

# An Introduction to Roof Inspection Software:

# Tools of the Modern Roofing Contractor

By Nick Warndorf

Photo Credit: iStock.com/kirisa99

It is no secret that the construction industry is slow to change. A recent study published by the World Economic Forum addresses the need for the construction industry to adopt technology in order to reshape the future as we know it. One of the main reasons for this need is that construction is considered an industry that affects all others.

Inefficiency and lack of productivity are the nemeses of all construction trades, which often fall short in some of the most basic facets of modern business, such as communication and planning. A report presented to the World Economic Forum in 2018 stated that “Large productivity improvements can be achieved by optimizing existing processes; the broader use of ‘lean’ principles and methods, for instance, could reduce completion times by 30% and cut costs by 15%.”<sup>1</sup> With regard to roofing, the National Roofing Contractors Association (NRCA) in 2018 reported continuing increases of 14% in revenue expected in the industry with an average of 6% profit margin.<sup>2</sup> While this is not new information for most of us, the data justify giving these figures extreme consideration, because even a marginal impact on efficiency has the potential for significant results.

That is where technology can assist in making improvements. Advancements in

modern technology have the potential to completely reshape the future of construction projects. We now have programs at our disposal, with open application programming interfaces (APIs) that will talk to one another across platforms and share information automatically.<sup>3</sup> We have unmanned aerial vehicles (UAVs) that will fly automated, pre-determined flight paths, mapping work sites and job progress in 3-D, utilizing building information modeling (BIM).<sup>4</sup> In our lifetime, we may even see the implementation of robotics as an everyday tool in lift assistance and material installation.<sup>5</sup> As amazing as this technology is, there is a hiccup, and a question begs to be answered: Why are we still seeing installers and supervisors who struggle with basic data capture and utilization such as digital job folders and plans, as well as scheduling and picture/video progress reporting?

It is important to mention here that I am a contractor in a crossover role, providing investigative and expert witness services to clients and contractors alike. In the day-to-day execution of my job duties, I not only use a

variety of programs that we already have, but I am constantly testing new products and software to find the best solutions. The goal is always to provide a high level of



Audit - 35/35 - 100%		
Question	Response	Details
<b>Site Details</b>		
Site / Project Name	US Cold LaVergne	
This Safety Audit is to show the results of the Safety Inspection performed by the Safety Director of Don Kennedy Roofing Co., Inc.		
<b>Work Areas</b>		Score (5/5) 100%
Do you wish to examine work areas on this safety walk?	Yes	
General Housekeeping (neat, tidy, dust free)	Yes	
 <p>Appendix 1</p>		
Walkways (free of debris and obstructions)	Yes	
Doorways (clear of clutter and debris)	N/A	
Sides or Holes (safety guards or covered)	Yes	
Hole openings in roof (none present, or adequately marked and covered)	Yes	
Material Storage/Lay Down (neat and tidy)	Safe	
 <p>Appendix 2</p>		
<b>Personal Protective Equipment (PPE)</b>		Score (4/4) 100%
Do you wish to examine PPE on this safety walk?	Yes	
201800012 Don Kennedy Roofing Co., Inc. Safety Inspection Score (35/35) 100%		

Figure 1 – Safety inspection example of auditor program used for customized picture reports.

service to our clients in the clearest way possible that is also efficient. That being said, this article is primarily a roofer's perspective on what software the industry needs regarding investigative services. Hopefully my experiences with software will help guide the readers toward more effective means of communicating complex conditions to their clients. I won't advocate here for any one program per se, but I would welcome discussion outside of this article.

The solution, I believe, lies within the elegant simplicity of integrating existing processes and advanced technology. All projects are ultimately at the mercy of the installer, and installers must understand and internalize key concepts efficiently. This has an immediate effect in field operations among an aging and increasingly multilingual work force. Easier said than done, right? With that in mind, technology is pushing us well outside of our comfort zones by requiring us to adopt new software to communicate and organize in a completely digital environment where physical plans and verbal communication have always been the norm.

Even if you don't want to dive headfirst into the deep end of software and submerge your business in new tech, where would you even start just trying to dip your toe in the technology pool? This is another big question many contractors face today, which leads to stagnation in implementation, confusion among their ranks, and fear that the upheaval in keeping up with a tech revolution will trade time-tested behavior for broken processes. This article is intended to answer these questions and address some of the programs currently in operation in the roofing industry and how they are helping and/or hindering daily data collection and decision-making.

## WHAT CONTRACTORS NEED AND WHAT CLIENTS WANT

While it is important to discuss advancements in new technology, it is also important to discuss why there is such an emphasis on technology in the first place.

