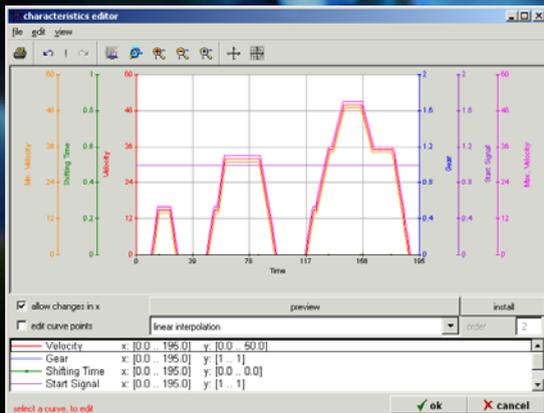
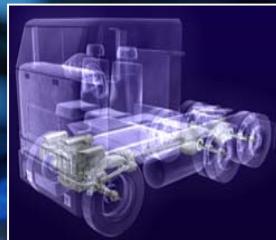
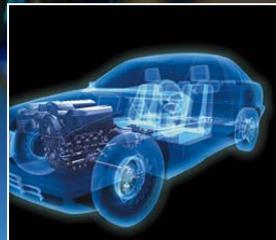
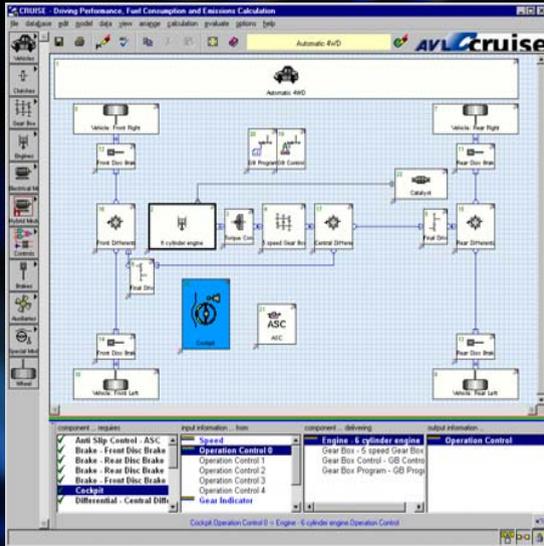


CRUISE - General characteristics



- Power train simulation for all types of vehicles
- Mechanical, electrical design and signal processing
- Driving performance, fuel economy and emission prediction
- Driver behavior, environment and heat flow simulation
- Optimization of vehicles and vehicle components
- Evaluation of new vehicle concepts (e.g. hybrids, fuel cell)
- Vehicle thermal management system
- Assessment of control strategies (energy management)
- Collective loads for stress/strain calculations
- Torsional elastic and rigid systems
- Variety of interfaces to in-house and 3rd party products

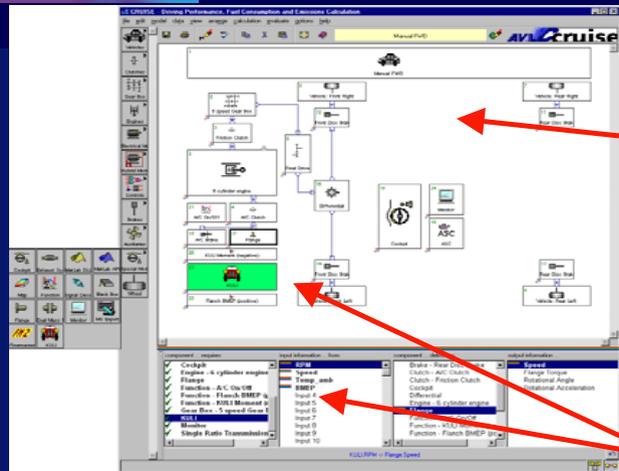
Main reasons for establishing the link

- **CRUISE is a highly flexible vehicle simulation platform which represents an ideal working environment for the integration of KULI® models**
- **KULI® is widely used in the automotive industry for simulation of engine cooling systems, A/C systems and other fluid systems**
- **Flexible coupling software mechanisms are available on both sides**
- **The link provides both software packages with an extended field of applications opening completely new perspectives in virtual automotive design**

