FLACS-DustEx
The industry standard for dust explosion modelling

FLACS-DustEx is a Computational Fluid Dynamics (CFD) tool that can determine the consequences of industrial dust explosions in realistic geometries. It has been developed using the expertise gained in over 30 years of research at Gexcon's own facilities. FLACS-DustEx is a valuable tool for engineers designing facilities, especially when optimising mitigating measures such as venting devices, suppression systems or explosion barriers.

Key benefits of FLACS-DustEx
- Full three-dimensional CFD model allows realistic representation of industrial process plants
- Suitable for most types of explosive dusts used in industry
- Validated against small, medium and large scale experiments
- Models:
  - Flame propagation and pressure build-up
  - Pressure-piling in interconnected vessel systems
  - Can include effect of various mitigation measures
  - External blast waves
  - Dust lifting by flow or shock waves and secondary explosions
  - Dispersion of dust in system
- Can be used in many applications including:
  - Accident investigation
  - Vent design and optimisation
  - Support for both Windows and Linux

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 is a Gexcon brand
Gexcon is a global knowledge and technology leader in dispersion, fire and explosion safety and risk management. Our experience arises from detailed knowledge of explosion phenomena built up through years of extensive research projects, carrying out safety assessments, performing accident investigations and experimental, physical testing at our dedicated facilities. We develop, maintain and use FLACS®, a single tool for modelling dispersion, fire and explosions.

For FLACS software enquiries, please contact us on FLACS@gexcon.com

www.gexcon.com - www.flacs.com
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Gexcon
FLACS-DustEx detailed capabilities:
- Calculation of flame propagation and explosion overpressure
- Effect of explosion mitigating measures
- Venting devices - location, area, opening pressure
- Fast acting valves - location, activation and closing time
- Suppression systems - location, activation and timing
- Extensive options for output of results, including 2D and 3D-plots
- Transient pneumatic dispersion of dust from pressurized reservoirs
- Dispersion of dust layers by turbulent flow or blast waves
- Strong ignition sources (e.g. chemical igniters)
- Supports most types of explosive organic dust used in industry (Kst > 100 bar/m^2)
- CAD import for external geometries from DGN (Microstation) and DWG (Autocad) formats
- Allows modelling effect of variable dust concentrations (g/m^3)

Benefits compared to dust explosion safety standards:
With FLACS-DustEx it is possible to calculate consequences and effectiveness of mitigating measures much more accurately, thereby allowing for a more cost effective and potentially safer design.

There are various international standards intended to predict dust explosion consequences, for example NFPA 68 2013, EN 14491 2012, VDI 3873. The standards are based on empirical formulas and as such have a limited range of applicability. Furthermore, due to the nature of dust explosions and the high sensitivity of results to exact dust combustion properties, these standards and formulas are typically very conservative and often result in overdesign of venting solutions and other mitigating measures. These empirical methods also do not allow details of the design to be assessed, as they do not include a detailed representation of the geometry.

Selection of relevant publications:
Davies, S (2014), Dust explosions: Case studies of dryer explosions and a need for advanced vent design, ISPHMIE 2014

FLACS-DustEx limitations:
- Not suitable for
  - Metal dusts
  - Dusts with Kst < 80 -100 bar/m^2 (e.g. low combustibility)
- For most accurate results 30L sphere dust test data should be used as input (please contact us for more detailed test data requirements)

Dust explosion consequences are relatively sensitive to the combination of dust combustion properties, such as particle size, water content and composition. FLACS-DustEx comes with data for pre-calculated example dust types. However, while these included dust types can be used for initial screening, to get the most accurate results and thereby the most out of FLACS-DustEx, it is recommended to use data from the standardised 20L sphere tests for the specific dust of interest. These types of test can be done by any lab capable of doing dust explosion/combustion testing. Gexcon Laboratories have many decades of experience with this type of testing and can also provide this commercial service and generate ready to use input data for FLACS-DustEx.