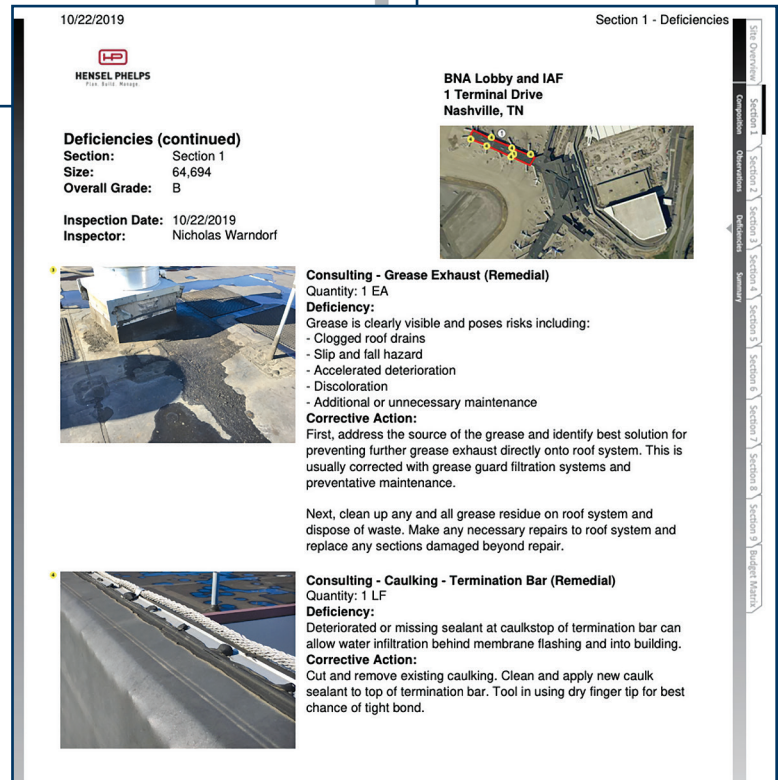
Something we have to remember is that the majority of our mid-level management comes directly from the field, generally based on their ability to perform above their peers as installers. The indirect result, however, is that our best installers are moved into roles in management and administration for which they may never have been trained and may not be qualified to do. This move also produces a deficit in the field in skilled labor and oversight, where there already exists a critical shortage of both. Therefore, mid-level managers need tools that will do the organizing and administration for them so they can focus their efforts on replicating themselves among their existing workforce. Mid-level managers also need to be trained and comfortable with using the technology.

Clients come in many forms, but in my experience, they are most commonly



Figure 2 – FCS standard recommendations page that follows a detailed roof report appearing at the end.

Figure 3 – FCS standard deficiencies page detailing observed conditions and potential corrective action. This feature can also include price if chosen.



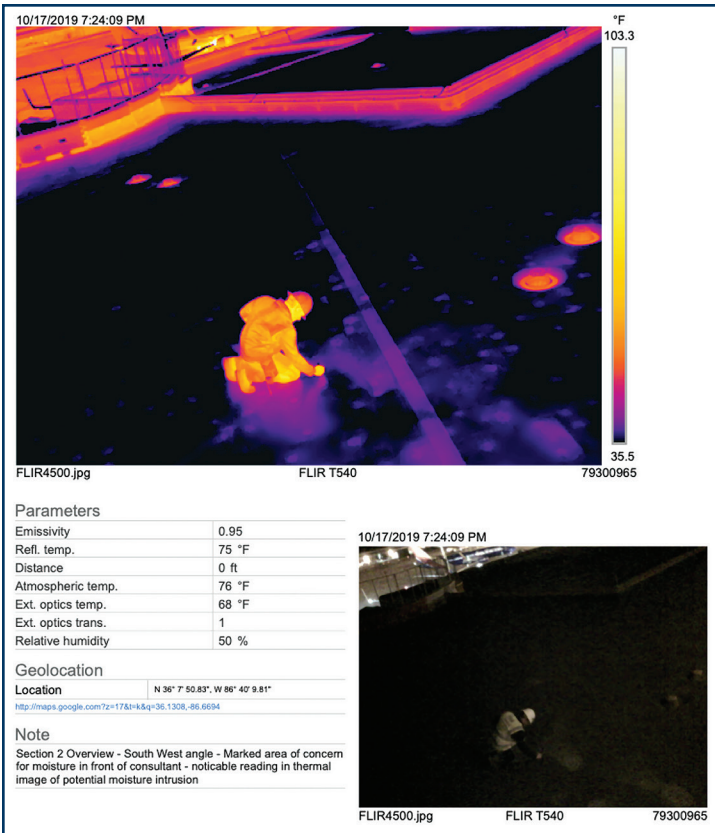


Figure 4 – FLIR Tools+ image from standard reporting with some limited adjustments—simple, but effective, and which may not be available for much longer.

