

Thermodynamic Software in Japanese Market

***Research Center of Computational
Mechanics, Inc.***

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Contents of presentation

1. Company outline
2. Japanese market of Thermodynamic Software
3. Application Examples of thermodynamic software in Japan

RCCM location

- A Tokyo Head Office Togoshi, 1-7-1, Shinagawa-ku, Tokyo
- B Osaka Branch Office (Technical R&D and support of Mechanical Finder, FEMS) 4-11-19, Minami-Semba, Chuo-ku, Osaka



RCCM company outline

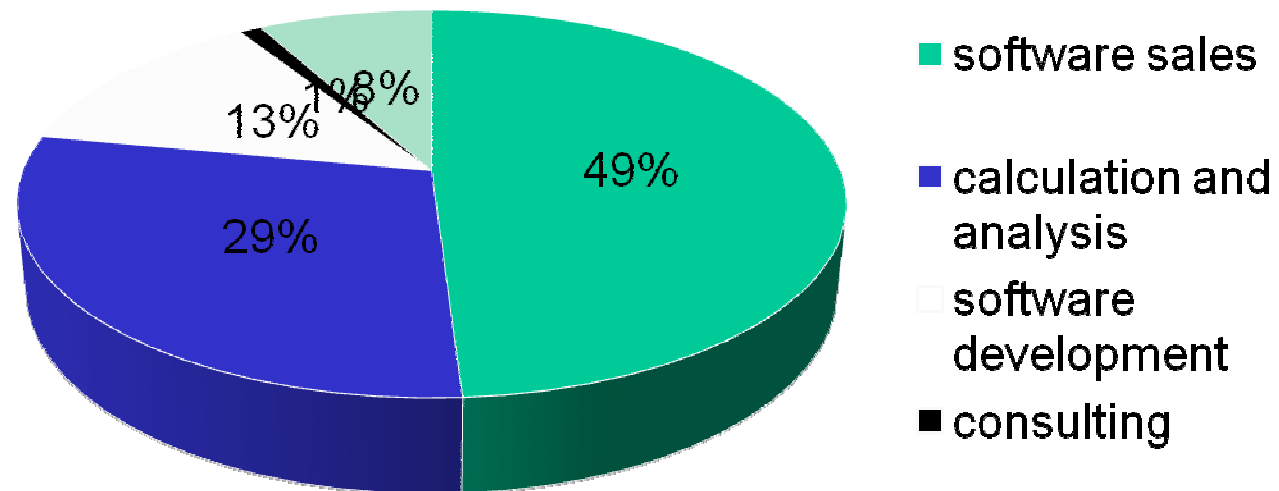
Established in 1982

Capital: ¥60,000,000.-(EUR500,000)

Annual turnover: ¥1,100,000,000.- (Feb/2009)
(EUR10mil.)

Number of employee: 72

Sales Category in 2009



Transition of RCCM business

1st Period(1982-1986): Development of structural analysis program

2nd Period(1987-1991): Overseas Techniques are introduced
(Computational Fluid Dynamics)

3rd Period(1992-1996): Development of RCCM own brand program

4thPeriod(1997-2001): Development of program for medical, disaster prevention, **FactSage introduced(2001)**

5th Period(2002-now): Further development of consulting business

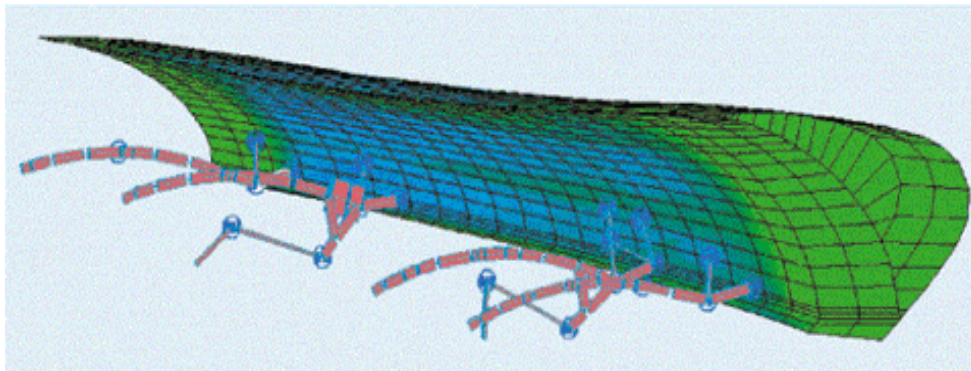
Main Customers

- Japan Atomic Energy Agency
- The High Pressure Gas Safety Institute of Japan
- Central Research Institute of Electric Power Industry
- Tokyo Electric Power Corporation
- Kajima Corporation
- Ube Industries
- Sumitomo Osaka Cement Co., Ltd.
- Sony Corporation
- Hitachi Ltd.
- Panasonic Corporation
- Nippon Steel Corporation
- Mitsubishi Heavy Industries Ltd.
- Nissan Motor Co., Ltd.
- Bridgestone Corporation
- Canon Inc

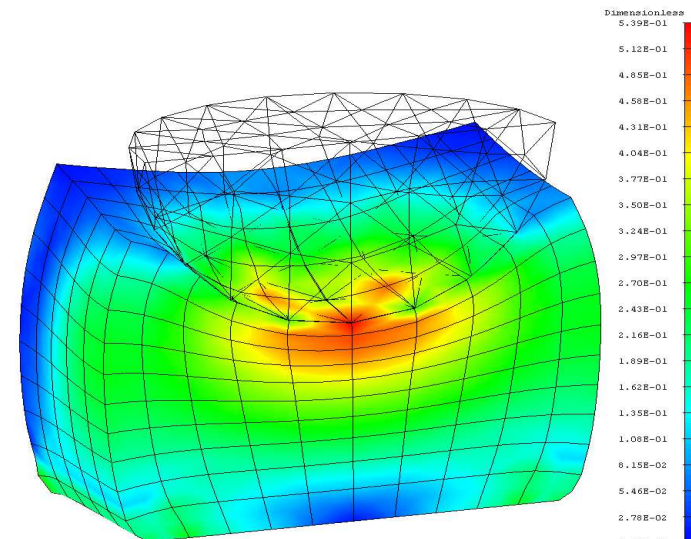
Products(1)

Structure, Mechanizm

SAMCEF
MECANO
NX Nastran
IR-FEM



Airplane Flap Analysis (MECANO)

