



# AFT PIPELINE

## The Applied Flow Technology newsletter

### October 2002

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## **New Products - AFT Impulse 2.0**

### **Waterhammer analysis for the expert & non-expert alike**



When released in 1996, AFT Impulse 1.0 was the first waterhammer/surge transient analysis software with a graphical interface, setting a new standard in user friendliness for this class of software. Gone were the days of having to define your system in arcane, line-by-line text entry. As with the pioneering graphical interface design of other AFT software, now you could build your system in a familiar diagrammatic form.

With a version 1.0 you knew something better had to be coming and it arrived early this year in the form of AFT Impulse 2.0, a major upgrade with so many new features that we can only begin to touch upon them here. Among the most notable new features is a new interface, built-in steady-state solver, event based transients and advanced pump transient modeling.

**New interface** - Equipped with all the features of the latest AFT interface design development, AFT Impulse 2.0 now includes;

- Scenario Manager - allows you to have multiple, linked variants of your system model in one data file
- Groups -group any combination of model elements and select objects by group for editing and output reporting
- Database Manager - easily manage your component, pipe and fluids databases, create, edit and share databases and set which databases (local and network) are used in your model
- Graph Sets - save any graphed results as a 'set' for ready recall
- and much more.

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## **Coming Soon -**

### **AFT Arrow 3.0 / AFT Titan 3.0**

**AFT Arrow 3.0** - Scheduled for an October 2002 release, version 3.0 of AFT's best in class compressible flow modeling software will please both new and existing users, with changes both visually apparent and 'under the hood'. AFT Arrow 3.0's interface will include all of the latest interface development, including Scenario Manager, advanced Database Manager, Groups and more. Visually more subtle but equally noticeable when you start running models will be the extended solution methods included. For many systems this results in improved robustness and significantly greater solution speed. Modeling steam systems? Version 3.0 will incorporate the high accuracy steam/water properties engine of AFT's SteamCalc, now with the latest ASME properties.

**AFT Titan 3.0** - If you're familiar with AFT Mercury and its ground breaking technology *IntelliFlow*™ (and if you're not, you should be if your concerned about cost) then you'll be familiar with AFT Titan. Just as AFT Mercury has brought to the engineering community nothing less than a new way to design incompressible flow piping systems with significant cost reductions, AFT Titan brings these capabilities to compressible flow systems. *(continued on page 4)*

## **New aft.com -**



A new aft.com has been online since April 2002, with various features continuing to be added over the next several months. This new website is much more than simply a rearrangement and new colors. The new aft.com includes several new features AFT software users and non-users alike will find useful.

What's the new site offer? For starters, more extensive product information, the latest news, FAQ and Tips sections, distributor info and enhanced download capabilities for latest releases and demos. Want to know when the latest update is available? You can now subscribe to be automatically notified by email and subscribe to this newsletter (of course if you received this newsletter by email, you already knew that). Can't seem to find the time to send in that registration card? No need to now as you can register online!

We welcome you to browse [www.aft.com](http://www.aft.com) and thank you for visiting.

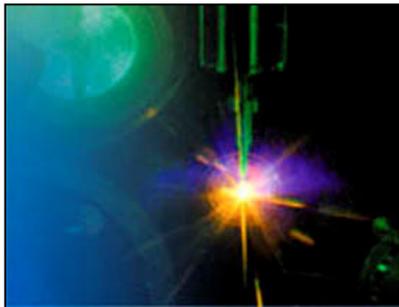


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### Featured Applications - **AFT Arrow** used for Lawrence Livermore's National Ignition Facility

Developing technology to unlock the power of the stars, Lawrence Livermore's National Ignition Facility represents leading edge engineering and science in a number of fields. The primary mission of NIF is to attain fusion ignition in the laboratory. This will provide the basis for future decisions about fusion's potential as a long-term energy source. High-energy-density regimes accessible though NIF experiments will also yield new insight into the origin of our universe.

**A miniature star created inside the Nova laser target chamber, the predecessor to NIF**



Based on the principal of inertial confinement fusion (ICF), a target containing deuterium and tritium is compressed spherically to very high density, and when driven with sufficient energy, to ignite and burn the fusion fuel. Delivering the ignition energy at NIF is a 192 beam, 1.8 megajoule, 500 terawatt laser (that's about 1,000 times the electric generating capacity of the United States - fortunately it only lasts for a few billionths of a second, so you won't have to worry about the lights dimming). Indeed, the laser itself is one of the cutting-edge developments of the NIF. Unlike previous glass-based inertial fusion lasers, the NIF uses a "multi-pass" architecture in which an initial pulse is amplified greatly within a main amplifier cavity, then transported and further amplified enroute to the target chamber.