Technology can help bridge the gaps between the contractor and the client through efficiency and communication. Because there are so many programs on the estimating and project management side, and because they would exceed the scope of this article, we will focus primarily on the

ing tools specific to the roofing industry. The software used can make a huge impact.

Keep in mind that a client has a building enclosure problem that they need to solve, and the roof system is a critical component of the system as a whole. They want to address persistent moisture intrusion,

need for consistent, predictable report-

energy efficiency, increased green/usable space, or, in some cases, all of the above. Unfortunately, the myriad of material types and specs can be overwhelming to those not in the roofing industry, and they need a simple solution incorporating all of their needs without breaking the bank or putting them at risk of litigation. The client must trust the diagnosis, recommendation, and skill of the



Figure 5 – FCS standard observation overview page at the beginning of a detailed roof report. Gives the client a general overview of conditions observed that don't necessarily need correcting.

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Submit articles or questions to Executive Editor Kristen Ammerman at 800-828-1902 or [kammerman@iibec.org](mailto:kammerman@iibec.org).

ROOF SYSTEM	TYPICAL DEFECTS
Built-up (3- or 4-ply)	Exposed felts, wind scour, blisters, asphalt migration (down slope), ply slippage (down slope), exposed embedded metal, inadequately filled pitch pockets, splits, or tears.
Modified bitumen (2-ply)	Open seams, inadequate bleedout, exposed bleedout, blisters, fishmouths, wrinkles, exposed reinforcing scrim, loss of granules, inadequately filled pitch pockets, punctures, tears, or splits.
Single-ply (heat-welded polymer)	Open-lap seams, short-lap seams, fishmouths, wrinkles, inadequately filled pitch pockets, punctures, tears, or splits.
Single-ply (adhered rubber)	Open-lap seams, short-lap seams, fishmouths, wrinkles, inadequately filled pitch pockets, punctures, tears, or splits.
Metal (standing-seam)	Open seams at standing seams, missing or backed-out fasteners, buckling of pans, scratches, dents, or corrosion.

Figure 6 – Image from 2008 Interface article about ROOFER program.

installer in order to demonstrate their own sound judgment in a decision-making role. An even more sobering insight is that roofing can account for as much as 80% of the total building envelope area, and it has been reported that over 90% of all roofs experience significant problems within their first five years of installation.<sup>6</sup> This same source reports that roofing accounts for roughly 75% of all new construction litigation.<sup>7</sup> Still another, albeit older, source quotes that number to be somewhere between 60 and 80%.<sup>8</sup>

Bearing all of this in mind, the contractor has to get the bid right, with clear and actionable information that the client will understand. All of this begins with the pre-estimate inspection. Based on conversations with roofing contractors around the country and individual research conducted about what works and what doesn't, there are several programs in common use. Here are some of the most commonly used reporting programs, both old and new:

1. Roof Logic
2. FCS Control
3. QuickBase
4. Form Connect
5. PDSpect
6. ROOFER Program (U.S. Army Corps of Engineers)
7. Company Cam
8. Flir Tools and Flir Tools+
9. iAuditor

Without getting into too much detail, these are good programs from a functional standpoint, but like everything, they have their respective limitations, and not every program is a good fit for every organization. Where many programs fall short is in simplicity and accessibility. They generally require a highly trained and seasoned inspector and/or consultant with extensive field knowledge to use them to their greatest

