

# AMESim

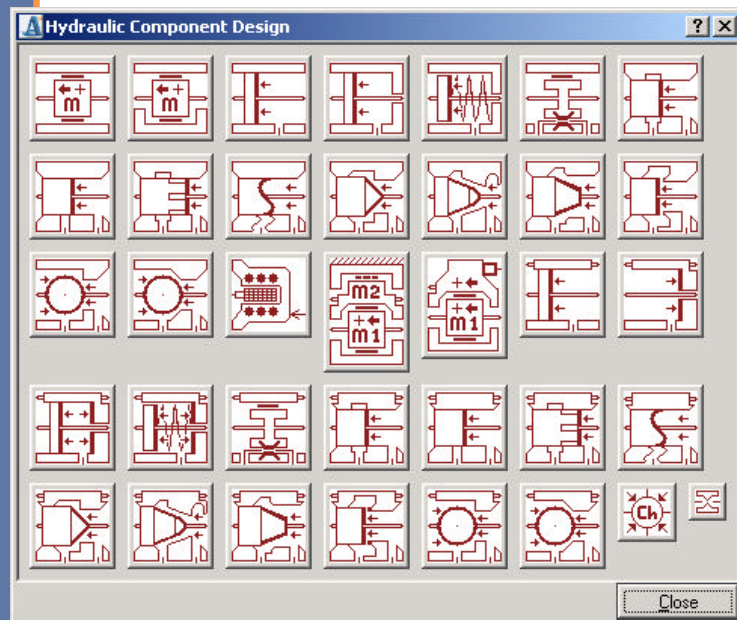
## LIBRARIES - HYDRAULIC COMPONENT DESIGN

### KEY POINTS

- Steady-state and transient simulation.
- Graphical interface enables you to create new designs quickly.
- State-of-the-art theory. Easy parameters filling from manufacturers' experiments or data from technical drawings.
- Recognizable technological icons facilitating direct model identification with technical drawings.
- Full multi-domain compatibility for total system analysis with study of energetic couplings.
- Complex modeling without writing a single line of code thanks to a Basic Element approach.
- Build and save your own models for easy reuse.
- Sensitivity analysis and size optimization.
- Time domain and frequency analysis for vibration modes characterization (eigenvalues, modal shapes, transfer functions).
- Activity index for energies and efficiencies evaluation, and reduction of models.
- Matlab®/Simulink® interface for control design.
- Direct integration of your own C and Fortran code.
- Fully compatible with other AMESim libraries.

### Overview

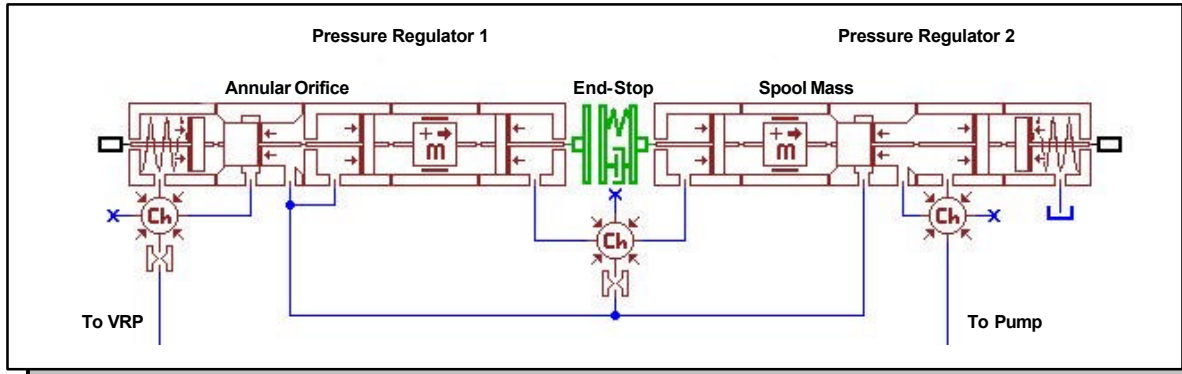
The AMESim® Hydraulic Component Design library is an incredibly powerful and unique tool including the basic building blocks of any hydro-mechanical system. This library can be viewed as an engineering language able to model hydraulic components such as fuel injectors, hydraulic hammer, piston and vane pumps, semi-active dampers or any kind of hydraulic valve. Since the models are component-based, interpretation of the model layout is straightforward and intuitive.



### Benefits

For engineering systems in the automotive, off-highway, aerospace or manufacturing areas, a main stumbling block is the diversity of hydraulic components.

Designed and developed by our expert engineers, the AMESim Hydraulic Component Design library (HCD) handles this diversity by using a subdivision that enables you to build the greatest number of engineering system models from the smallest number of icons and models. We could describe those as technological units since each element is a tangible object for an engineer. With most HCD models, you could almost go to the engineering store, collect the corresponding physical objects and use them to make a component. Experiences show that, by using this library, companies save months in the development cycle of hydraulic components and significantly reduce the number of prototypes.



Double pressure regulator used in an automatic gearbox.

## Features

The AMESim Hydraulic Component Design library enables you to rapidly design, analyze and optimize any kind of hydraulic component. This library facilitates a large number of capabilities such as:

- All standard hydraulic technology groups included (spool, conical poppet, ball poppet, piston, vane and others).
- Ability to model components in detail taking into account:
  - Dynamics of the moving bodies.
  - Influence of oil compressibility.
  - Limitations and saturations.
  - Flow rate induced by pressure difference.
  - Variation in the cross section.
  - Variation in the hydraulic diameter.
  - Variation in the flow coefficient (Reynolds and cavitation number).
  - Volume variation.
  - Flow rate induced by movement.
  - Friction and leakages.
  - Hydraulic forces.
  - Flow forces.
- Calculation of all the required variables (flow rates, pressures, cross section, valve lift, volume...) accessible during or after computation.
- Compressible fluid consideration with rigorous treatment of fluid properties and mass conservation.

## HCD model families

- Single mass with friction and end-stops.
- Double masses with friction and end-stops.
- Solenoid.
- Hydraulic orifice.
- Hydraulic volume with compressibility.
- A large set of hydraulic component functions with fixed or moving body:
  - Piston.
  - Piston with spring.
  - Viscous frictions and leakages.
  - Spool with annular orifice.
  - Spool with orifice hole.
  - Spool with slot orifices.
  - Spool with custom orifice.
  - Poppet with sharp edge seat.
  - Poppet with conical seat.
  - Poppet with no seat.
  - Poppet with plain seat.
  - Ball poppet with sharp edge seat.
  - Ball poppet with conical seat.

## Requirements

The AMESim Hydraulic Component Design library runs on Unix<sup>®</sup>, Linux<sup>®</sup> platforms and Pentium<sup>®</sup>-based PCs.

The AMESim Hydraulic library is required.

The AMESim Hydraulic Resistance library is recommended.

**IMAGINE**  
www.amesim.com

Contact IMAGINE directly:

USA: +1 734 207 5557  
 UK: +44 18 69 351 994  
 France: +33 (0)4 77 23 60 30  
 Germany: +49 89 548 495 0  
 China: +86 13818750986  
 Japan: +81 (0) 3 3351 9691

E-mail: [info@amesim.com](mailto:info@amesim.com)

Visit [www.amesim.com](http://www.amesim.com) to obtain contact information for authorized IMAGINE representatives in other countries.