Some basic characteristics of the link

- **CRUISE - KULI[®] link is designed for a transient co-simulation in time domain**
- **The link is easy to understand and straightforward to implement**
- **Interface is controlled by CRUISE and can exchange up to 100 signals in both directions in each time step**
- **CRUISE can record up to 10 input and output variables**
- **KULI[®] generates a complete set of results viewable in KULI[®] post-processor**

Creating CRUISE - KULI® link

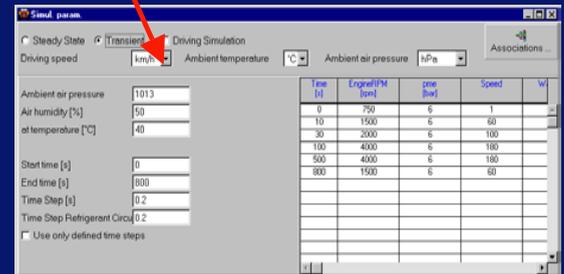
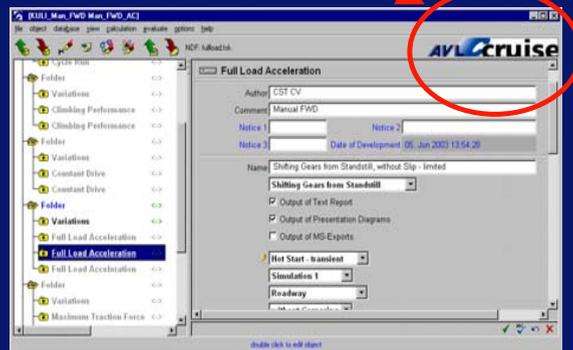
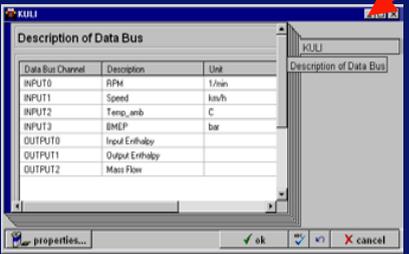
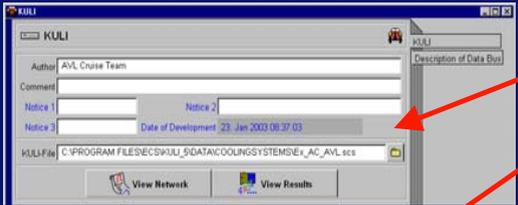
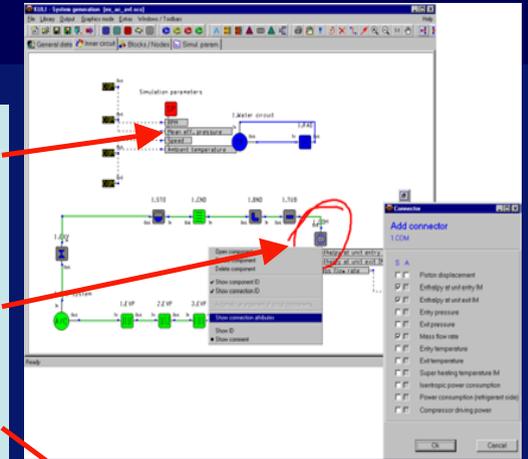


1. Creating CRUISE and KULI® models
2. Defining connecting points

- KULI®:
1. Selecting import/export components and variables.
 2. Attaching COM components and defining labels and units

- CRUISE:
1. Adding KULI® component in CRUISE model and connecting it with other components
 2. Referencing KULI® model
 3. Defining labels and units as in KULI®

