



CHEMCAD Process Simulation in Oil & Gas, Oil Refining and Petrochemical Business

Chemstations and Nor-Par

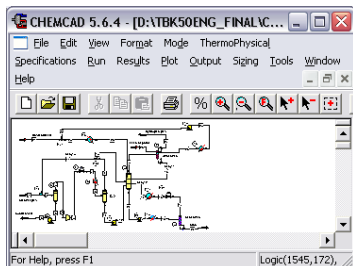
Chemstations Inc based in Houston TX, USA are the owners and makers of the CHEMCAD Suite of process simulation software.

Oslo-based Nor-Par a.s is exclusive distributor of CHEMCAD Suite in Scandinavia, East Europe and Russia. Nor-Par a.s and its daughter company Nor-Par Online A/S also provide own software and solutions to fill the gap between standard process simulation software and unique needs of the market as well as unique needs from a specific client.

Why CHEMCAD?

The CHEMCAD Suite of process simulation software, present in the market since 1984 is nowadays one of the **most modern and easy to use programs**, serving the entire oil & gas processing route.

From the mining cavern, through oil & gas separation and purification on an offshore platform or in the field, through transmission and distribution pipelines, through the entire oil refinery to the petrochemical plant.



Openness

CHEMCAD and the completely integrated modules CC-THERM, CC-DYNAMICS, CC-BATCH, CC-SAFETY-NET and CC-POLYMER form together powerful Windows program, open to the world of the manufacturing and engineering with its interfaces via the **only proven CAPE-OPEN, OLE, OPC, API (VB/C++)** and Excel as well as interfaces to mechanical heat exchanger software or life-cycle project management tools such as COMOS and AXSYS. **All these**

unique features come free together with the program.

Easy to use

CHEMCAD is one of the **easiest to use** process calculation programs found in the market. You are able to solve your first production problem in minutes: Draw a sketch (flowsheet), select components, let the program help you selecting the right thermodynamic methods, enter your feed streams, define the equipment, calculate, analyze the results and make reports and Process Flow Diagrams.

Value for money

Unlike other process simulation programs, CHEMCAD has a big number of valuable features included as a standard and **you do not need to pay any extra for it**. For example, there is **crude oil database, electrolytes, amine sweetening, glycol dehydration, hydrate prediction, pressure relief device calculation (DIERS), mass transfer in distillation, environmental analysis (WAR), solid handling, advanced pipeline simulation with heat transfer and two/three phase flow, piping network analysis, CAPE-OPEN, OPC** and all other interfaces as well as hundreds of other expensive features that you get included in the license.

Unlike some other process simulation packages **you can add your own unit operations, physical property data, equilibrium data, kinetics parameters and other own development at no extra cost.**

CHEMCAD is available in several licensing forms from unlimited network license to limited license where you only **pay for what you really use.**

Reputation

Extensive benchmarks have been run against process simulation packages from AspenTech, HYSYS and PRO/II. These benchmarks proved that CHEMCAD is **equal or**

better from other competitors, depending on the application.

For this reason CHEMCAD is used by several oil refineries, many oil & gas producers and big number of petrochemical plants, many of them using the software loyally for 15 or more years now.

Do you need CHEMCAD?

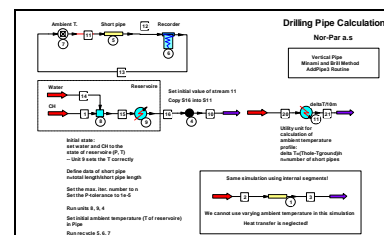
If you are a process engineer working directly at any production facility en route from oil & gas mining to petrochemicals or in R&D or in engineering/contracting company or in process equipment manufacturing company or at technical university, then you should take interest in CHEMCAD to benefit of your company or organization.

CHEMCAD at oil & gas mining, upstream processing and transmission

CHEMCAD has all features needed to calculate offshore or field technologies from the cavern to the pipeline.

