Integrate Pipeline Design and Gas Production System Models with Aspen HYSYS® featuring Billington Process Technology

Webinar Q&A

This document summarizes the responses to questions posed before and during the webinar. Additional questions should be directed to AspenTech Support.

Submitted Before the Webinar:

Q: What exactly are the interfaces and segregation of capabilities between Aspen HYSYS and OLGA for pipeline design?
A: The interface that was demonstrated employs Aspen HYSYS for the overall simulation and the processing modules, with OLGA for transient behavior in a pipeline. Aspen HYSYS Hydraulics can also model transient behavior, as well as pigging and flow assurance.

Q: What design features have been included to avoid hydraulic hammer?
A: We are mostly looking at multiphase flow where one would rarely see water hammer effects. However, OLGA does provide the functionality. If Aspen HYSYS is feeding into OLGA, then the water hammer effect may occur upon closing a valve at the boundary. We have not done anything in the LINK to avoid such occurrences.

Q: What are the latest versions of OLGA and Aspen HYSYS that are compatible?
A: Aspen HYSYS V8.3 and OLGA V7.3 (using OLX).

Q: Is it possible to get technical documents about this presentation?
A: Yes, the entire presentation will can be viewed at a later date.

Q: How reliable is Aspen HYSYS slug analysis?
A: Aspen HYSYS is able to predict the hydrodynamic slugging, not the terrain based slugging.

Q: What are the differences between flow assurance in Aspen HYSYS and flow assurance in OLGA?
A: Many engineers have found that Aspen HYSYS Hydraulics is equal to rigorous in a wide range of circumstances. Aspen HYSYS hydraulics flow simulator has multiple capabilities that are applied in flow assurance, such as CO₂ corrosion, erosion, hydrate formation, wax and asphaltene formation, and unstable flow (slugging) and pigging functionality. It is really the modeler’s preference on which tool to use when validating cases.

Q: Do you use derivatives for P&F?
A: Yes, we do. OLGA provides the derivatives to Aspen HYSYS. We are looking into ways of passing Aspen HYSYS P&F derivatives to OLGA.
Q: Where do we go to find webinar courses that are coming up in the next few months?
A: You can look on our official website’s events tab for upcoming events, including Web Seminars (webinars) or for your reference, all webinars are available—post event—in an on-demand version. Here are some upcoming webinars (10:00 a.m. EST):
- December 18: 22-Minute Webinar: Optimize Upstream, Gathering and Production Systems using Aspen HYSYS and aspenONE Engineering

Q: Can you give us training on dynamic simulations?
A: We have put a lot of focus over the last 12 months in providing a wide range of training materials on dynamic simulation employing Aspen HYSYS Dynamics, Aspen Plus Dynamics, Aspen Custom Modeler, and our batch modeling tools. These training options include a series of pre-recorded webinars on getting started with these tools—which are available to view on-demand, written jump start guides that can be accessed from our public web pages, sample models to accompany the jump start guides, various short video clips, a new CBT training module on Aspen HYSYS Dynamics, regular “lunch-and-learn” sessions that our BCs run at customer sites—customers request, and public in-person courses periodically held in a variety of locations worldwide.

If you have specific topics related to dynamic simulation that you would like us to develop additional training materials for, please contact Irina at irina.rumyantseva@aspentech.com.

For your convenience, here are links to the public product pages for Aspen HYSYS Dynamics and Aspen HYSYS Upstream Dynamics where you can access some of the resources mentioned above.

Submitted During the Webinar:

Q: Are all these tools available and included in the aspenONE® license?
A: If you have a token based license, all of the Aspen HYSYS features and tools are available and included within the aspenONE license. If you have a point product license then:
- The Aspen HYSYS pipe segment is available in base Aspen HYSYS
- The Aspen HYSYS Hydraulics subflowsheet may be found in the upstream tab of the model palette and it requires an Aspen HYSYS upstream product license

The table shown below summarizes the availability of the various features:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Functionality</th>
<th>HYSYS Pipe</th>
<th>Hydraulics Subflowsheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pipe Correlations</td>
<td>Multiple options</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Allows different correlations for different segment orientations</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Flow Network</td>
<td>Can solve flow networks</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Boundary Conditions</td>
<td>Calculate pipe diameter</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Calculate pressures and flowrates</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fluid Properties</td>
<td>Options for emulsion viscosity method</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Heat Transfer</td>
<td>Specify heat flow</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Specify outlet temperature</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Specify heat transfer coefficients</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Flow Assurance</td>
<td>CO2 Corrosion</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Hydrate Formation</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Wax Deposition</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Erosion Utility</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Piping</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slugging Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rigorous Dynamics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic Simulation</td>
<td>Support of dynamic modeling</td>
<td>X (Simple)</td>
<td>X (Rigorous)</td>
</tr>
</tbody>
</table>

Table 1: Summary of features
Q: I would like see the design basis before validating results. Is there any kind of support document related to this software? Is the license for Computer-Based Training modules free?
A: The online help in Aspen HYSYS explains the details of the models and the functionality. The Computer-Based Training modules can be accessed from within any aspenONE engineering product (i.e. Aspen HYSYS) and they do not consume any new license or additional tokens.

Q: Is OLGA included in Aspen HYSYS or it is a separate software license?
A: OLGA is separate software licensed by Schlumberger.

Q: How is OLGA different from Aspen HYSYS and does it require additional tokens?
A: OLGA is a software license sold by Schlumberger and is separate from Aspen HYSYS. Aspen HYSYS Upstream has a TCP/IP link to OLGA which supports older OLGA software versions up to V5.3.4. Using OLGA via this link will require tokens for Aspen HYSYS Upstream Dynamics & Aspen HYSYS. The OLX software from Billington enables use of OLGA versions V7.2 and higher from Aspen HYSYS via an OPC link.