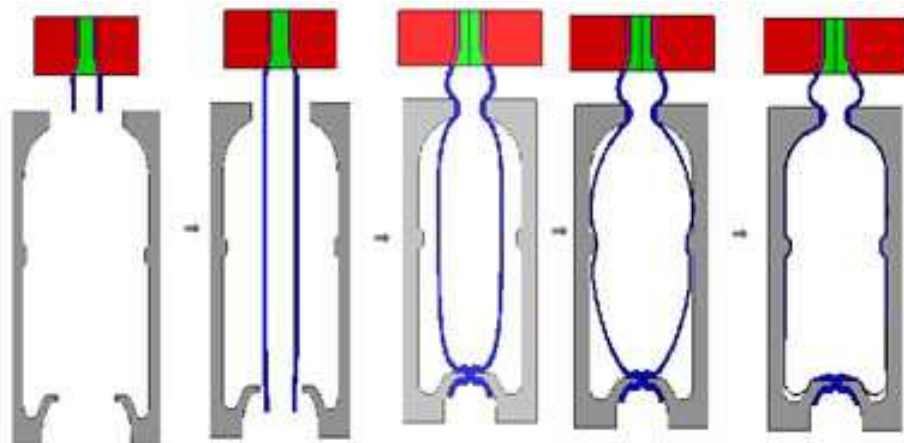


Compressible Analysis of
Rubber Material(NX Nastran)

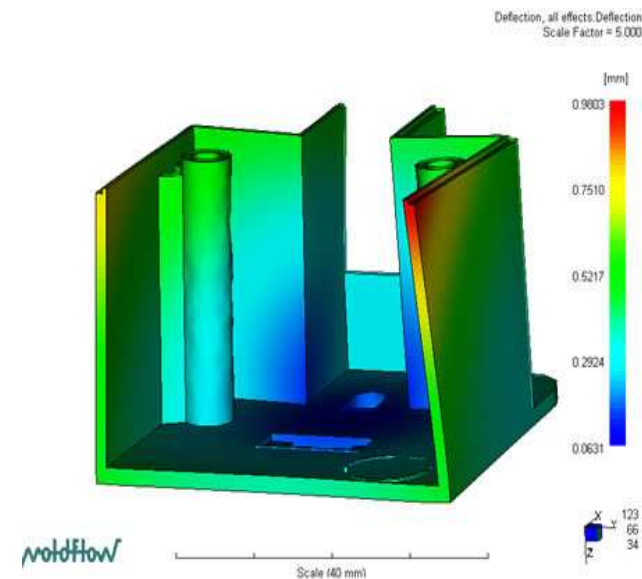
Products(2)

Computational Fluid Dynamics

AnsysFluent (calculation & analysis)
AnsysPolyflow(calculation & analysis)
Moldflow
VorCat



Polyflow Example (Blow Molding)



Moldflow Example
(Mold Warp)

Products(3)

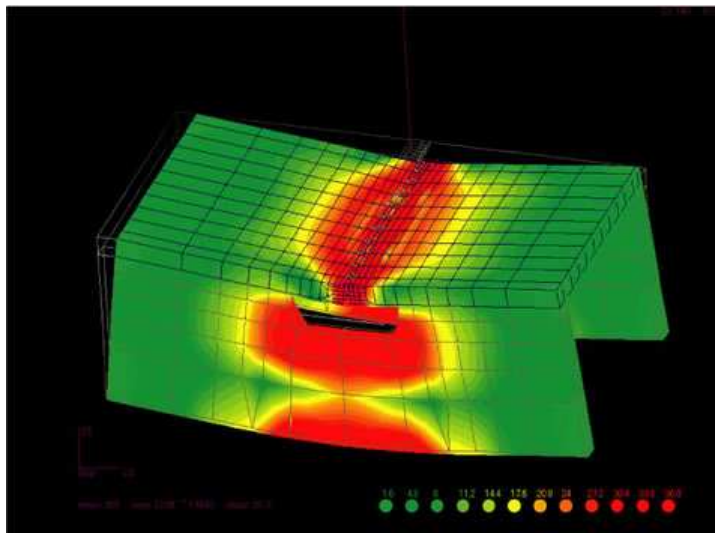
Thermal & Welding Analysis

Quick-Therm

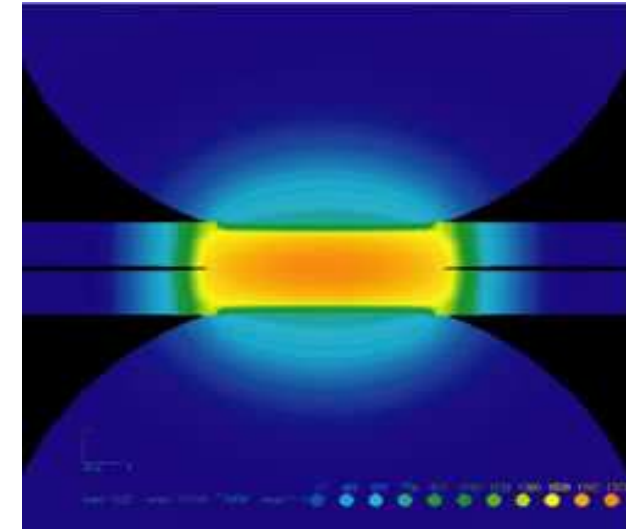
Quick-Welder

Quick Spot

(Red letters: RCCM own brand products)



Quick-Welder Example



Quick-Spot Example

Products(4)