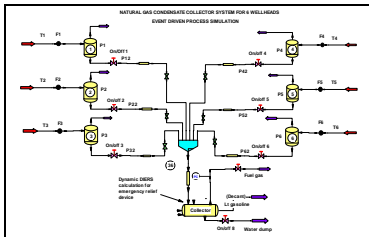
Examples:

- Full thermodynamics/physical calculation of mixture properties as well as **advanced pipe fluid flow and detailed heat transfer** allows calculating the mining process from the cavern to the well-head



Simulation of 3 kilometer tall drilling pipe

- Low-temperature separation
- Condensate systems



Dynamic simulation of a condensate system

- Prediction and inhibiting of **hydrate formation**
- Absorption of hydrocarbons in lean oil
- Desulphurization by **amine** absorption (amine model, electrolytes) or by **adsorption**, also by the latest technologies (e.g. chelates)
- Dehydration by **glycols**
- Transmission pipelines using **detailed heat transfer** model
- Transmission pipelines for **liquid CO2**
- Re-compression and reducing stations
- Safety aspects with DIERS technology for **pressure relief devices**
- Design, rating and simulation of performance of **heat exchangers** including **fired heaters**. (CC-THERM required).
- **Pumps** and **compressors** as well as **expanders** can be rigorously simulated based on performance curves or characteristic equation.

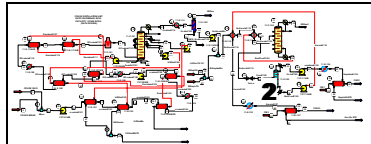
CHEMCAD at the oil refinery

CHEMCAD Suite has necessary tools for simulating technologies found in an oil refining plant.

Examples:

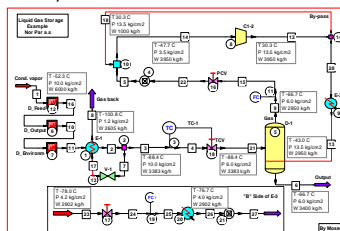
- **Crude Oil Database** (included as standard, so it is **free**) together with Distillation Curves allow creating pseudo-components needed in simulating the oil processing

- Specific **oil properties** found in CHEMCAD databank and calculation procedures make it easy to determine quality of by-products and final products and allow reliable calculation of **blending** of different brands of crude oil



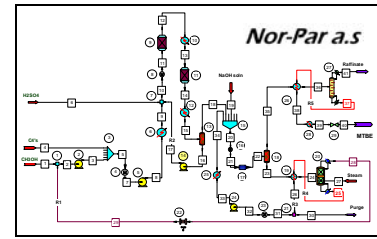
Full model of atmospheric distillation

- Specialized **distillation** models such as the Tower Plus or Tower allow quick and precise calculation of distilling processes. Combined with the Dynamic simulation, it is possible to troubleshoot production problems, improve the technology performance and optimize.
- **Sizing and hydraulic performance** of absorption/distillation **tray or packed columns** is possible. Libraries of industrial packing exist as standard in the program. These libraries are included **free** in the program.
- Acquisition and using data from **Control Systems** (DCS/PLC and SCADA) allows **Online Process Simulation**. Rigorous **Training Simulator** models are feasible. Simulation of **Advanced Process Control** can be realized.
- CC-DYNAMICS includes features for advanced simulation and trouble-shooting related to **tank farm** and **storage** and **pressure vessels**. Strong point of CHEMCAD is included DIERS model for pressure relief device performance calculation at true process conditions and including **fire situation** (API 520/521, API 2000, OSHA 1910 106, NFPA-30)



Dynamic simulation of refrigeration system for atmospheric ethylene storage

- Variety of **refinery reactor system** models can be built



Simulation of MTBE manufacturing at the oil refinery

- **Extraction** simulation
- **Hydrogen** generation
- Olefins by **thermal and catalytic cracking**
- **Sour water** model and electrolyte model for removal of aggressive gases from refiner's effluents
- **Pumps** and **compressors** as well as **expanders** can be rigorously simulated based on performance curves or characteristic equation.
- Design, re-design, selection, rating and simulation of performance of **shell & tube, plate, and double pipe** heat exchangers as well as **air coolers** and **square finned-tube** exchangers (CC-THERM required)
- **Sweetening** of oil by-products and removal of H₂S, SO₂, H₂S and CO₂ from refinery off-gas
- **Flaring network simulation**
- **Environmental** calculations according to the WAR technology of EPA.
- **Investment cost and manufacturing cost calculations are standard feature in CHEMCAD**

