lease

In order to meet our customer's needs, we offer a standard FLACS package as well as individual modules



- ▶ FLACS standard version - for ventilation and dispersion, gas explosions and hydrogen safety
- ▶ FLACS-GasEx - gas explosions only
- ▶ FLACS-Dispersion - ventilation and dispersion only
- ▶ FLACS-Hydrogen - hydrogen safety only
- ▶ FLACS-DustEx - dust explosions
- ▶ FLACS-Fire - jet and pool fire modelling



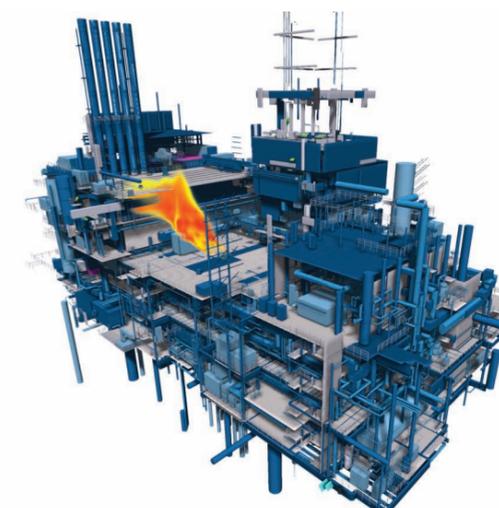
FLACS-Fire

The FLACS-Fire module adds jet- and pool-fire modelling capability to the industry standard 3D CFD explosion and dispersion modelling software FLACS.

FLACS-Fire build on the solid foundation of the existing explosion and dispersion CFD model and adds a new fire specific combustion model and advanced Discrete Transfer Method (DTM) to model thermal radiation. Over the last few years it has been extensively validated against experimental data and based on this work we have established clear and robust user guidelines to get accurate results in a very efficient workflow.

Key benefits of FLACS-Fire

- ▶ Full 3D CFD and radiation ray-tracing model
- ▶ Suitable for both high and low momentum flow jet-fires and pool fires
- ▶ Extensively validated with focus on high momentum jet fires
- ▶ Same efficient GUI, result visualisation tool and CAD import as in standard FLACS
- ▶ Very modest learning curve
- ▶ Existing dispersion scenarios can be quickly converted to jet-fires scenarios
- ▶ Existing FLACS geometry models can be used
- ▶ Support for both Windows and Linux
- ▶ Three levels of accuracy/detail available
 - ▶ CFD + DTM (most accurate)
 - ▶ CFD + 6 flux
 - ▶ Solid flame model + DTM (for screening)



FLACS simulation showing natural gas jet fire on a process deck

To learn more about FLACS visit our website at: www.flacs.com or contact: flacs@gexcon.com

GEXCON

FLACS is a GexCon brand

GexCon is owned by the research institute CMR, with the University of Bergen as majority owner. Our Head Office is based in Norway and we have subsidiaries in a number of locations around the world.

We also work together with partners in China, Korea, Japan, Russia, India, Malaysia, Singapore and Indonesia.

GexCon AS (Head Office)
Fantoftvegen 38
NO-5072 Bergen,
Norway
Tel: +47 55 57 43 30

GexCon Australia
8/64 Fitzgerald st,
Northbridge, WA 6003
Australia
Tel: +61 8 92 27 80 01

GexCon US
4833 Rugby Ave,
Suite 100, Bethesda,
MD 20814,
USA
Tel: +1(301) 915-9940

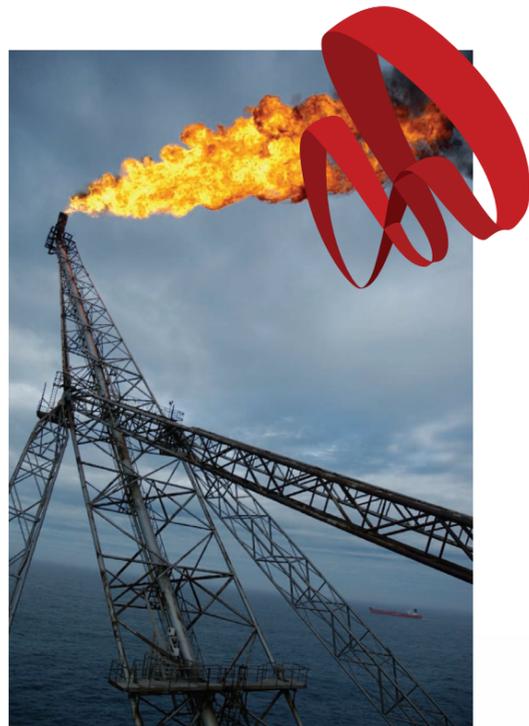
GexCon Italy
Via Visconti 4
20093 Cologno Monzese
(Milano) Italy
Tel: +39 02 4975 6649

