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Validating Your SPF Applications

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Justin Strombeck started his career in the spray foam industry, over twenty-one years ago, on the contractor side doing both roofing and wall foam applications. Since then, he has been the technical manager for a large chemical company where he oversaw training, built a nationwide technical team, and helped formulate and credential foams in over twenty countries. Over the last five years, Justin has worked for Akurate Dynamics consulting with physicists, mechanical engineers, software engineers, chemists, and other industry professionals, to help move the technology of the equipment used in the spray foam industry forward.

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Wayne is a seasoned professional with a diverse career spanning nearly four decades. With sixteen years of experience as a teacher, he shaped young minds while also working as a contractor for twenty-eight years, honing his skills in construction and SPF. He holds a Bachelor's in Education, Master's in Science, and is a certified electrician, combining his passion for teaching and technical expertise to make a lasting impact in both the classroom and the trades.

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Introduction

Industry overview

- Spray foam accounts for about $2.34 billion in 2023.
- Market acceptance is becoming commonplace.
  - The positives:
    - Building code becoming increasingly difficult to achieve.
    - Outright calling it out.
    - Unmatched performance.

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Introduction

SPF Market Acceptance

- The negatives
  - When done correctly…
  - Low barrier to entry
  - No 3rd party oversight
  - No standards
  - More failed jobs than ever

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Introduction

The role of data-driven decision making pre, during, and post application.

- Accountability for the contractor, chemical manufacturer, and customer.
  - No more pointing fingers
  - Code official peace of mind
  - Limiting exposure

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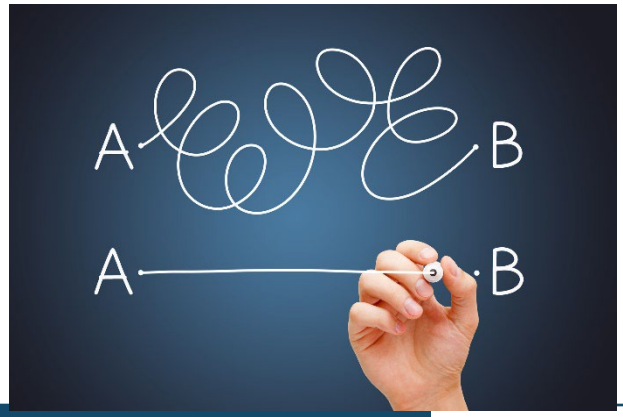
What does data Validation even mean?

- There are two main definitions that are applicable.
- 1. The action of checking or proving the validity or accuracy of something.
  - Proving (demonstrate the truth or existence of something by evidence or argument)
    - Evidence (the available body of facts or information indicating whether a belief or proposition is true or valid)
- To summarize
  - It means “The action of using a “body of facts or information” to validate something.

Definition Continued…

2. The action of making or declaring something legally or officially acceptable.

- To make something “legally official" means to take steps to ensure an agreement, document, or action is recognized and enforceable by law, typically by including necessary elements like signatures from all parties involved, clearly outlining the terms, and following proper legal procedures to establish its validity in a court of law.
  - How do you make data valid in a court of law, it must be properly authenticated, relevant to the case, reliable, and demonstrably unaltered; meaning you need to prove the data's source, ensure it directly relates to the disputed facts, and show that it hasn't been tampered with throughout the collection and preservation process.



Equipment Verification

What kind of equipment

- Proportioner
  - Sensors, where are they, how often do they post?
  - How is data acquisition recorded, and with what accuracy?
  - Data storage, how permanent is this data/ information?
- Environmental
  - Brand (Harbor Freight probably not better than Fluke)
  - Specificity to the “thing” you are testing.
  - Accuracy of the number being recorded?
  - How are the records saved and with what frequency?

Equipment Verification

Trusting your equipment, because “I know what good foam is” isn’t good enough.

