

AFT Fathom™ Provides Critical Accuracy at Dupont

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Dupont needs little introduction, being a world leader in the development and production of chemicals with over 150 facilities in more than 90 countries and 92,000 employees.

Dupont's vast capabilities in the development and production of chemicals requires extensive underlying resources. Among these are Dupont Engineering who are tasked to support the demands of Dupont's wide ranging activities, including a highly developed specialization in the application of pumps. It was this capability that was called upon to solve a recurring problem at Dupont's Experimental Station.

The Experimental Station is a corporate "university" where new chemicals are developed and safe disposal of chemicals is essential for operation. Key to this safe disposal is an incinerator where combustion breaks complex compounds down into simpler compounds that are the absorbed by a caustic solution circulation system. Critical to the absorber system's operation was a circulating pump that was

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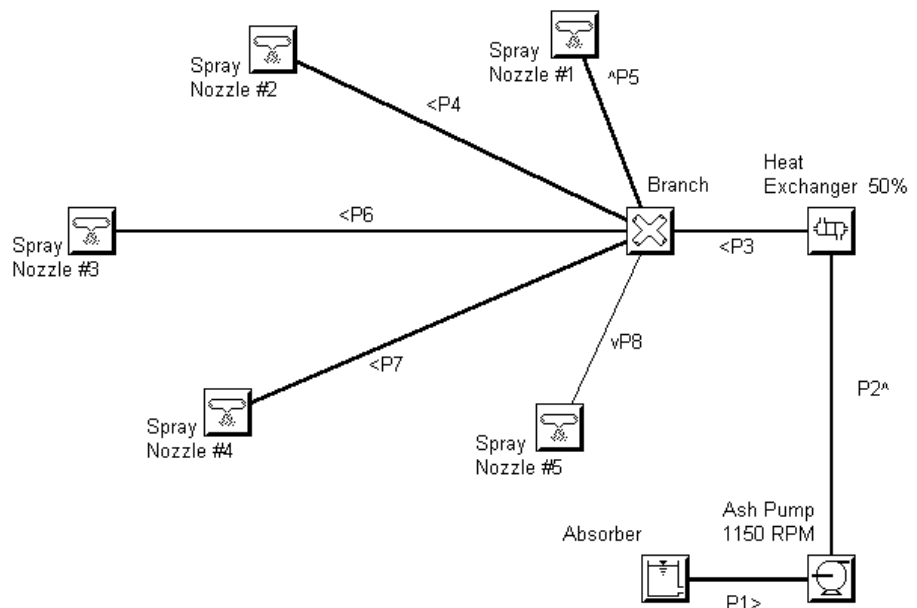
continually failing.

Judy Hodgson, a Pump Consultant at Dupont Engineering, was called in to solve the Experimental Station's problem. Judy determined that the recurring failure of the pump's rubber lining and bearings was due to excessive operating speed. A reduction in operating speed to solve the pump failures could not, however, be allowed to create another, more serious problem; inadequate flow in the absorber system. With no historical data available to indicate where the pump was operating, Judy modeled the caustic circulation system's sump,

circulating pump, heat exchanger, spray nozzles and interconnecting piping using *AFT Fathom*. Knowing pumps don't operate just at a design point, Judy performed a comprehensive analysis of the operating envelope, studying the effects of pump speed, heat exchanger fouling and liquid level. As a result of this analysis, it was concluded that pump speed could be reduced to 1150 RPM, a level commensurate with good

service life of the pump lining and bearings, while providing the required circulation rate of 1,280 gpm. EPA requirements mandated testing to demonstrate the revised pump speed would produce the required flow in the absorber system. Test results were within 1 gpm and 0.1 psi of that predicted by *AFT Fathom*, less than 0.1% error.

Judy explained that Dupont's *Best Practice for Pump Application Design* specifies *AFT Fathom* for



Absorber System

A circulating pump drawing caustic solution from the absorber discharges through a heat exchanger to a distribution hub (J5) to five spray nozzles. Image printed by AFT Fathom. Modeled by Dupont Engineering.

system modeling and analysis; “We are actively directing our full service design contractors to use Fathom on all of our projects”. Dupont’s standardization on *AFT Fathom* followed a comprehensive comparison of available pipe flow software, selecting *AFT Fathom* for the ease of use of its drag & drop interface, Visual Report, extensive output and graphing capabilities and its ability to easily investigate different scenarios. Indeed, all operating scenarios of Dupont’s pumping systems are now analyzed before making decisions on pumps. Emphasizing the benefits, Judy stated; “The speed, accuracy and thoroughness of Fathom, including its documentation capabilities is an order of magnitude better than our previous in-house programs. Fathom does the work for us! Complete documentation is a mouse click away. Multiple scenario runs take only a minute or two. With all possible scenarios run, there’s no need to add fudge factors to pumps.” As Dupont has found, *AFT Fathom* is flow analysis software that provides the kind of confidence that comes from proven results.

AFT Fathom’s capabilities are both deep and wide, as illustrated by the many applications by Dupont, including:

- Boiler feedwater
- Brine supply
- Cooling water
- Fluorobenzene supply
- Hydroheater supply
- Extruder cooling water
- Caustic supply
- Oil supply



For more information on *AFT Fathom*, contact Applied Flow Technology at (800) 589-4943 or (719) 686-1000 or fax us at (719) 686-1001.

Output									
Show: Pipes and Junctions Only		Print Format...		Sort By...		Transfer Results to Initial			
Pipe	Name	Vol. Flow (gal/min)	dH (feet)	Velocity (feet/sec)	dP Total (psid)	dP Friction (psid)	dP Gravity (psid)	Pipe Nominal Size	Length (feet)
1	Suction	1280	0.261	5.2	0.115	0.115	0.00	10 inch	10.
2	Pump Discharge	1280	1.298	8.2	9.852	0.574	9.28	8 inch	28.
3	From Heat Exchanger	1280	6.471	8.2	7.277	2.859	4.42	8 inch	35.
4	Pipe	253	0.079	2.8	0.919	0.035	0.88	6 inch	10.
5	Pipe	251	0.077	2.8	1.360	0.034	1.33	6 inch	10.
6	Pipe	256	0.081	2.8	0.478	0.036	0.44	6 inch	10.
7	Pipe	259	0.083	2.9	0.037	0.037	0.00	6 inch	10.
8	Pipe	260	0.451	6.6	-0.242	0.199	-0.44	4 inch	10.
Jct	Name	Vol. Flow Through Junction (gal/min)		Elevation (feet)	P Inlet (psia)	dP (psid)			
1	Absorber	1280		5.8	13.	0.093			
2	Ash Pump 1150 RPM	1280		1.0	15.	-60.992			
3	Spray Nozzle #2	253		34.0	34.	20.485			
4	Heat Exchanger 50% Branch	1280		22.0	66.	24.386			
5	Branch	N/A		32.0	35.	0.000			
6	Spray Nozzle #1	251		35.0	33.	20.044			
7	Spray Nozzle #3	256		33.0	34.	20.926			
8	Spray Nozzle #4	259		32.0	35.	21.367			
9	Spray Nozzle #5	260		31.0	35.	21.646			

Absorber System

Tabular output and pump vs. system curve...two of the many output options available to document the analysis.

Pump Curve vs. System Curve