GexCon UK (Omskirk)
Suite 11&12 Hattersley House,
Hattersley Court,
Burscough Road, Ormskirk,
Lancashire, L39 2AY, UK
Tel: +44 (0)1695 726 565

GexCon Middle East
Office 208 1-Lake Plaza
Jumeirah Lake Towers
Dubai, UAE
Tel: +971 4 276 6867

GexCon UK (London)
Suite 218,
BE Business Centre Wembley
1 Olympic Way
Wembley HA9 0NP, UK
Tel: +44 208 434 0514

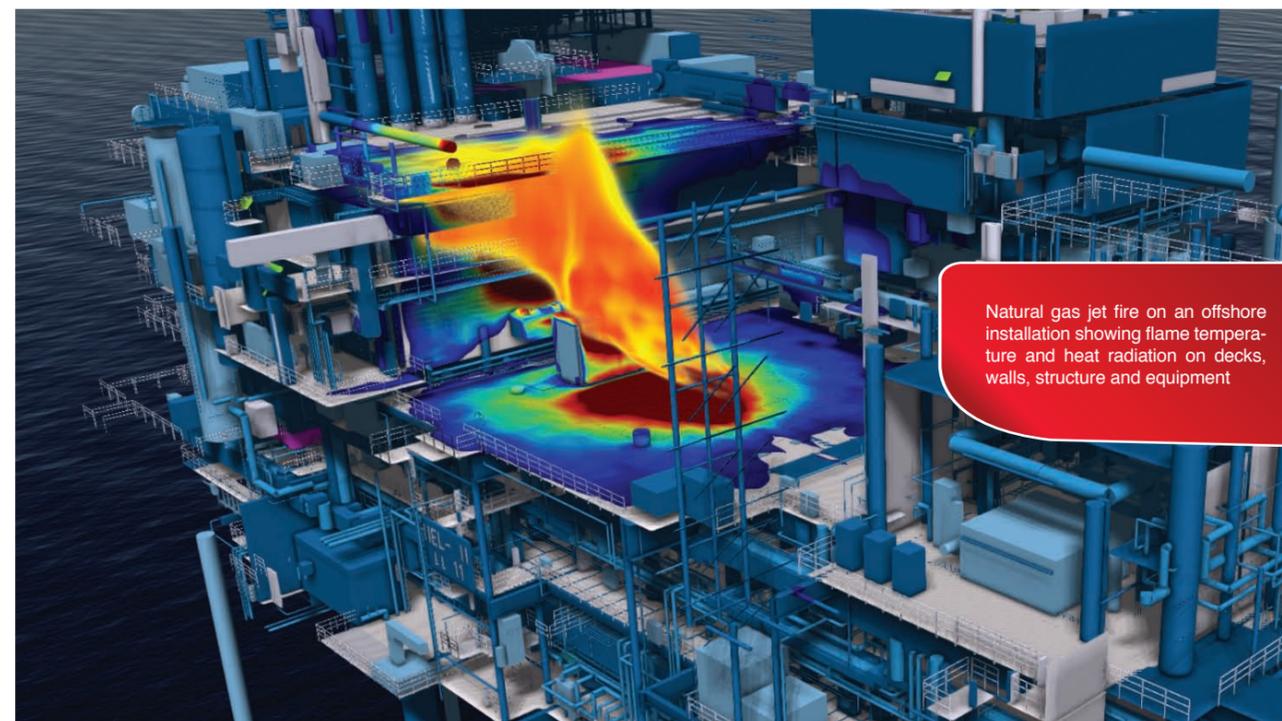
GexCon China
Tel: +86 1391 6639 854



FLACS-Fire

FLACS-Fire Capabilities:

- ▶ Jet fires
- ▶ Pool fires (non-coupled model)
- ▶ Full 3D CFD and 3D radiation ray-tracing model
- ▶ Two radiation models available:
 - ▶ DTM (default and most accurate)
 - ▶ 6-Flux (fast, effective for smoke analysis)
- ▶ Accurate and efficient transient modelling of combustion and heat radiation in complex geometries
- ▶ Includes "solid flame" model for quick screening simulations
- ▶ **Validation cases:** jet fires (confined, unconfined, NG, hydrogen, LNG etc), flash fires, pool fires, compartment fires.....
- ▶ **Validated output parameters:** Gas temperature, flame shape, velocities, radiative and total heat flux, toxic-, soot- and smoke concentrations



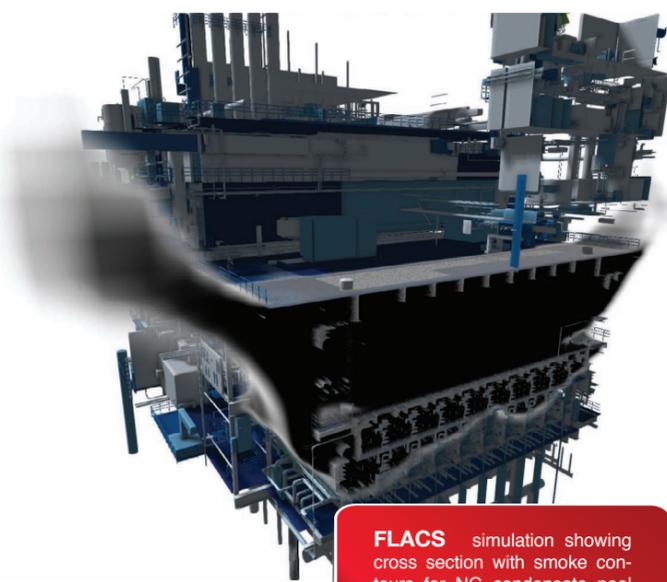
Natural gas jet fire on an offshore installation showing flame temperature and heat radiation on decks, walls, structure and equipment

Wide range of application areas for on and offshore industries

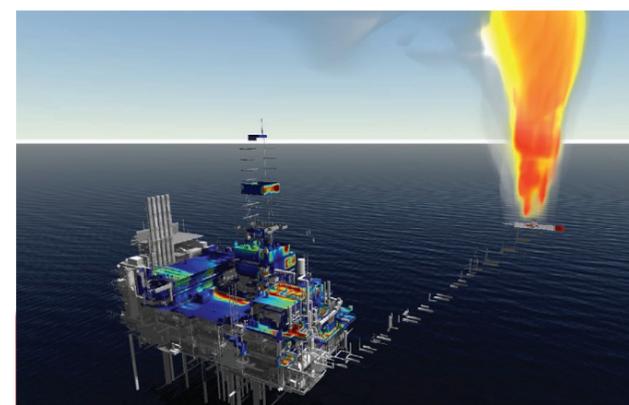
FLACS-Fire is suitable for many applications in various industries. It is especially suitable in situations where more accurate and detailed modelling can improve safety, help with selecting most effective mitigation measures and provide input to cost-effective design.

- ▶ Passive Fire Protection (PFP) optimization*
- ▶ Flare studies
- ▶ Escape route impairment (heat, smoke, toxic, visibility)
- ▶ Vessel heat up modelling*
- ▶ Risk based fire modelling*
- ▶ Fire and smoke detection*
- ▶ Accident investigation
- ▶ Visualisation, hazard awareness, training