Civil Engineering, Construction

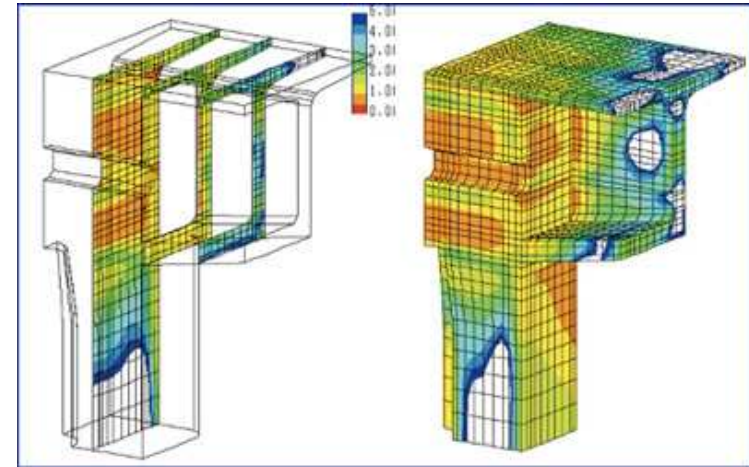
ASTEAMACS

ENGAI

ASTEAMLEAKAGE

RC-POST

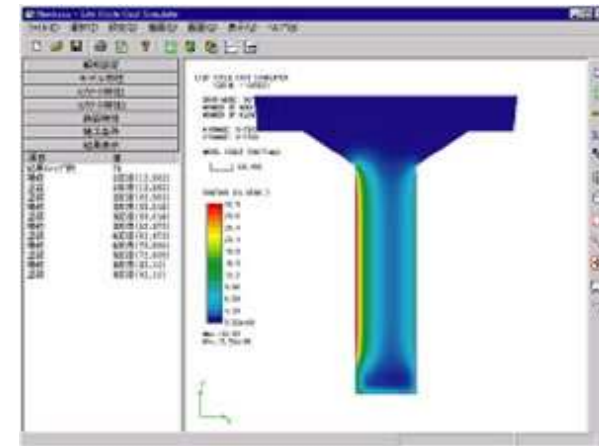
ATENA



ASTEAMACS Example

Underground Water, Environmental Contamination

ASTEAMSEAPAGE

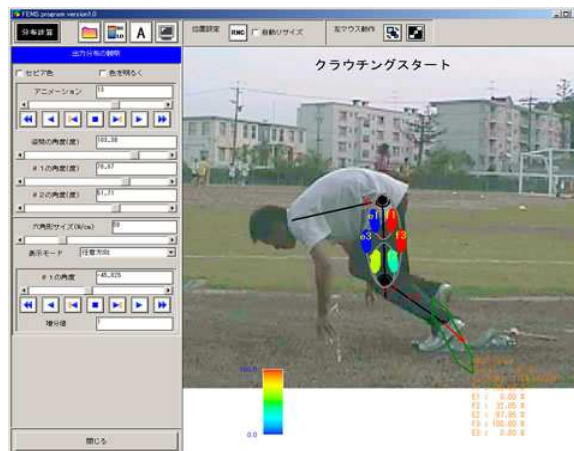


ENGAI Example

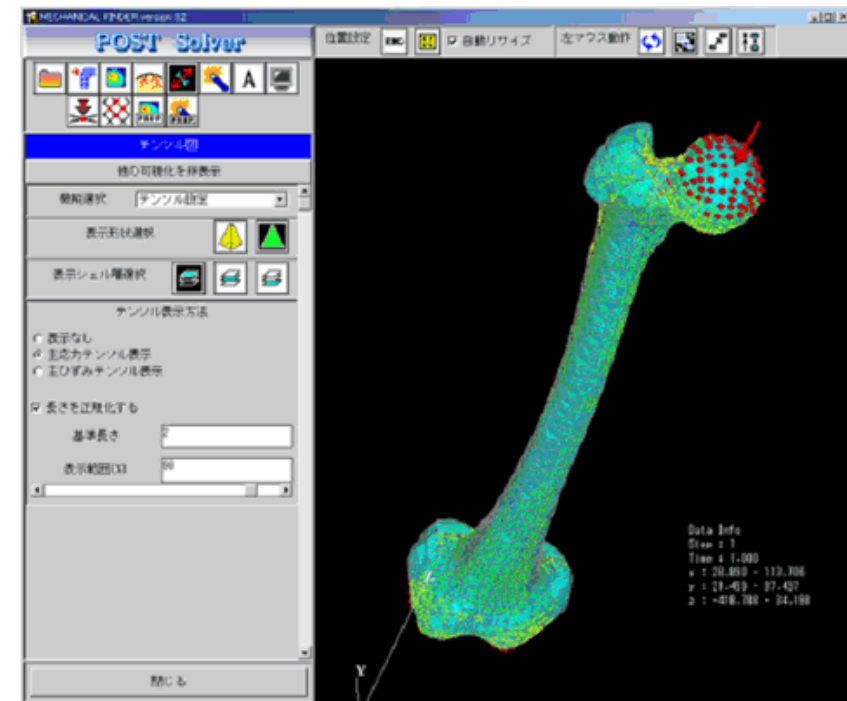
Products(5)

Medical

Mechanical Finder(Bone Strength)
FEMS(Functional Effective Muscle Strength)



FEMS Example

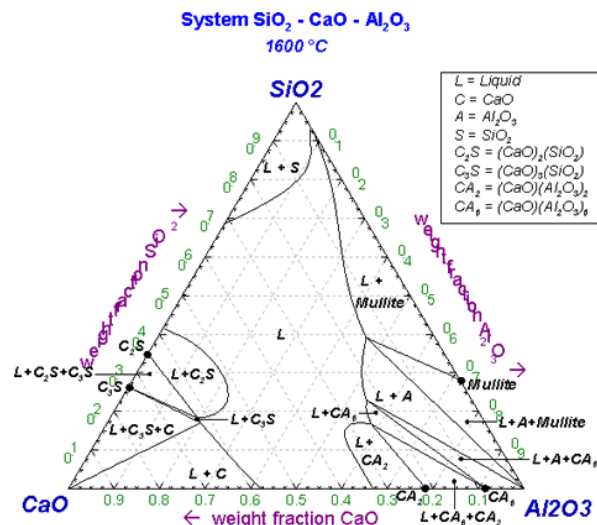


Mechanical Finder Example

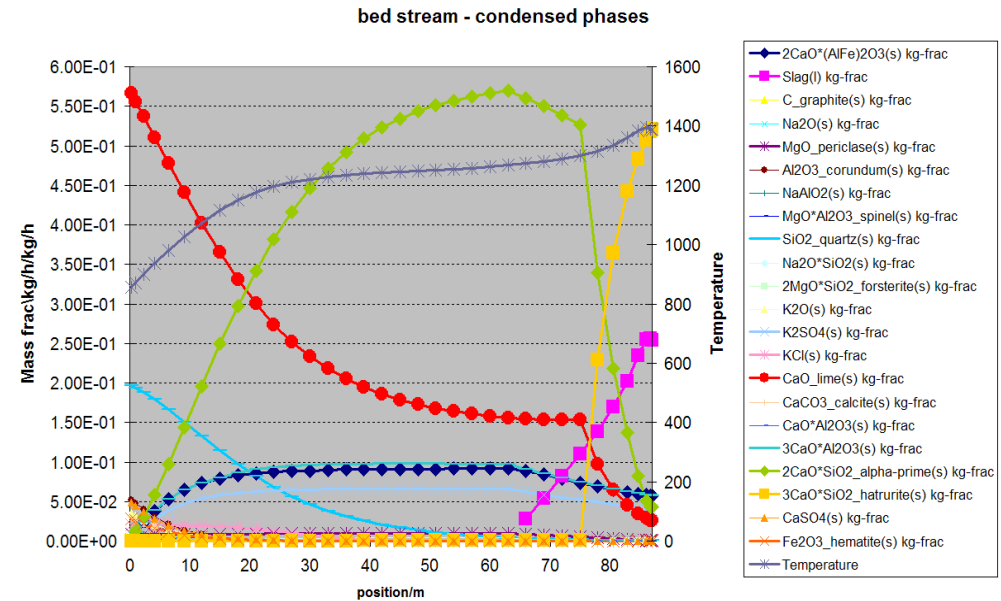
Products(6)

