



NFPA/FPIC Quarterly Conference

Thursday, June 3, 2021

8:00 AM to 11:45 AM Central Time



“Advanced Software and Smart Tools for Fluid Power Component and System Design, Simulation and Optimization”

8:00 – 8:10 AM	<p>Connection Time/Prepare for Event</p> <p>We want to make sure everyone is connected and ready to go for an informative and interactive morning. Use this time to make sure your connection is working, familiarize yourself with the platform and connect informally with other participants via the virtual networking tables.</p>
8:10 – 8:30 AM	<p>Welcome and Icebreaker</p> <p>Tom Wanke (MSOE) and Eric Lanke (NFPA) will call us to order, talk about the technology theme for the day’s session and make some other important announcements including details on utilizing the event platform and conduct an icebreaker exercise.</p>
8:30 – 9:20 AM	<p>Title: “Smart Methods to Solve Complex Hydraulic System Predictions” Presenter: <i>Dave Persson, Owner/President, Hydrasoft Corp.</i></p> <p>Abstract: This presentation addresses “Smart Methods”, versus traditional numerical methods, to markedly improve speed, accuracy and reliability of the equation solving process of complex large Hydraulic Systems. Hydro-Mechanical complex equations are solved using numerical methods to obtain the time response. For example, a Bernoulli flow equation is simple by itself. However, when connected to a valve opening or closing, the momentum of the flow produces a flow force on the spool, which in turn produces motion, and simultaneously opens or closes the area of flow. This type of connectivity, along with others, lead to highly coupled differential equations to solve using “Smart Methods”.</p>
9:20 – 9:40 AM	<p>First Break/Networking Session</p> <p>Use this 20-minute break to attend to details of your morning or join other attendees at a virtual table to network with audio/video. <i>Networking tables during this break will be shuffled every 5 minutes to boost networking opportunities.</i></p>
9:40 – 10:30 AM	<p>Title: “Simulation of Fluid-Structure Interaction in Pipes and Valves” Presenter: <i>Dr. Siva Sashank Tholeti, Senior Application Engineer, COMSOL, Inc.</i></p> <p>Abstract: Fluid flow through pipes and valves forms an integral part of the hydraulic and pneumatic systems used in the fluid power industry. Numerical simulations can be used to better design these systems and predict their performance to effectively cut down on the experimental costs and in cases shorten the time of the design cycle. In the case of fluid flow through pipes and valves, it is not only important to resolve the fluid flow but it is also imperative to resolve the interaction with the surrounding structure. The COMSOL Multiphysics® software is especially suited in these cases as multiple physics can be modeled in the same graphical user interface. This presentation will demonstrate how to model turbulent flow of water through a spring-loaded ball check valve. This involves the use of Fluid-Structure Interaction multi-physics interface. The behavior of this valve is studied under varying functional and reverse flow</p>
10:30 – 10:50 AM	<p>Second Break/Networking Session</p>

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10:50 – 11:40 AM	<p>Title: “An Integrated Design Technology with Data Management Strategy for Fluid Power”</p> <p>Presenter: Ing T. Hong, Ph.D., P.E., President, BarDyne, Inc.</p> <p>Abstract: Today’s fierce competitive environment of industrial products requires companies to grasp the key factors of design integrity, consistency, and expeditiousness early in the product development or upgrade stage to gain a market advantage. This presentation begins by introducing the integrated design principle and process. Next, the design data management strategy and implementation rationale that warrants design consistency is described. That is followed by an illustration of engineering optimization practices based on an expert system that focuses on “how to” formulate the “best” strategy to design a fluid power component that will expeditiously satisfy desired application service requirements. Finally, the design of a practical gerotor pump is used to demonstrate the underlying design technology and data management strategy addressed. The demonstration goes through the process beginning with the inception of setting design requirements then move through performing design calculation and verification, generating CAD drawings, and finally producing a physical prototype using a 3D printer.</p>
11:40 – Log Off	<p>Wrap-Up and Evaluation</p> <p>Tom Wanke (MSOE) will provide some summary comments on the morning, answer any remaining questions, and thank everyone for participating. Please fill out the provided online evaluation survey to gather feedback on the success of this program and to collect ideas for future programs. If you are available, feel free to jump back into your conversations at the networking tables.</p>

Presenter Contact Information

- Dave Persson: dpersson@hydrasoftcorporation.com; (309) 360-5750
- Dr. Siva Sashank Tholeti: sivasashank.tholeti@comsol.com; (781) 273-3322
- Ing T. Hong, Ph.D., P.E.: ithong@bardyne.com (405) 743-4337

NFPA is the **National Fluid Power Association**, a trade association representing more than 300 companies across the fluid power supply chain, that works to strengthen the fluid power industry by convening an effective forum of industry stakeholders, delivering industry statistics and market information, providing opportunities for fluid power promotion and building an educated workforce for the industry. Companies interested in joining NFPA should contact:

Eric Lanke, President/CEO, NFPA (414) 778-3351; elanke@nfpa.com

FPIC is the **Fluid Power Industrial Consortium**, an industry networking group established by the Milwaukee School of Engineering to engage fluid power suppliers, manufacturers, distributors and OEMs in a quarterly series of half-day seminars on the latest fluid power technology advances with immediate implementation. All NFPA members are automatically members of FPIC. Non-NFPA-members interested in joining FPIC should contact:

Tom Wanke, Director, FPIC and Industry Relations, MSOE (414) 277-7191; wanke@msoe.edu

Future Programs:

- September 2, 2021 – “Advanced Software Solutions for Machine Control”
- December 2, 2021 – “Advanced Technologies for Eco-Friendly Fluid Power Systems”
- March 3, 2022 – “Advanced Manufacturing Technologies for FP Components and Systems”
- June 2, 2022– NFPA/FPIC Quarterly Conference –Topic TBD