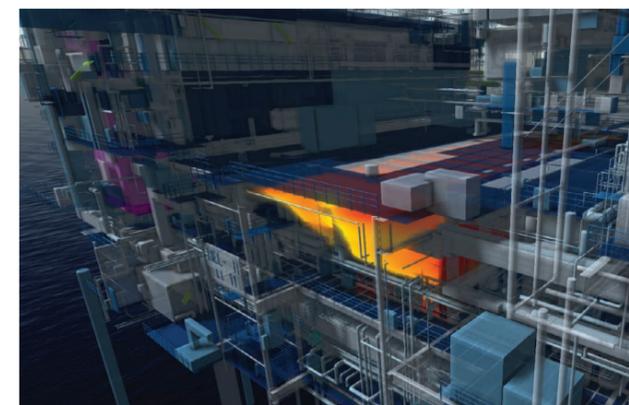
* requires post-processing



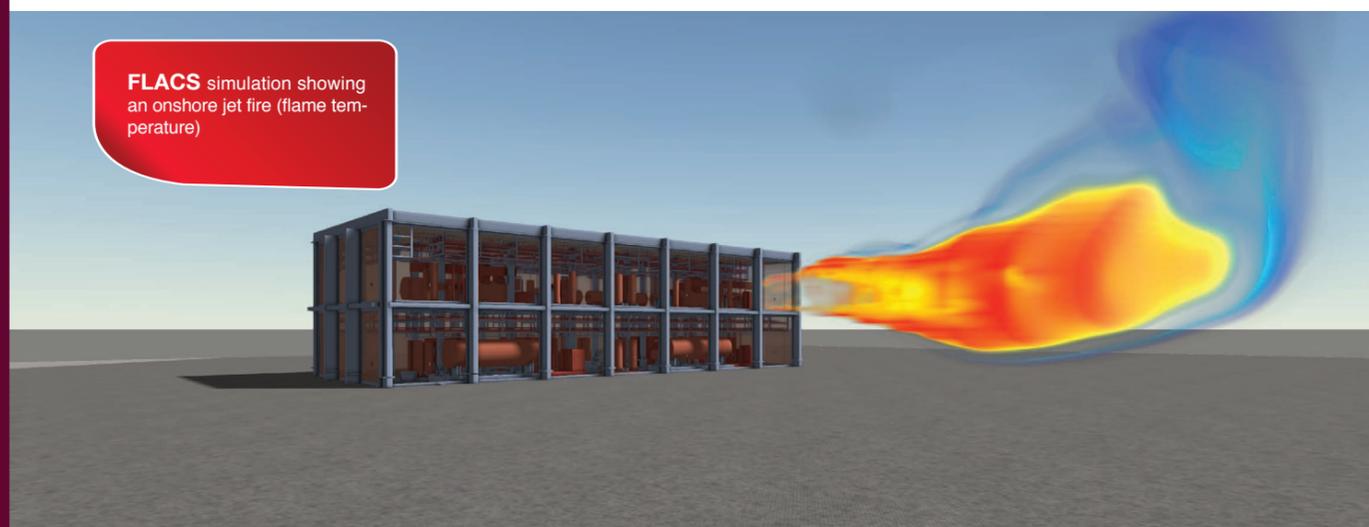
FLACS simulation showing cross section with smoke contours for NG condensate pool fire (smoke concentration)



Flare study showing flare flame shape and heat radiation on decks, walls, structure and equipment



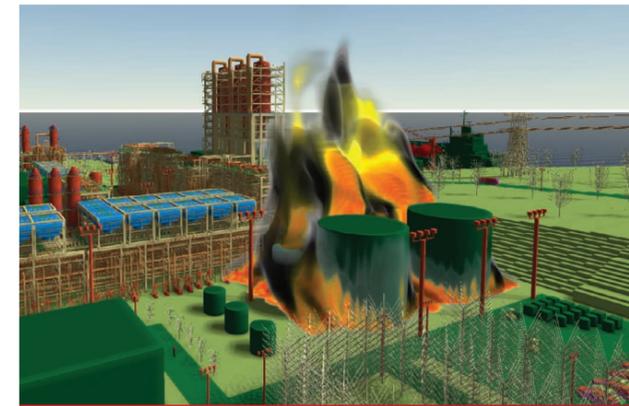
Natural gas condensate pool fire in confined and congested process deck area showing flame temperature



FLACS simulation showing an onshore jet fire (flame temperature)



Crude oil pool fire on sea under an offshore installation showing flame temperature and smoke development and dispersion



Crude oil pool fire around storage tanks in a refinery showing flame temperature and smoke development and dispersion