Thermodynamics

FactSage
ChemApp
ChemSheet
KilnSimu



FactSage Example
(SiO_2 - CaO - Al_2O_3)

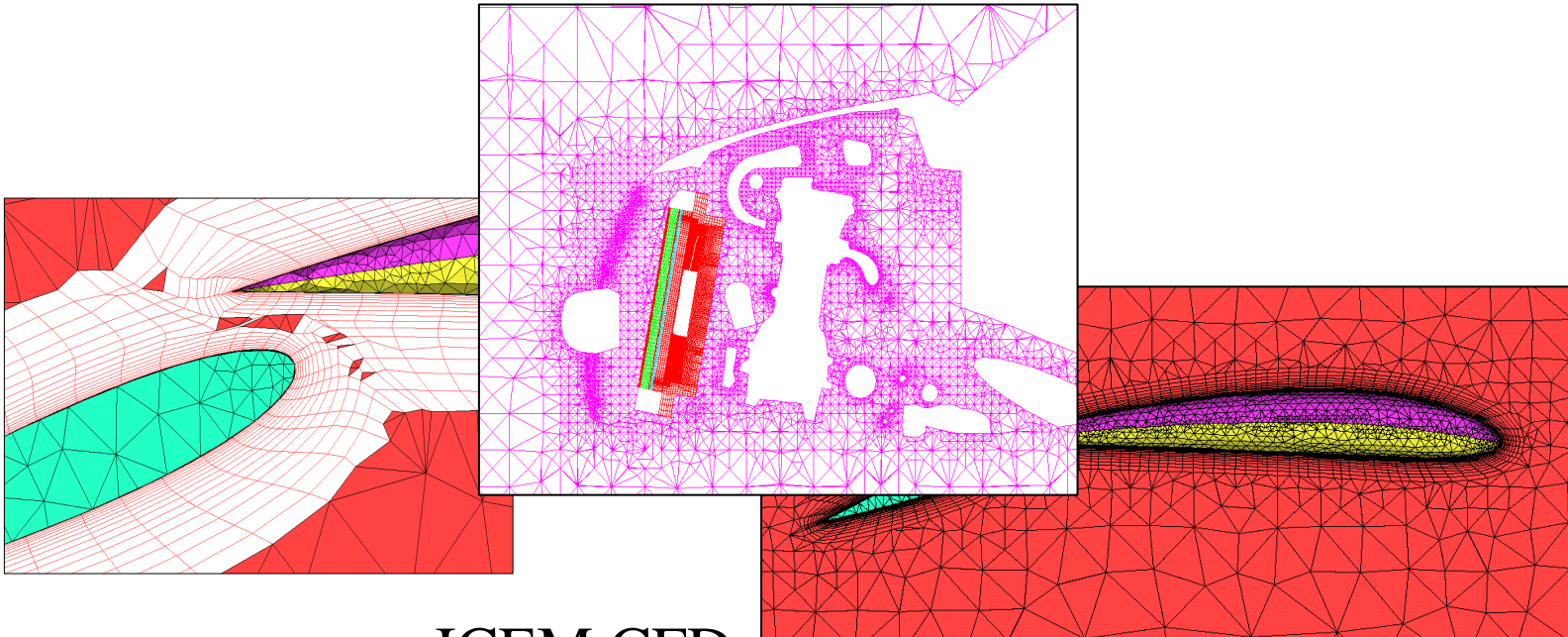


KilnSimu Example
(Cement Process)

Products(7)

Mesh generation software

Ansys ICEM CFD



ICEM CFD

Various Meshes

CAD

VX

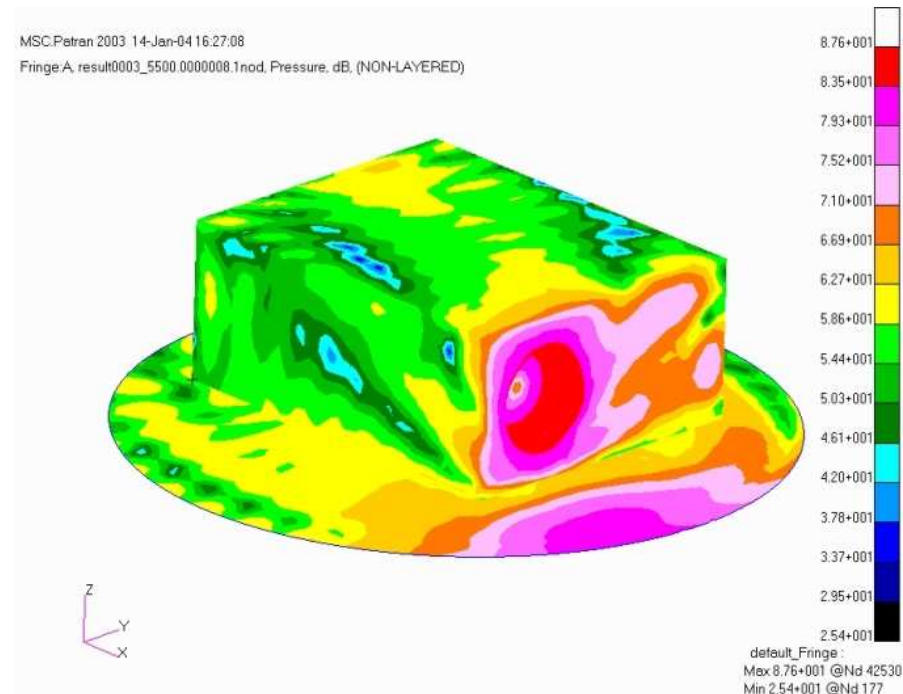
Products(8)