Q: Do you need to have OLGA installed independently of Aspen HYSYS?
A: Yes, you do.

Q: How do you configure the OLGA trends in this interface? Do you need to specify them twice in OLGA and Aspen HYSYS?
A: You do not need to specify them twice. You only need to configure them once in Aspen HYSYS.

Q: Can you use an OLGA model with two pipelines connected to Aspen HYSYS with one extension? Can you specify multiple reference streams in this case? Can you elaborate on the reference streams if needed?
A: For the time being, we can link to one OLGA pipeline per unit operation. BPT is looking into this and they think it will be possible to fully utilize the OLGA software by having several reference streams. This will, of course, be an alternative to having the full compositional link. Today, you can perform two pipelines with one reference stream.

Q: How is the load characterized by PVT (Multiflash via cape Open) in OLGA? Is this done by a compositional model or a black oil table?
A: You can use any of the options. It doesn't matter whether you use the PVT tables or if you use the compositional model. You just need to make sure you have consistent PVT and the physical properties of the fluid. You can use the Multiflash software which can be run under CAPE-OPEN with Aspen HYSYS. However, in most instances, that is not necessary. You can also do it by using the AspenTech link for OLGA to Aspen HYSYS—it provides the same functionality.

Q: How is the fluid used in Aspen HYSYS Flow Assurance Module characterized, especially with regards to matching lab data, wax properties, etc.?
A: There are different ways you can do this in Aspen HYSYS. There is a PVT analysis environment where you can also use third-party software to characterize your fluid, such as Multiflash or PVSim.
Q: The PVT was implemented using Multi-Flash in the example. Is it possible to use PVTSim instead? Also, when you have your PVT file, how it is implemented into Aspen HYSYS?
A: Yes, you may use PVTSim instead. However, care should be taken to ensure that both PVT, as well as fluid properties, are correctly represented. In Aspen HYSYS, the PVT will need to use the binary interaction coefficients identical to PVTSim for non-library components.

Q: Do you need a special license to use OLX™?
A: The OLX is a BPT development and needs a separate agreement with BPT. Contact support@bpt.no to acquire a time limited demo license.

Q: Has OLX been made available for all users of Aspen HYSYS?
A: The OLX is available as a licensed extension to all Aspen HYSYS users that are using Aspen HYSYS V7.3 or higher with the latest patches.

Q: Where can one find the OLX module in Aspen HYSYS?
A: Users have to acquire the software and license from BPT. Contact support@bpt.no to acquire a time limited demo license. When installed, the OLX will be available as unit operations under extensions.

Q: Is the OLX tool a recent development?
A: The OLX tool has been in service since June 2012, but only recently it has become available to the market.

Q: If OLGA and Aspen HYSYS pipe segments (topsides) are connected via OLX, what are the correlations?
A: The user needs to select the correlations in OLGA and Aspen HYSYS. OLX is only communicating the phase mass flows, the P&T, as well as the derivatives of pressure and flow.

Q: How accurate is the viscosity prediction of emulsified oil-water in OLGA or the OLX link?
A: The user needs to select the correlations in OLGA. OLX is only communicating the phase mass flows, the P&T, as well as the derivatives of pressure and flow.

Q: In the demo presented by Per Billington, does Aspen HYSYS perform the flash calculation in steady-state mode and OLGA performs the hydraulic calculation in dynamics mode? Can Aspen HYSYS perform both dynamic and steady-state calculations? What is the advantage of combining them?
A: Aspen HYSYS addresses your pipeline hydraulics modeling needs. You can

- Solve complicated pipeline flow networks faster using the Hydraulics functionality in Aspen HYSYS Upstream
- Provide pressure drop/flow hydraulic correlations with support for the state-of-the-art Tulsa Unified model
- Have flexible specifications for heat transfer and boundary conditions
- Provide critical flow assurance with support for hydrate formation, CO2 corrosion, and pipeline erosion
- Perform dynamic simulation of pipelines

The example presented by BPT adds to core hydraulics functionality in Aspen HYSYS by integrating with 3rd party pipeline simulators such as OLGA.
Q: What are the recommended flow correlations available and how do they compare to other standard hydraulic engines and any limitations i.e., liquid hold up prediction?
A: We offer standard published correlations similar to other hydraulic simulators (for example, the Beggs & Brill and the Tulsa Certified Model). There is also an option for OLGA steady-state model and many others. Depending on your application, you can choose which correlation to use. We are looking into coming up with documentation on when to use which correlation. The following white paper published covers most of the correlations available “An Integrated Approach to Modeling Pipeline Hydraulics in a Gathering and Production System”. Research still needs to be done on which correlation is best for your specific application.

Q: Can we perform pressure surge analyses in pipeline (water hammer) like the one using AFT Impulse?
A: Yes, you can.

Q: Can we perform flowline dynamic blowdown using this application (not the regular vessel blowdown utility)?
A: Yes, you can.

Q: Is the Pigging (slug volume) a new tool that has been developed?
A: No, the dynamic pigging functionality in the Aspen Hydraulics subflowsheet has been available since Aspen HYSYS 2006. There is also a steady-state slugging tool available in the Aspen HYSYS pipe segment that has been available since Aspen HYSYS 2004.

Q: Is it possible to simulate a stainless steel pipe cool down process for the LNG industry in Aspen HYSYS?
A: Yes, a dynamic simulation can be set up to model this process with either the Aspen HYSYS pipe segment or the Aspen Hydraulics subflowsheet. The Aspen Hydraulics pipe model has a more accurate heat transfer model than the standard Aspen HYSYS pipe so it is probably more suitable.