- **Validating processing data** means double-checking and making sure that the information you're working with is **correct** before you use it to make decisions or run a process.
- In the same way, when you're using data to run machines, make products, or even just track numbers, it must be **right**. If the data is wrong, everything that depends on it could go wrong too.
  - Think of it like checking your recipe before you start cooking. If you skip reading the instructions or don’t check the ingredients, you could mess up the dish. Maybe you add sugar instead of salt, or you forget an ingredient altogether. That could ruin the food.
  - Another way I like to think of this is like driving a car with a multitude of safety features.

Why is Data Validation Critical?

There are 5 main reasons.

1. Quality Assurance
   - Ensures product consistency and performance
     - Less reliant on the applicator to “read” the foam.
     - If the equipment is gathering the correct data and everything is maintained properly there is little left to the imagination.
   - Accurate record-keeping for insurance purposes.
     - Lawyers are ambulance chasers
     - Homeowners looking for handouts because they have been “researching/ looking into the side effects” on the internet about spray foam.

Why is Data Validation Critical?

2. Compliance and Regulations
   - Adherence to industry standards and environmental regulations.
     - What are the data validation standards in the US?
       - None
     - What are the data validation standards in Canada?
       - Project Details:
         - Date of installation, job location, work order, permit.
       - Environmental Conditions
         - Substrate temps, humidity, relative humidity, etc…

Daily Work Record Form

CALIBER
TRUST YOU CAN BUILD ON

																Y	Y	Y	Y	M	M	D	D
Apprentice:															Appr. Card #								

Project Address:														
	AB	BC	MB	NB	NL	NS	NU	ON	PE	QC	SK	OTHER		
Project Description:													Building Permit Posted: Yes	No
													Building Permit #:	
Person/Company responsible for thermal barrier:														

BASF	Carlisle	Huntsman (HBS)	JM	Shunda SPF	SWD	Other	
	Isocyanate			Resin			
Lot number:							
	Y Y Y Y M M D D			Y Y Y Y M M D D			or
	Y Y Y Y M M D D			Y Y Y Y M M D D			Density: Light Medium Other
Drum Temperature				°F		°C	Color:
Quantity of Cycles Used:							

Manufacturer of Machine:		Model:	
Mixing Chamber Size:		Hose Length:	m ft
Isocyanate psi:		Resin psi:	
Primary Heater Temperature:		Hose Temperature:	°F °C

(hhmm) 24h format		(%)	Wind Velocity Mph Km/h	

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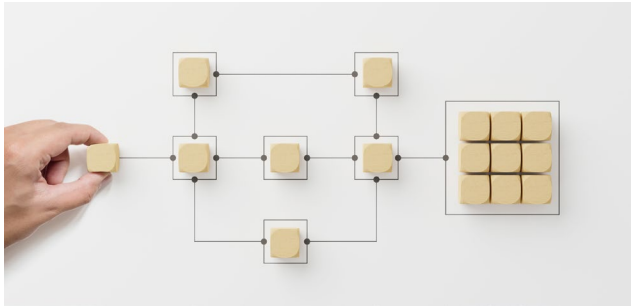
Why is Data Validation Critical?

3. Operational Efficiency - In the event of a failed job.
   - Data acquisition is already done.
   - As much information as possible.
   - Getting to the bottom of the problem ASAP (targeted failure management)
     - For example: If there are definitive conclusive data packets to verify the spray application don't dwell on the equipment as an issue.
     - If you have verified environmental data move on from that as a variable.
   - If using a 3rd party during the discovery phase or as a failure analysis opinion, the best way to clear your company is to have verifiable data to present.
     - If you found out that your (audience) had a job that failed today that you completed 6 months ago, could you produce enough data to clear yourself (company)?



Why is Data Validation Critical?

4. Money - Cost savings through accurate Job assessment.
   - Yield
     - Get consistent results person to person, crew to crew
     - Be accurate, making decisions with bad numbers isn't wise
   - Jobsite efficiency
     - Equipment set up/ dialing the chemical in
     - Environmental flexibility, when to spray and when not to
     - Substrate and environmental effects on chemical and personnel.
   - Targeted training for employees
     - Not just a general online training.
     - For example: The skin of the foam is 10% of the overall yield.
     - For example: Fluid dynamics and its effects on physical properties of the spray foam plastic and just turning up the temps until the foam starts to shrink is bad idea.