Fluid Acoustics, Vibro Acoustics

ACTRAN/VA

ACTRAN/TM

ACTRAN/AA



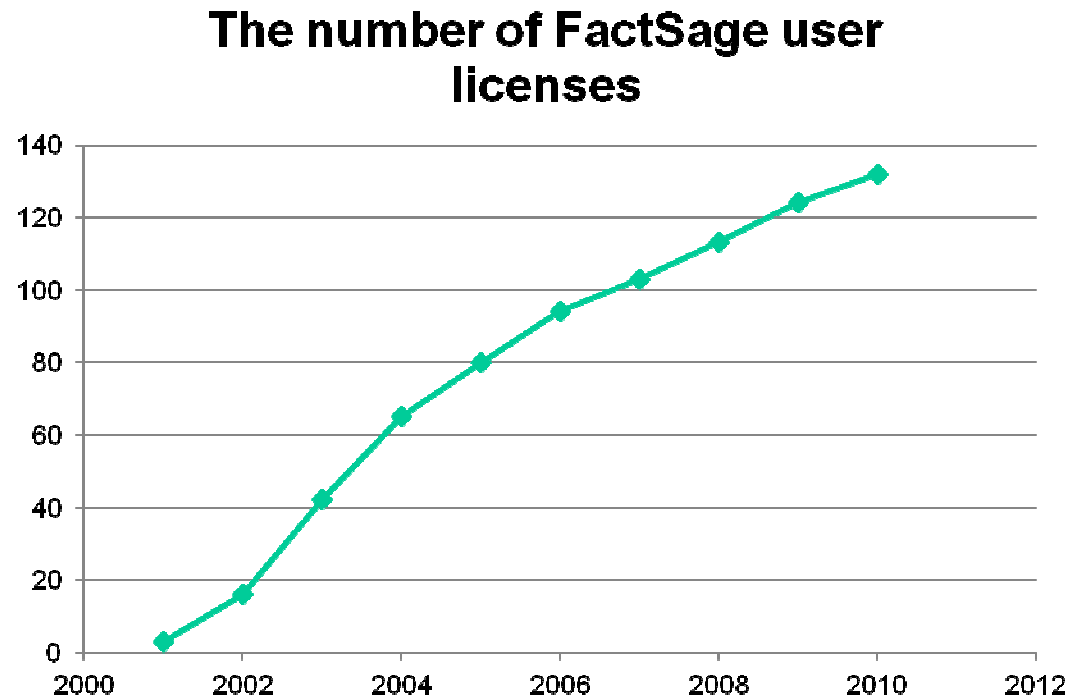
Actran/TM
Projector
Analysis

Japanese Market of Thermodynamic Software

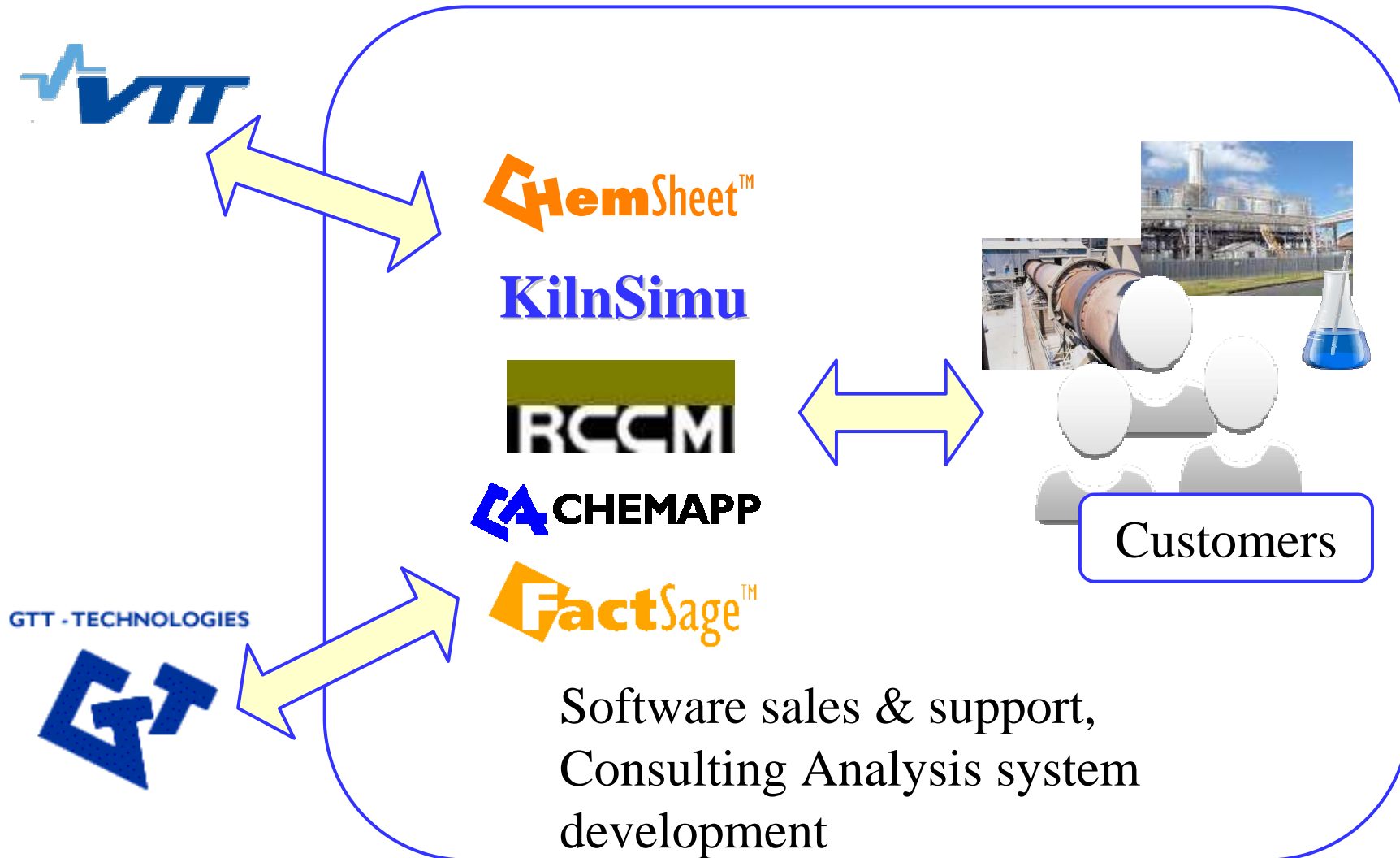
Exclusive distributor of GTT products in Japan

Start selling in 2001

- Steelmaking
- Non-ferrous metals refining
- Cement
- Chemical Industry
- Waste Treatment
- Nuclear Power
- Others



Japanese Market - Customer relationship



Japanese Market

- What RCCM has done for Japanese market

1. FactSage Manual in Japanese → Translate all ppt slides into Japanese + add many calculation examples → complete as tutorial guidebook

2. Training Course

FactSage basic training: 6 times a year

FactSage advanced training: 6 times a year

Generation of thermodynamic data: 4 times a year

ChemSheet: 3 times a year

ChemApp: 4 times a year

Japanese Market

- What RCCM has done for Japanese Market

3. Customer Support On-line in RCCM web page

- FAQ
- Calculation examples
- Operation examples

4. Tokyo Workshop (FactSage yearly userconference)

- Introduction of FactSage new version
- User presentations
- Hands-on seminar

FactSage support online

Products

Training & Events

Support online

FactSageメインページ - Mozilla Firefox

http://www.rccm.co.jp/factsage/fs.html

FactSageメインページ

RCCM

FactSage ChemSheet ChemApp SimuSage KilnSimu CSFAP 受託解析・イベント お客様サポート お問い合わせ

RCCM » FactSage

FactSage

• FactSage
 • データベース
 • 適用事例
 • 操作例 1
 • 操作例 2
 • 動作環境
 • ご購入について

最新情報

- ◆ 2009年度 FactSage ユーザー会(10/29, 10/30)のご案内
- ◆ FactSage 6.1 がリリースされました。
- ◆ 2009年 FactSage 関連製品トレーニング