3. Setting Calculation Parameters
4. Starting Simulation

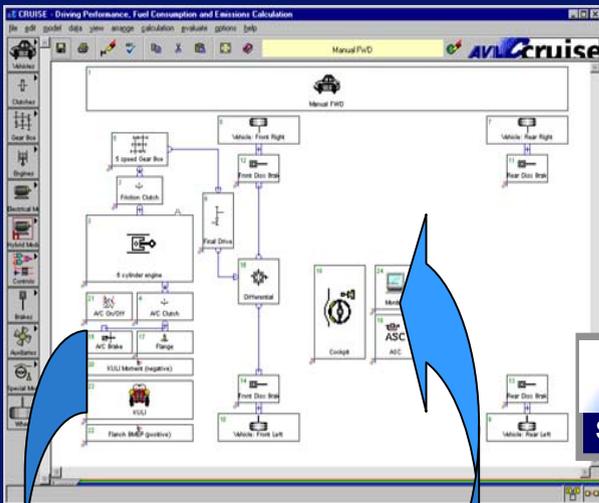


CRUISE - KULI[®] Application Example

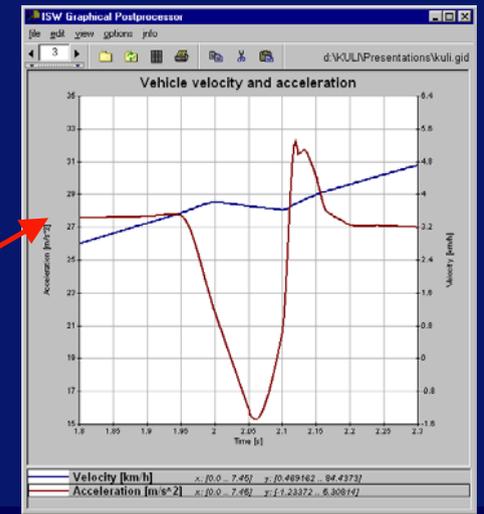
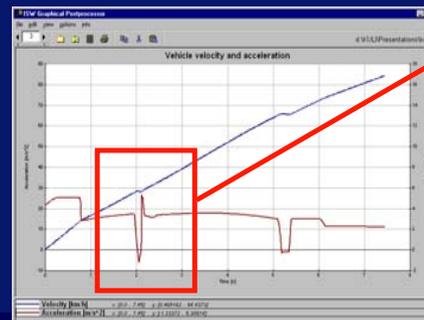
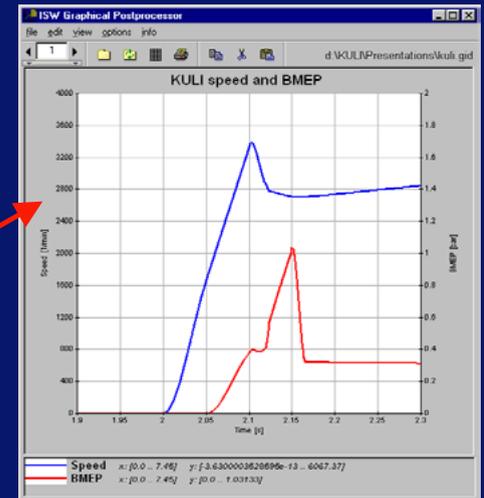
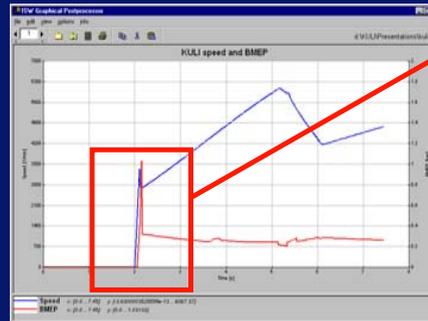


Analyzing transient A/C effects

- Incorporating KULI A/C system in a CRUISE standard manual FWD vehicle model
- Simulating full load acceleration test
- Switching on A/C system after 2 sec.



cruise
Simulation of Complete Vehicle



Outlook: Integrated 1-D VTMS system

