Power Plant Simulator & Designer
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ABOUT K E D

History:

- KED was established in 1975. Its main activities were calculations for nuclear power stations, the automotive and chemical industries, together with the development of computer programs.

- KED is the market leader in Germany with the programs STEAM BOILER, HEAT EXCHANGER and SHEET CAD and has the absolute best specialists in the field of fluid and structural dynamics and FE calculations.

- Since 1991 there has been a close cooperation with Russia in software development, particularly for steam boiler construction and sheet programs.

Management

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- 12 engineers and experts employed with different qualifications
Widely used by more than 100 Boiler-manufacturers & Operators:

- RWE Energie AG, Essen, Germany
- Nooter Eriksen, St.Louis, USA
- Florida Power & Light, West Palm Beach, Florida, USA
- Siemens AG, Erlangen, Germany
- Babcock & Wilcox Volund, Esbjerg, Denmark
- Alstom Power AG, Baden, Switzerland
- Babcock Kraftwerkeotechnik GmbH, Oberhausen, Germany
- Siemens Westinghouse, Orlando, USA
- NEM, Leiden, Netherlands
- CMI Erie, USA
- Austrian Energy and Environment, Austria
- E-On, Munich Germany
- Keppel-Seghers Belgium NV, Willebroek, Belgium
- Balcke-Dürr, Vienna, Austria
- Thermax, Pune, India
- Bertsch-Energy, Bludenz, Austria
- Techno SK, Seoul, Korea
- Standardkessel-Baumgarte, Duisburg, Germany
- Cockerill Mechanical Industries, Willebroek, Belgium
- TÜV Süd Deutschland: Filderstadt, Dresden, Munich, Mannheim
- TÜV Nord Hannover
- Vyncke Energietechniek, Harelbeke, Belgium
- Wuxi Huaguang Boiler Co, Wuxi, China
- ........ and many other users of HRSG, Biomass, Coal, Oil-Gas, CFB, AFB boilerplants
Major features of Power Plant Simulator & Designer
Main Features of Power Plant Simulator & Designer

- Nearly all kind of boilers, incl. HRSG, biomass steam & hot water boiler, Fluidized Bed Boiler
- Fully modular design structure and interconnections
- Selection between approx. 60 different elements (heat exchanger surface, spray cooler, control elements etc.)
- Almost any combinations of the heaters, coolers, combustion chambers are possible
- Complete water-steam circuit, incl. turbine, condenser, feed water preheater (high pressure and low pressure), feed pump, dearator etc.
- Combustion and post-combustion calculation (staged combustion), supplementary combustion (duct-burners)
- Complete thermal calculation, pressure drop, natural-, sub- and supercritical forced circulation calculation with all kinds of recirculation's
- Precise vaporization calculation in economizer
- Efficiency calculation (direct & indirect method, acc. EN-12952-15/DIN 1942 and ASME PTC)
- Easy switch to nearly all units (SI, US, Imperial, mixed)
- Heat exchanger can be divided into zones to take different temperatures and mass flows into consideration
- Performance range from 100 kW to 1500MW
- Hot water and Thermal Oil boiler (shell tube, water tube and waste heat boiler)
Typical Features (flue gas scheme)
Typical Features (water-steam scheme)

- Selection of scheme
- Zooming
- Element with drag & drop in scheme
- Selection Element group
- Save File
Main Features of Power Plant Simulator & Designer (2)

- Nominal load calculation i.e. with pre-set steam flow: calculation of temperatures, pressures and fuel consumption.
- Easy multi-part load calculation (Multicalc),
- Tube bundle vibration calculation
- High pressure flue gas possible
- Heat exchange with real gases such as CH4, H2 etc.
- User-definable detailed input and output calculation data with Excel Files
- Extraction of specific data with Drag & Drop,
- User-definable graphical illustrations with diagrams
- Integration of own specific additional parallel calculations with script's
- Creation of own data-bank (e.g. fuel analysis...)
- Undo-and Redo button, Help topics (F1 button), Language selection
- Error alerts and warnings
- Working in the network
- Executable with MS Windows 95/98/NT/ME/XP/2000/Vista/Windows 7
Typical Example of detailed output data of WHB
Typical Example of output diagrams for a WTE-Boiler
Typical Example of Input/Output reports with excel file
Typical Options: Language, Schema, Dimension set-up, Document properties, Calculation options
Typical Example of scripts
Typical Example of MCR (Multi-Calculation-Reports)

Input Data MCR

Output Data MCR

Typical Example of MCR (Multi-Calculation-Reports)
- Typical applications (extract of multiple references)
Typical Boiler Applications: Compact WT oil/gas fired Boiler
Typical Boiler Applications: Small Biomass Boiler
Typical Boiler Applications: Combined Thermal Oil Energy Plant
Typical Boiler Applications: Secondary fuel fired Boiler (ESB)
Typical Boiler Applications: Bio-Waste fired Boiler with separate fired Superheater (a)
Typical Boiler Applications: Bio-Waste fired Boiler with separate fired Superheater (b)
Typical Boiler Applications: WHB behind industrial furnaces (a)
Typical Boiler Applications: WHB behind industrial furnaces (b)
Typical Boiler Applications: CFB-Boiler (a)
Typical Boiler Applications: CFB-Boiler (b)
Typical Boiler Applications: Flue gas condensation

CASE 5: With FG-Condensing + Quenching + Stack plume avoidance
Additional Special Modules

- **Water Circulation Calculation Module**
  - Natural circulation
  - Benson subcritical & supercritical

- **Dynamic Calculation Module**
  - Cold, warm start-up
  - Load changes
  - Tube metal temperatures during start-up
  - Drum metal temperature during start-up

- **Tube bundle vibration calculation**
Typical Example Biomass fired Boiler (nat. circulation scheme)
Typical Example HRSG (with 3 pressure levels)
Typical Example HRSG (with 3 pressure levels)

QT-Diagram

Dynamic calculation of metal temperatures during start-up