Why is Data Validation Critical?

5. Customer Satisfaction - Professionalism
   - Builds trust for all party's: applicator, chemical supplier and end user.
     - Not just a “good ol’ boy” handshake
       - Don’t just say it Prove It.
     - Trust is what the best business is built on.
   - Reduced warranty claims/ call backs
     - A trained contractor with validated provable data, is going to have less issues.
     - We are all in this together… no one wants jobs to fail!
       - This leads to a stronger industry
       - Keeps everyone on the same playing field

Wayne Davison

My Journey into the spray foam industry.

- Transition from a GC into a Spray Foam professional- Quality Issues
- Training
  - Woefully lacking
  - Learning through making mistakes on the job
- Experience- Thank you customer

Quality Control (Historically)

- Environmental Measurements- Not provable but good to have
- Density Check- Unreliable, small piece of the overall puzzle
- Visual Inspection- Unreliable
- Ratio- Barrels emptied at the same time, so I'm good, right?

Post Application Struggles

Then the unthinkable, reality sets in

- Loss of future jobs- That builder no longer uses me
- No Data- I couldn't prove I did it right
- Potential Legal Exposure- The builder was threatening legal action
- Chemical Manufacturer Response- Oops, my bad, sorry

Another failure – or was it?

- Persistent odor- not foam related
- Medical Issues- coincidental
- No data- I couldn't prove that I did it right
- Foam Removal- Even though it was "good foam."

Looking inward to improve the future

How do I avoid putting myself/ company in this situation again?

- Installing on ratio, properly mixed foam
  - Temperature
  - Viscosity
  - Modulating pumps controlled by flow
- The benefits of verifiable data collection.
  - Confidence/ Integrity- there is no price you can put on this
    - 1/20,000 of gallon recorded every 5 milliseconds is what I choose.
    - 14 temperature sensor actively controlling their zone, not passively.
    - 4 pressure sensors
    - Separates us from competition
    - Better yield as a byproduct
    - Inventory Accountability
    - Limits legal exposure

What does good foam look like?

- Its about the data, not the aesthetics
- When people ask me what good foam looks like its like the matrix – its about the numbers
- Since my transformation of philosophy, I've had exactly 0 failures

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Legal Burdens

Summary of Key Legal Concerns:

- **Reliability and accuracy** of the data: If the data cannot be reliably tied to the equipment or the event in question, it may be excluded.
- **Chain of custody**: Ensuring that the data has been handled and stored securely to avoid tampering or loss.
- **Verification**: The equipment's data collection and reporting methods must be verified by experts to ensure the data's credibility.

In essence, while construction equipment data can be extremely valuable in legal cases, it must meet certain standards of reliability, accuracy, and verification to be admissible in court. Without these guarantees, the data risks being excluded due to doubts about its integrity.

Software and Automation

Leveraging data validation tools in software systems.

- Because you can't be an expert at everything
  - Physicist, mechanical engineer, software engineer, chemist…
- Theres a lot going on
  - Masking, GC, Homeowner, No shows…
- Level up your crew
- Software automation is not an opinion
  - Don’t leave $500,000 decisions up to the crew

Automated alerts for anomalies in material or application data.

- You're not always in front of your equipment
- An alert may not be a failure
- Ultimately, we are trying to stay inside of the manufacture's guidelines

In Summary

1. Best Practices for Data Validation

1. Standardize Data Collection Processes

- Define clear protocols for data entry, data storage, pre, active and post monitoring.

2. Regular Training

- Educate staff on the importance of data accuracy and validation.

3. Invest in Technology

- Use advanced sensors, IoT devices, and software for real-time validation.

4. Conduct Periodic Audits

- Use of a 3rd party for the Review of all data logs and validation processes and information for continuous improvement.