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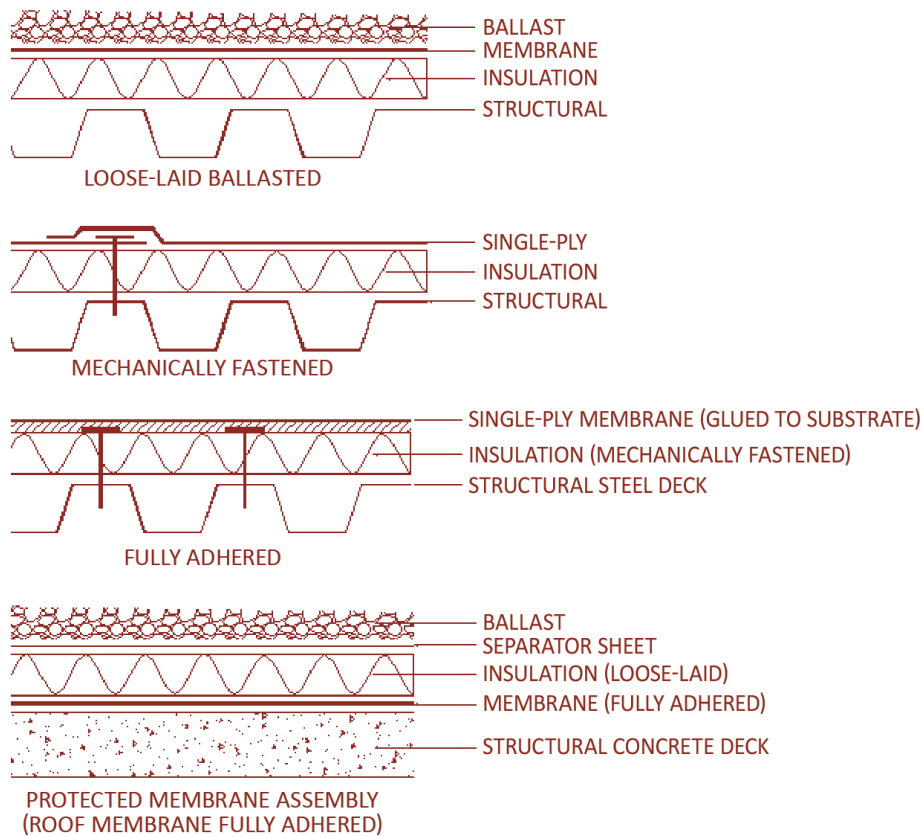


Figure 7 – Image from 2008 Interface article about ROOFER program.



Figure 8 – CompanyCam overview; by far one of the easiest applications for field techs to report job progress.

potential. A program’s inefficiency, however, is ultimately its downfall. Inspectors need programs with scripted deficiency identification, as well as corrective action instructions that both the client and the field tech can understand. After all, roughly 90% of all of our identified roofing deficiencies in the average pre-estimate inspection are repeating, with 10% or less falling into the more complex categories. These deficiencies also need pricing with general cost kept up to date so that the user doesn’t waste a lot of time on the estimating process, and there’s less interpretation among varied sources on what cost “should” be versus what it actually is.

Another limitation in locating the right software is finding a program that will accommodate the appropriate wording. To quote Mark Twain, “The difference between the right word and almost the right word is the difference between lightning and the lightning bug.” This is powerful imagery from one of the greatest prose writers in history, yet it illustrates the importance of impactful statements in how we utilize language in our daily lives. I’ve read hundreds of reports, and I think it is safe to say that very few were little more than

window dressing. Or, to quote a friend and forensic architect, Harrison McCampbell, wordy reporting can be like a lemon-meringue-filled pie—nice appearance on the outside, but not much substance on the inside. The irony is that I believe you need a healthy dose of both. The aim is to tell the client a story they can follow.

That being said, good reporting software should incorporate both data and information that is useful to all parties involved—information I generally refer to as actionable intelligence. This is good, sound information that lets the building do the talking, that a trained eye can translate, and that the client will understand. Some of the essential information is listed below:

- Roof/building age
- Weather during inspection
- Relative humidity
- Internal/external temperatures
- Material temperature
- Moisture readings
- Core samples
- Infrared temperature readings/thermal images
- Roof system “layers”
- Roof material type
- Intended building use and/or original design specs
- Terminations
- Drainage
- Penetrations
- Outstanding deficiencies
- Roof facet quantities and measurements (curbs, walls, penetrations, etc.)
- “Red flag” items (ponding water, poor design, limited access, limited door and window thresholds, special/unusual site conditions, etc.)

We must inspect and report on these conditions to answer a myriad of questions, such as:

- Does the proposed system accommodate its intended function?
- Does the cost of repair outweigh the cost of a new roof? If so, can repairs be made to provide more time to budget for the roof that the building needs rather than what the client can afford?
- Are there other issues, such as condensation, exterior wall moisture intrusion, fenestration, or plumbing failures that are being misdiagnosed as roof leaks, etc.?

Good software will accommodate and incorporate all of the above.

The problem inspectors often face is that reporting software has predetermined explanations that are dated or inaccurate. Some programs don't allow for list customization. Some allow for customization but have limited functionality in their templates and data collection capabilities. Some programs are very simple to use and require minimal training but lack deficiency templates. This makes reporting more open-ended, providing a less professional presentation to the client. Many perform well, yet all fall short of total satisfaction in design and performance.

