15.1. HYSIS – A Professional Software Package

As mentioned earlier there are a few general purpose simulation software packages available both for commercial & educational purposes. Out of these, ASPEN Plus (of AspenTech) and HYSIS (of HyproTech) are widely used round the globe. Very recently (May 31, 2002), HyproTech has been merged with AspenTech. Hyprotech is now part of a new Engineering business unit within AspenTech that will focus on engineering and Asset Lifecycle solutions, including simulation, engineering, evaluation and optimization technologies.

HYSYS — the product that continually extends the bounds of process engineering software. With HYSYS, one can create rigorous steady-state and dynamic models for plant design and trouble shooting. Through the completely interactive HYSYS interface, one would be able to easily manipulate process variables and unit operation topology, as well as to fully customize the simulation using its OLE extensibility capability.

HYSYS has been developed with Hyprotech's overall vision of the ultimate process simulation solution in mind. The vision has led to create a product that is:

- Integrated
- Intuitive and interactive
- Open and extensible

15.1.1. Integrated Simulation Environment

In a truly integrated simulation environment, all of the necessary applications work is performed within a common framework, eliminating the tedious trial-and-error process. Such a system has a number of advantages:

- Information is shared, rather than transferred, among applications.
- All applications use common thermodynamic models.
- All applications use common flowsheet topology.
- Only need to learn one interface.

- Switching between modelling applications at any time, gaining the most complete understanding of the process.

The plant lifecycle might begin with building a conceptual model to determine the basic equipment requirements for your process. Based on the conceptual design, you could build a steady-state model and perform an optimization to determine the most desirable operating conditions. Next, you could carry out some sizing and costing calculations for the required equipment, then do some dynamic modelling to determine appropriate control strategies. Once the design has become a reality, you might perform some online modelling using actual plant data for "what-if" studies, troubleshooting or even online optimization. If a change at any stage in the design process affects the common data, the new information is available immediately to all the other applications — no manual data transfer is ever required.

While this concept is easy to appreciate, delivering it in a useable manner is difficult. Developing this multi-application, information sharing software environment is realistically only possible using Object Oriented Design methodologies, implemented with an Object Oriented Programming Language.

15.1.2. HYSIS Products

15.1.2.1. HYSYS.Process

Process Design - **HYSYS.Process** provides the accuracy, speed and efficiency required for process design activities. The level of detail and the integrated utilities available in **HYSYS.Process** allows for skillful evaluation of design alternatives.

15.1.2.2. HYSYS.Plant

Plant Design - HYSYS.Plant provides an integrated steady-state and dynamic simulation capability, offers rigorous and high-fidelity results with a very fine level of

equipment geometry and performance detail. **HYSYS.Plant+** provides additional detailed equipment configurations, such as actuator dynamics.

15.1.2.3. HYSYS.Refinery

Refinery Modeling - HYSYS.Refinery provides truly scalable refinery-wide modeling. Detailed models of reaction processes can be combined with detailed representations of separation and heat integration systems. Each hydrocarbon stream is capable of predicting a full range of refinery properties based on a Refinery Assay matrix.

15.1.2.4. HYSYS.OTS

Operations Training System - **HYSYS.OTS** provides real-time simulated training exercises that train operations personnel and help further develop their skills performing critical process operations. Increased process understanding and procedural familiarity for operations personnel can lead to an increase in plant safety and improvements in process performance.

15.1.2.5. HYSYS.RTO

Real-Time Optimization - HYSYS.RTO is a real-time optimization package that enables the optimization of plant efficiency and the management of production rate changes and upsets in order to handle process constraints and maximize operating profits.

15.1.2.6. HYSYS.Concept

Conceptual Design Application - HYSYS.Concept includes **DISTIL** which integrates the distillation synthesis and residue curve map technology of Mayflower with data regression and thermodynamic database access. **HYSYS.Concept** also includes **HX-Net**, which provides the ability to use pinch technology in the design of heat exchanger

networks. Conceptual design helps enhance process understanding and can assist in the development of new and economical process schemes.

15.1.3. Intuitive and Interactive Process Modelling

The role of process simulation is to improve the process understanding so that one can make the best process decisions. HYSYS solution has been, and continues to be, interactive simulation. This solution has not only proven to make the most efficient use of your simulation time, but by building the model interactively – with immediate access to results – you gain the most complete understanding of your simulation. HYSYS uses the power of Object Oriented Design, together with an Event-Driven Graphical Environment, to deliver a completely interactive simulation environment where:

• calculations begin automatically whenever you supply new information, and
• access to the information you need is in no way restricted.

At any time, even as calculations are proceeding, you can access information from any location in HYSYS. As new information becomes available, each location is always instantly updated with the most current information, whether specified by you or calculated by HYSYS.

15.1.4. Open and Extensible HYSYS Architecture

The Integrated Simulation Environment and the fully Object Oriented software design has paved the way for HYSYS to be fully OLE compliant, allowing for complete user customization. Through a completely transparent interface, OLE Extensibility lets you:

• develop custom steady-state and dynamic unit operations
• specify proprietary reaction kinetic expressions
• create specialized property packages.

With seamless integration, new modules appear and perform like standard operations, reaction expressions or property packages within HYSYS. The Automation features

within HYSYS expose many of the internal Objects to other OLE compliant software like Microsoft Excel, Microsoft Visual Basic and Visio Corporation's Visio. This functionality enables you to use HYSYS applications as calculation engines for your own custom applications. By using industry standard OLE Automation and Extension the custom simulation functionality is portable across Hyprotech software updates. The open architecture allows you to extend your simulation functionality in response to your changing needs.