FactSage ～熱力学平衡計算ソフトウェア & データベース～

- ◆ FactSage は、多成分系の熱力学平衡計算、多成分系の計算状態図の作成、電位-pH図の作成、熱力学データベースの管理、熱力学データの作成等ができるソフトウェアです。
- ◆ 信頼性の高い熱力学データベースを利用できます。FactSage が計算できる系は広範囲にわたります。例えば、熔融スラグ、酸化物固溶体、塩、鉄合金、銅合金、軽合金、貴金属合金、はんだ、核材料物質、水溶液などです。
- ◆ 操作性(操作例 1、操作例 2)に優れています。Windows上で動作します。FactSage の画面上で、計算条件の設定、計算結果のグラフ表示などを容易に行えます。
- ◆ 材料科学、冶金、鑄造、腐食・防食、セラミックス、セメント、燃料電池、廃棄物などを扱う世界中の数多くの代表的な企業、大学、研究所で導入されています。

完了

FactSage support online

1. Click Support

KilnSimu CSFAP 受託解析・イベント **お客様サポート** お問い合わせ

ユーザ名とパスワードを入力してください

https://www.rccm.co.jp の "FS_Users" に対するユーザ名とパスワードを入力してください

ユーザ名:

パスワード:

OK キャンセル

2. Enter username and password

FactSage online support

FactSage Support HOME - Mozilla Firefox

ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) 辞書履歴(Q) ツール(T) ヘルプ(H)

https://www.rccm.co.jp/factsage/support/index.html

FactSage Support HOME

FactSage お客様サポート オンライン

サポートホーム FactSage ChemSheet ChemApp KilnSimu ドングルドライバ

サポートホーム

製品別サポート

- [FactSage](#)
- [ChemSheet](#)
- [ChemApp](#)
- [KilnSimu](#)

お客様サポートオンラインのご案内

FactSage 関連製品でよくお問い合わせいただく質問とその回答場合は、メールまたは電話でお問い合わせください。

お知らせ

- ◆ FactSage 6.1 のインストール手順書をダウンロードページに置
- ◆ FactSage 6.1 がリリースされました。(2009/7/6)
- ◆ FactSage 6.0 にアップデートしたために発生した不具合と対応をクリックしてください。(2009/3/27)
- ◆ FactSage 6.0 アップデートセミナー資料をダウンロードページに置
- ◆ FactSage 6.0 がリリースされました。(2009/2)

メールまたは電話でお問い合わせする

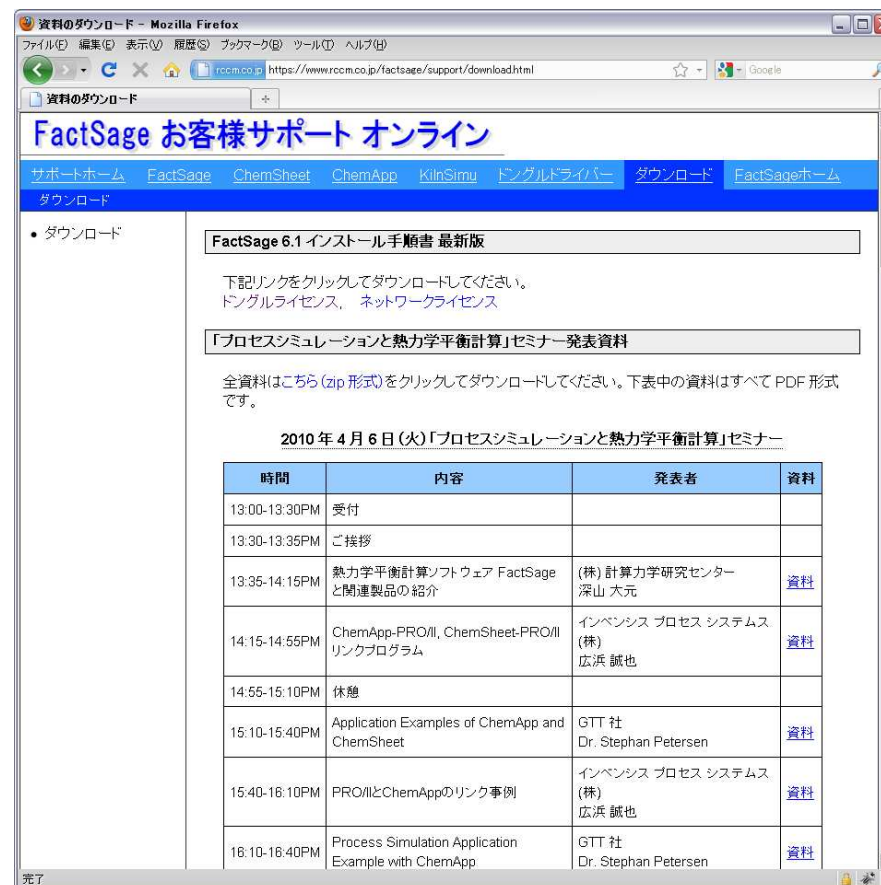
完了

FactSage support online



Frequently asked questions

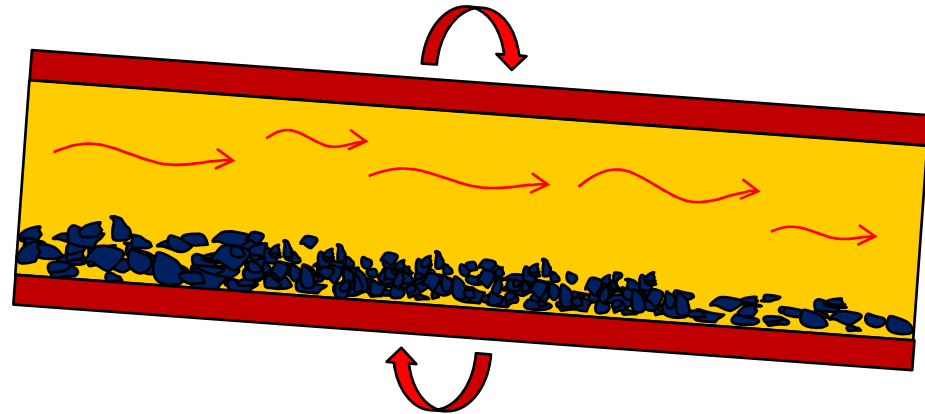
Download Documents



KilnSimu, Application examples (Japan)



