

AFT Arrow™ Results Support Manufacturing Facility Data – Dust Collection Systems Rebalanced

CASE STUDY

Dust Collection System
Manufacturing Industry



TruStile Doors, LLC Denver, Colorado, USA Platinum Pipe Award Winner - Correlation to Test/Field Data

Jeremiah Osborn, maintenance engineer at TruStile Doors, used AFT Arrow to model three systems used for dust collection at the hardwood door manufacturing facility in Northwood, Iowa.

These dust collection systems are essential to ensure employee safety and are an OSHA requirement in the wood processing industry. Dust collection is necessary to prevent explosions and to prevent long term eye and respiratory disease.

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The existing Northwood systems have been modified extensively over the years to accommodate changing process conditions without any rebalancing work. The systems consist of a baghouse filter, a fan and ducting to each machine. The ducting is spiral wound galvanized steel.

Osborn constructed AFT Arrow models to balance the airflow in the systems. Since all the models are heavily branched, only System 3 is shown in this case study (see Figure 1). The models and the results for Systems 1 and 2 are similar to System 3.

Wood dust requires 4,000 - 4,500 ft/min (1219 - 1372 m/min) of airflow for adequate dust collection. Using a Pitot tube and manometer, the main trunk lines on each system were tested and compared to the model data (see Figure 2).

Asked to describe the benefits of using AFT Arrow, Osborn said “Using AFT Arrow to model these dust collection systems was much easier and faster than creating a tool in Excel and/or doing the calculations by hand. These systems are heavily branched, and AFT Arrow handled the complexity with ease. I was also surprised at how easily my models converged and how close they were to field measured data. AFT Arrow also gives me the capability to easily modify the systems when adding new equipment to see how it will affect other dust collection points. Overall, using AFT Arrow made this project easier, cheaper, and more accurate than any alternative.”

TruStile was founded in 1995 on the principles of design flexibility and short lead times. They recognized a market need for a dependable source of high-quality doors easily specified to match any architectural style and application. They have become the nation's leading manufacturer of solid medium density fiberboard (MDF) doors. In 2003, TruStile added a wood door manufacturing plant in Iowa and now has the ability to fulfill virtually any door need for any residential or commercial project.

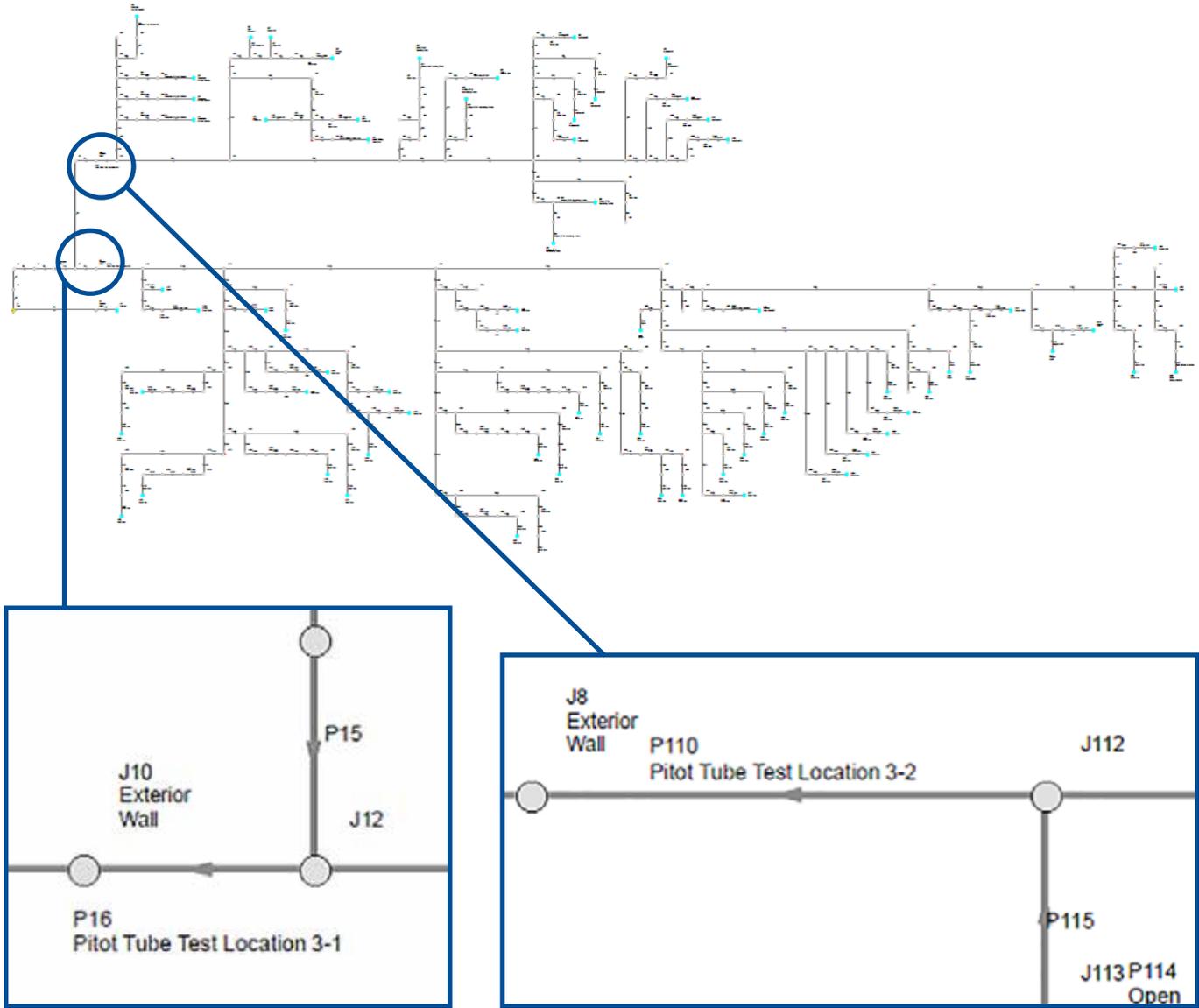


Figure 1 - AFT Arrow model showing Dust Collection System 3

System	Field Velocity ft/min (m/min)	Modeled Velocity ft/min (m/min)	Field Flow Rate ft ³ /min (m ³ /min)	Modeled Flow Rate ft ³ /min (m ³ /min)
NW System 3-1	4,950 (1,509)	4,992 (1522)	27,500 (779)	27,766 (786)
NW System 3-2	3,100 (945)	3,479 (1,060)	32,400 (917)	38,302 (1,085)

Figure 2 - Field measured data & AFT Arrow model predictions - Dust Collection System 3