To cool the amplifiers, NIF engineers need to flow synthetic air uniformly through a maze of meter square beam tubes. LLNL's Ray Finucane used AFT Arrow to model the cooling system, ***"Our application at the National Ignition Facility is hardly a typical one, in fact there's nothing like it anywhere on the globe. Our needs demanded uniform gas flow throughout the beam-tube maze. So selecting a modeling tool robust enough to meet this unique challenge was of critical importance."***

[NIF has a great website](#) describing not only the hardware and current status of the facility's construction, but also highly interesting descriptions of the science and technology that make NIF possible. Discussions of the potential practical applications of inertial fusion energy (IFE) can be found at [UC Berkeley's related website](#).

### Intelligent System Sizing subject of Pump Symposium paper and magazine articles -

Intelligent system sizing, the technology of *IntelliFlow*™ as featured in AFT Mercury and, soon, AFT Titan, has been a hot topic in a number of venues. In a joint paper by Judy Hodgson of Dupont Engineering and Trey Walters of AFT, a description of intelligent system sizing and several real world examples were presented at the 19th International Pump Users Symposium in Houston this past February. The paper received an enthusiastic response and was one of the real hits of the pump show. Show attendees were then able to visit AFT's booth and see a live demonstration, talk to Trey (one of AFT Mercury's developers) and pickup a demo. You can read the paper by clicking [here](#).

Based on the high interest in this subject at the pump show, Chemical Processing magazine asked AFT to author an article on Intelligent System Sizing, which appeared in the June 2002 issue; "Cutting Costs in Pump and Pipe Sizing". If you missed this issue, you'll find the full article [here](#).

Interest continues to run high with a second article to be featured in the October 2002 issue of Pumps & Systems magazine.

Saving cost is almost always a hot topic and that's just what Intelligent System Sizing and *IntelliFlow*™ are all about. The above paper and articles are a great way to learn more about the subject and, of course, you can try it first hand with an [AFT Mercury demo](#).



**Ductwork for amplifier cooling installed above the main amplifier at the National Ignition Facility**



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### **Meet AFT's New Development Engineer - Dave Miller**

If you've called in for tech support over the last few months you've likely already met Dave, at least by phone. Dave joined AFT in May, 2002 as a Development Engineer. As most of us here, Dave wears a couple of hats, so in addition to software development Dave is also our first line of technical support.

Dave's career before joining AFT has varied from being a spy (not really, but he did work for the CIA), a rocket scientist (well, he did work for a rocket engineering and manufacturing company, Martin Marietta) and then finally settled down to engineering software development with Black & Veatch's BV Solutions Group. His stint with Martin Marietta introduced him to Colorado living, which he missed during his several years with Black & Veatch in Kansas thus providing additional motivation to join us recently. Desiring to maximize the Colorado living experience, Dave settled here in beautiful Woodland Park where AFT is located. He and his family not only enjoy living in the shadow of Pikes Peak, but Dave also enjoys the three to five minute commute typical for those living and working in Woodland Park.



Dave and his wife Leslie were busy this past summer relocating their household with the big move finally occurring in August. With all this, Dave still finds time to spend with his four children, including joining a couple of his boys at scout camp this past summer.

So next time you call or email for tech support it won't be a stranger, it's Dave. Be sure to say hello and be prepared to receive some of that outstanding support AFT is known for.



**AFT & Dupont at the summit of 14,005' Mount of the Holy Cross  
Trey Walters, Jeff Olsen, Jeff Warren, Judy Hodgson (Dupont)**

Turns out the hikers of AFT have a kindred spirit in Judy Hodgson of Dupont Engineering. Judy is one of the pump experts at Dupont and a long time user of AFT Fathom and, more recently, AFT Mercury. Compared to some of the complicated pumping systems Judy deals with daily, the Mount of the Holy Cross seemed like a pretty reasonable challenge, so Judy joined our crew of intrepid hikers.

As the photo above documents, the summit was successfully scaled, with everyone having a great time while achieving a well deserved sense of accomplishment. Indeed, the planned eight hour hike only took fourteen hours.

### **AFT & Dupont reach new heights**

With AFT located in the Rocky Mountains of Colorado, it won't come as a surprise that we have a few hiking enthusiasts here at AFT. While Colorado is blessed with a large selection of great hikes to choose from, scaling some of our 14ers, as the 56 mountains within Colorado exceeding 14,000 feet in elevation are called, presents a special treat and challenge. Pikes Peak had been done, of course, being in our back yard, so it was time to look for the next challenge. The mountain of choice was one of the best known, the Mount of the Holy Cross, southwest of Vail. It's name is derived from a unique configuration of rocks on one face of the mountain that, when filled with snow in the winter, appears in the shape of a cross. Besides the unique characteristic that provides its name, it's a pretty good hike, too. From the trailhead you climb 1,000' then descend 1,000' then back up 4,500'. All told, 6,500' vertical over 8 miles - each way.