KilnSimu: Simulation of multiphase chemistry in counter current or co current rotary kilns



11 customers

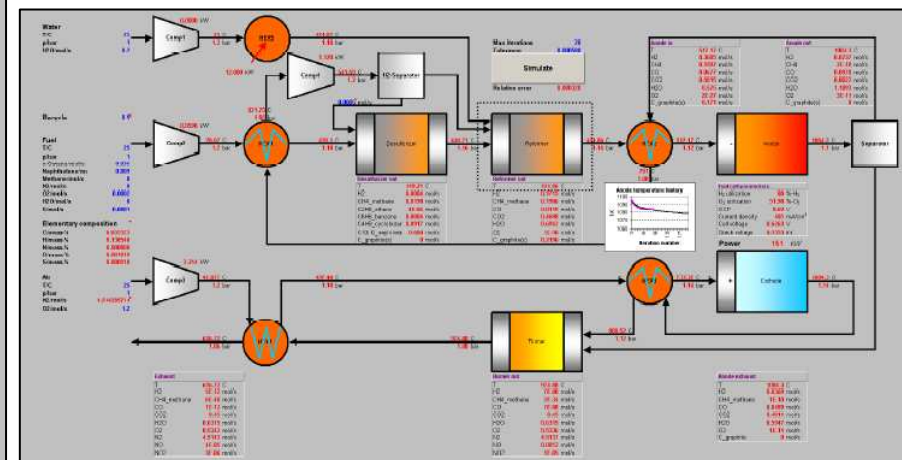
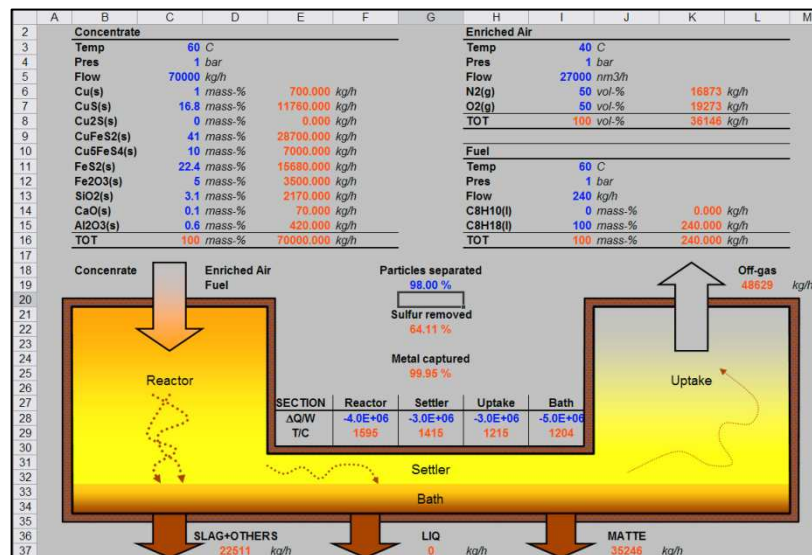
- Cement process(1)
- Thermal treatment of wastes(3)
- Ni ore refining(2)
- WAELZ (production of ZnO, Zn)(2)
- Others(3)

ChemSheet, Application examples (Japan)

ChemSheet: EXCEL add-in for thermochemical process simulation

6 customers

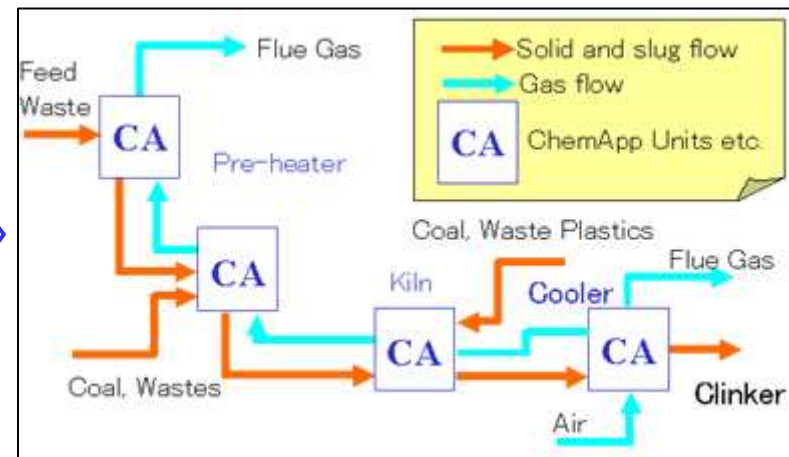
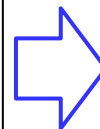
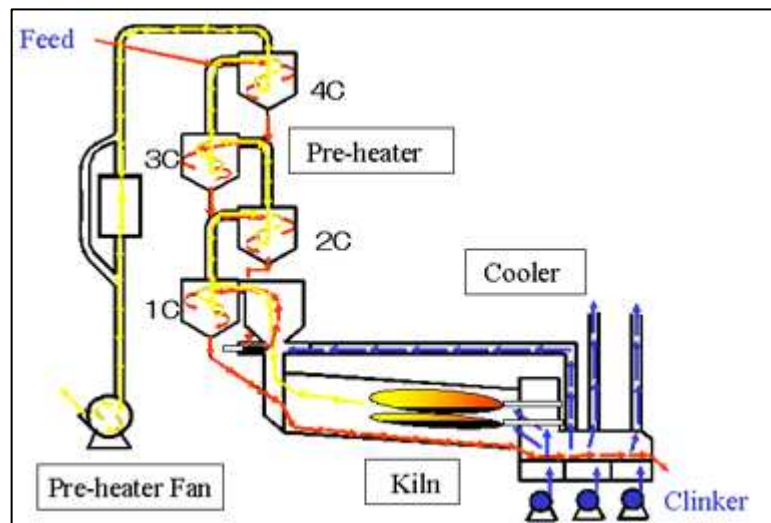
- Copper Sulfide Flash Smelting
- Solid-Oxide Fuel Cell Process



ChemApp, Application examples (Japan)

ChemApp: thermochemistry library for your software

- Cement Kiln / ChemApp + Pro/II(Process Simulator)



- Halogen lamp/ChemApp+FLUENT(Computational Fluid Dynamics)

