

Purchase Specifications

Item NO	Description	Q'ty/unit
1	Computational Fluid Dynamics Program for Marine Exhaust Gas After-treatment System	1

1 Features

- This should be based on universal thermal flow calculation program that computational fluid dynamics analysis is possible on marine SCR(Selective Catalytic Reduction) system.
- Thermal flow phenomenon of After-treatment system has following three steps.
 - Dispersed spray simulation of Urea
 - Evaporation/Thermolysis/Hydrolysis simulation of injected Urea
 - Catalytic reaction simulation of NH_3
- This analysis program calculates the flow/heat transfer/chemical reaction on various type of catalytic reactor, the exhaust pipe and DPF(Diesel Particular Filter) as 1D and 3D.
- The purpose of this program is supports of design and analysis on Urea SCR system. Therefore, this program should provide a sufficient function.
- The using quality of this program must be guaranteed.

2 Standard and specifications

A. 3D CFD Program

- **The pre-processor**
 - ◆ 3D grid generation tool that provides SCR system models
 - ◆ Native CAD data files (ProE, CATIA, etc.) are converted into the FIRE specific flm-file format
 - ◆ Basic surface/mesh modification function in GUI

■ **Spray-Modeling**

- ◆ Define the Nozzle Information (Position, Hole, etc.)
- ◆ Define injection specifications (Time, Mass, Temperature, etc.)
- ◆ Define an arbitrary rate of UWS(Urea Water Solution) (e.g. Urea 40%, Water 60%)
- ◆ Define of Multi Component Evaporation for UWS(Urea Water Solution)
- ◆ Thermolysis & Hydrolysis Reaction Mechanisms applied

■ **SCR-Modeling**

- ◆ Define of Homogeneous Gas Phase Reaction
- ◆ Wall interaction and Wall film
- ◆ Various Wall Treatment (1D&2D Conduction)
- ◆ Urea Precipitation Model for solidification
- ◆ Porous Medium for Catalyst
- ◆ Pre-defined Catalyst Model for SCR (Steady & Transient)
- ◆ DOC/TWC/LNT/DPF analysis and Pre-defined Catalyst Model
- ◆ DoE (Design of Experiments) optimization and Case Study
- ◆ Provides User Coding Interface

■ **Solver**

- ◆ 2D and 3D flow analysis
- ◆ Steady and transient simulation
- ◆ Laminar and turbulent flow analysis
- ◆ Minimum 8 CPUs parallel computing per 1 solver license

■ **The post-processor**

- ◆ Graph and contour on 2D/3D analysis results
- ◆ Results extraction function for the specified location and time after completing the calculation

- ◆ Provides a self-generated animation

B. 1D CFD Program)

■ The pre-processor)

- ◆ Tuned SCR Catalyst parameters in the 1D CFD must be used in 3D CFD program without separate conversion.

■ Solver

- ◆ Map-based Conversion
- ◆ Consider a multi-catalyst wash coat

■ SCR Modeling

- ◆ Heat loss simulation through the exhaust pipe
- ◆ Multi-component Liquid Injection in the exhaust pipe
- ◆ Simplified wall-film modeling
- ◆ HiL(Hardware-in-the-Loop) link of SCR Model
- ◆ Urea Thermal Decomposition Model
- ◆ Pre-defined Catalyst Model for SCR (Steady & Transient)
- ◆ DOC/TWC/LNT/DPF analysis and Pre-defined Catalyst Model
- ◆ DoE (Design of Experiments) optimization and Case Study
- ◆ Provides User Coding Interface
- ◆ Multi-Channel Modeling

■ The post-processor

- ◆ Various 2D plot
- ◆ Animation function on graphs
- ◆ Provides a mathematical function

3. Product constitution

- **3D SCR System Analysis Program 1 EA**
- **1D SCR System Analysis Program 1 EA**
- **User Guide (PDF)**
- **SCR Modeling Examples and Tutorial Manuals (PDF)**

4. Note

- The latest version must be supplied.
- **License Period : 1 Year**
- **Free Maintenance Period : 1 Year**
- **Technical Support** : Remote Support(phone/email) and Visit
- Technical Support by experienced engineer(AVL Korea)
- Runs on Windows XP & 7 and Linux environment