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### New Products - AFT Impulse 2.0

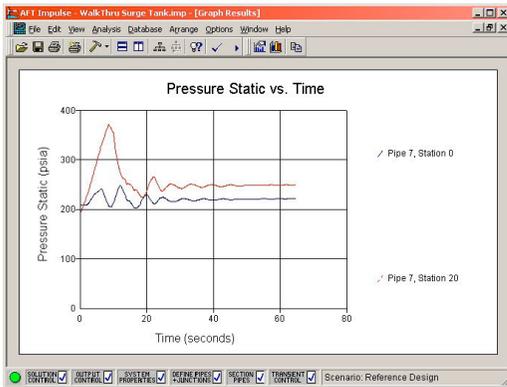
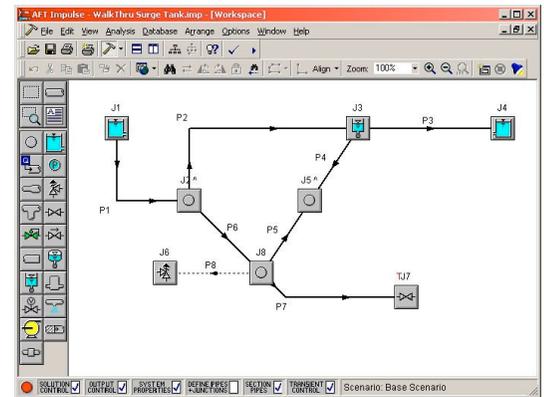
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**Compared to steady-state system failures, transient piping system failures are more likely to be catastrophic, resulting in system down time and/or safety problems**

**Built-in Steady-State Solver** - AFT Impulse has always been able to import AFT Fathom models and results, facilitating the generation of the transient initial conditions. Now, with a built-in steady-state solver based on AFT Fathom, going from steady-state to transient and back again is virtually seamless. Change your design and need to re-run the analysis? Simply run it and AFT Impulse 2.0 first runs the steady-state case to determine the transient initial conditions then proceeds to automatically run the transient case. And, yes, you can still import your model developed in AFT Fathom, in fact, even better than before.

**Event Based Transients** - So, what's an *event based transient* and why is this an advantage? Of course you've always been able to define a transient based on time and still can. For example, a tank fill valve transitions from full open at time = 5 seconds to full closed at time = 7 seconds. But what if, instead, we want to model the valve closing when the tank reaches a specific level and don't know when that level occurs? With AFT Impulse 2.0 you explicitly define the tank fill valve closure to begin based on tank level (just the way it actually works in the real system) - this is an event based transient. Almost any transient can be initiated with an event at any location within the system, with about 90 different events available including; flow, pressure, level, velocity and more. In fact, for some objects such as valves, you can even have cyclic events, modeling not only the fill valve in our example closing when the tank reaches max level, but reopening when the tank level drops. Event based transients let you easily and flexibly model a wide range of control system functions and see how your system will dynamically react.



**Advanced Pump Transient Modeling** - In addition to time vs speed transients, you can now select from a variety of new, advanced pump modeling modes -

- Pump trip with inertia and no backflow - calculates pump deceleration based on inertia of the pump and driver, and hydraulic load
- Pump trip with inertia - Four quadrant - calculates pump deceleration using inertia of the pump and driver, and hydraulic load accounting for the various possibilities of positive/negative flow and head resulting from transient flow and direction reversals
- Pump startup with inertia - pump acceleration determined from inertia and hydraulic load including the various possibilities of positive/negative flow and head

**For the expert and non-expert alike** - Whether you're an experienced transient analysis expert looking for a tool with additional capabilities and features to increase productivity, or a piping systems engineer without transient modeling experience but need to address these issues in your systems, you'll find AFT Impulse 2.0 will fill your needs and then some. You can read more about AFT Impulse 2.0 and download a free, working demo [here](#).

### Coming Soon - AFT Titan 3.0

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Coupling the flow analysis and system modeling capabilities of AFT Arrow with a powerful optimization engine, AFT Titan allows you to intelligently size your compressible flow piping systems for first or life cycle cost. The potential benefits in reduced cost are nothing less than staggering. So check back with us soon at [aft.com](http://aft.com) for the release announcement and availability of working demos.