ChemApp + FLUENT

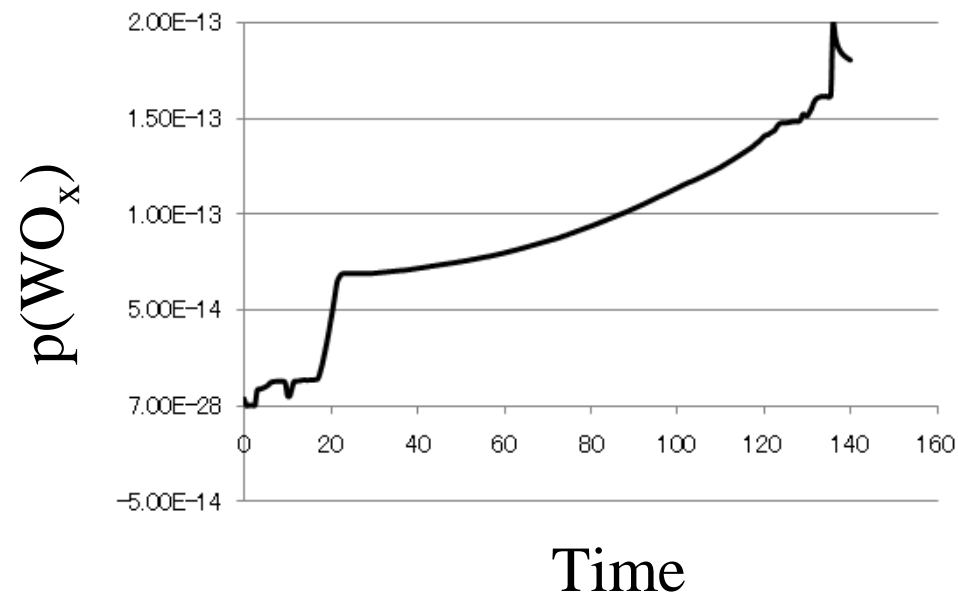
Purpose

Simulation of chemical species concentration change in thermo-fluid using commercial programs

Halogen lamp



Partial pressure of Tungsten oxide at a point



Commercial programs



- Most famous flow modeling program in Japan
- Good models of thermo-fluid systems for industrial applications
- Solve user defined scalar (chemical species concentration) transport equation in flows



Rich set of subroutines for the calculation of complex multi-component, multiphase chemical equilibria

Scalar transport equation

Mass Concentration Equation in Fluid

$$\frac{\partial \rho Y_i}{\partial t} + \frac{\partial}{\partial x_k} \left(\rho u_k Y_i - \rho D_{im} \frac{\partial Y_i}{\partial x_k} \right) = w_i$$

Y_i : the mass concentration for species i

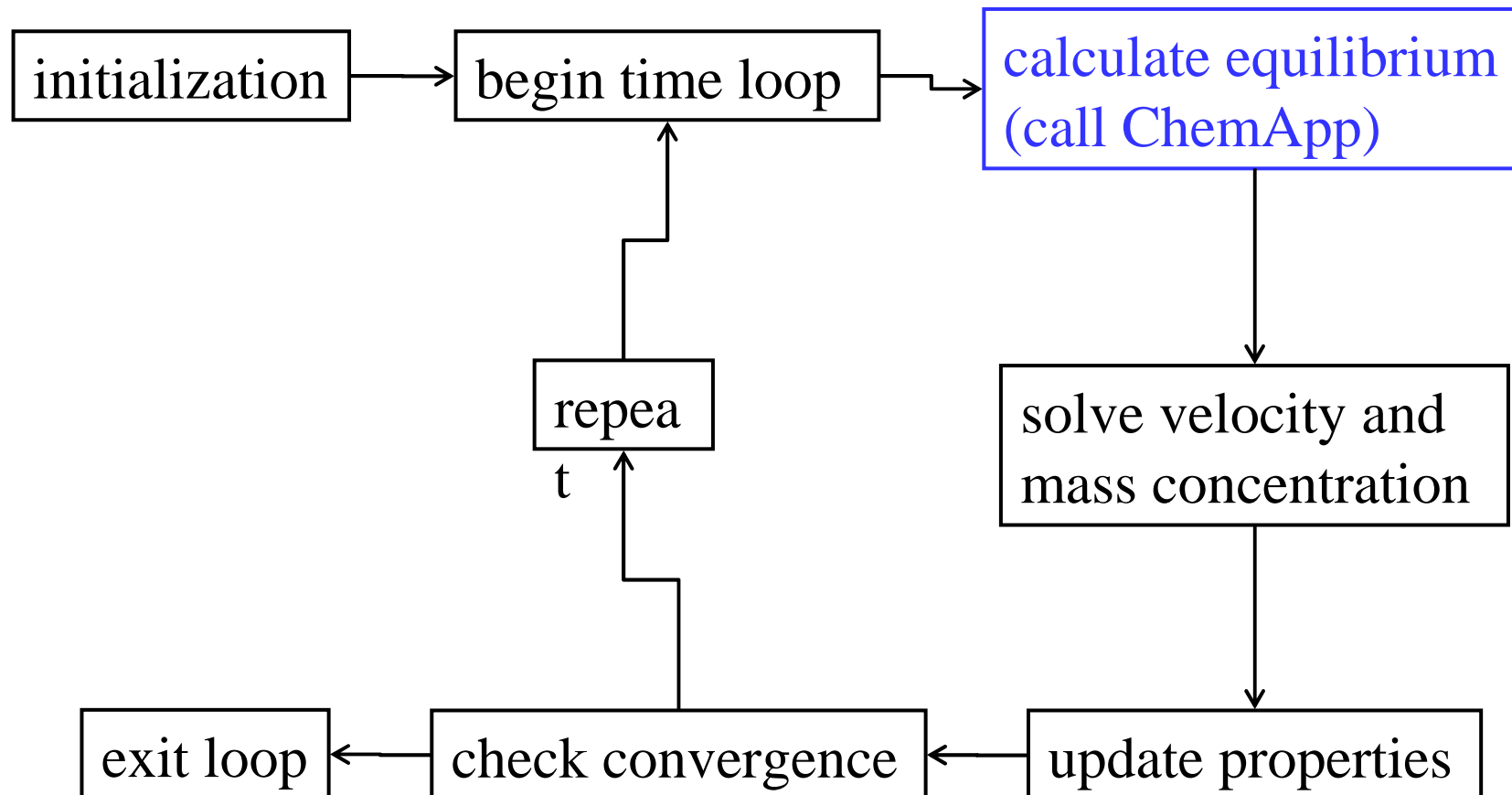
D_{im} : coefficient of molecular diffusion for mixture m

w_i : mass production per unit time and mass

FLUENT solves the scalar transport equation:

ChemApp + FLUENT

FLUENT calls user-defined program with ChemApp.



Conclusion

FLUENT linked to ChemApp is utilized in the simulation for time change of chemical species concentration.

Thank you for your attention !