CHEMCAD for petrochemicals

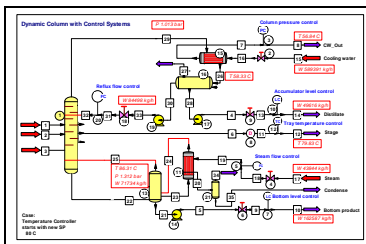
CHEMCAD has been from its origins the chemical engineering simulation program. It is ideally fit for all the needs found in the petrochemical plant, including the polymer manufacturing. **CHEMCAD has the strongest features in petrochemical and polymer industries**

Examples:

- The program is equipped with a large DIPPR databank for **physical properties** and components and extensive

facilities for mixture property calculations. The user can add own specialty components by prediction and regression facilities

- The program has over 40 **thermodynamic** methods for vapor/liquid/liquid/solid equilibria as well as the experimental data databank of DECHEMA. The user can regress own experimental data
- The program includes several **reactor models** including vessel and tubular reactors working on equilibrium or kinetic or minimizing the Gibbs potential principles. Any type of kinetic rate expression can be entered by the user. There is regression facility for experimental kinetic data including the **interface with the Mettler-Toledo RC1 calorimeter**.
- Dynamic simulation of **vessel reactors** (continuous, batch and semi-batch) is possible using CC-DYNAMICS. **Heterogenic and catalytic reactions** can be uniquely simulated
- The program allows simulation of any **absorption, desorption or distillation** process using the SCDS model. **Azeotropic, reactive, or extractive distillation** of any kind is supported. **Mass transfer** model for distillation is included.
- **Sizing and hydraulic performance** of absorption/distillation **tray or packed columns** is possible. Libraries of industrial packing exist as standard in the program. You do not need to pay more for these libraries.



Dynamic simulation of a distillation system including control system model

- **Batch or semi-batch** distillation is possible with CC-BATCH or CC-DYNAMICS modules
- **Extraction, crystallization and adsorption** can be simulated

- Any part of the **Control System** can be included in the dynamic model (CC-DYNAMICS) including true industrial controller models
- **Electrolytes** are standard feature for any type of systems that include ions. **You do not need to pay more for the Electrolyte capability, it is free.**
- **Dynamic simulation** (CC-DYNAMICS) allows making **safety studies**, especially for runaway reactions.
- The included DIERS model allows selecting and analyzing the **performance of pressure relief devices** during malfunction in the plant operation. Performance of the heat exchange system, especially during the malfunctions can be studied
- **Heat exchangers** can be designed, re-designed, selected from storage for replacement, rated. It is also possible to simulate true performance of a heat exchanger based on its geometry (CC-THERM)
- **Pumps and compressors** as well as **expanders** can be rigorously simulated based on performance curves or characteristic equation.
- **Solid handling** is supported.
- **Combustion** processes are easy to calculate
- **Environmental analysis** is possible with the included WAR technology from Environment Protection Agency of the USA (EPA)
- Program can acquire and use trusted measured data from plant's Control Systems, process visualization systems (SCADA/HMI) and Historian systems for increased accuracy and improved model parameter calibration. The **OPC or OLE** interfaces are **included** in the program
- Building **models of entire plants** including pressure envelope and based on true specifications and sizes of the operating equipment as well as including relevant control model is not only possible, but had been realized for large clients, making the ideal base for **Training Simulator, Production Improvement &**

Optimization System and Online Process Simulation

- **The CC-POLYMER module allows detailed modeling of polymerization reactor systems**
- **Investment cost and manufacturing cost calculations are standard feature in CHEMCAD**

More questions?

- Please first refer to brochures for CHEMCAD, CC-SAFETY NET (this program is included in CHEMCAD), CC-THERM, CC-DYNAMICS, CC-BATCH and CC-POLYMER.
- Ask your dedicated representative of Nor-Par for organizing a Web demo (a presentation over Internet) to answer more detailed questions.
- After the Web demo let us talk together what software and what licensing form suits your needs the best.

The exclusive distributor in Scandinavia, The Russian Federation and in East Europe

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