Assuming that what was promised in the contract was delivered during installation, the newly installed system now must be maintained per the manufacturer's war-

ranty requirements. Most manufacturers will require an array of exclusions to be addressed if warranty coverage is to remain valid.<sup>9</sup> It is obvious that clients should employ regularly scheduled maintenance to ensure the greatest possible longevity of the roof system. There is no substitute for routine maintenance. The alternative is like driving your car without ever changing the oil. It just doesn't make sense not to incorporate such a substantial piece of the building enclosure.

An article published in *Interface* in 2008 references the same concerns that we still have today with regard to proper maintenance programs in the industry:

The objective of a roof maintenance program is to extend the expected useful life (EUL) of a roof system. The elements comprising such a program are periodic inspections, routine maintenance and repair, and correct application of quality roofing products. One of the first major organizations in the United States to adopt a formal roof maintenance management program was the U.S. Air Force (USAF).<sup>10</sup>

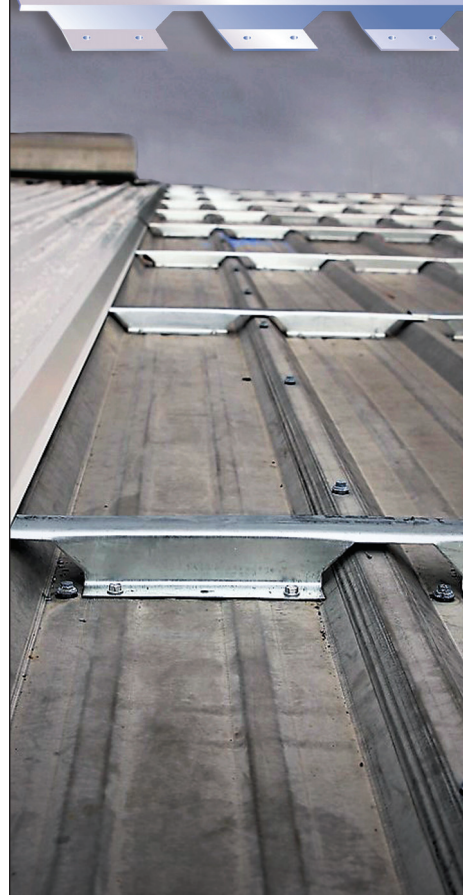
Not much has changed in the industry regarding attitudes about roof maintenance—both from the contractor and client standpoint—since 2008 when this statement was published. The technology, however, has changed significantly. Roof reporting and inspection software may very well dictate the difference between winning and losing a job in the years to come. Decision-makers are increasingly seeking digital access to their portfolios. I have conducted an equal number of client onboarding meetings for people near retirement and their colleagues closer to their 30s, with increasing regularity favoring the latter. In a world of podcasts, apps, and social media, the general expectation is that information can be consumed quickly in a mobile format. Future clients will be seeking more accessible web-based access to roofing insights.

#### WHAT THE INDUSTRY NEEDS

What we need are programs specific to roofing with

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Roof reporting and inspection software may very well dictate the difference between winning and losing a job in the years to come.



Figure 9 – Customized MS Word consulting report the author uses for specific inspections.

open APIs to help supplement their shortcomings. Few business owners are willing to take a chance on new software for fear that the cost of confusion will outweigh the potential gains. As most software providers will tell you, “You will only get out of this product what you put into it.”

This leaves most of us pursuing two options: Build your own, or work with what you’ve got. To address this challenge, we as contractors at Don Kennedy Roofing are currently pursuing both options simultaneously, taking what we learn in one program to supplement another. We are essentially applying specific tools to specific jobs and suffering through the fact that they don’t play well with one another. It is not uncommon for me to write a report in one pro-

gram for a service client and write another report in MS Word for a legal inspection report.

The ideal software for our industry does not and most likely will not exist as long as individual companies continue to shield their APIs and attempt to gain market share. At some point, it would seem, the cost of overhead would eventually outweigh the value of the subscription itself. Therefore, I contend that the best approach would be industry partnerships with open-source material and open APIs to be brokered by progressive think tanks such as the Roofing Technology Think Tank (RT3).<sup>11</sup>

Better results lead to happier, loyal clients and a vastly improved industry as a whole.

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Nick Warndorf is director of consulting services at Don Kennedy Roofing in Nashville, TN. He entered the roofing industry as a sheet metal installer after earning a master’s degree from the University of Louisville studying unconventional warfare. Since then he has been a part of nationally recognized award-winning projects and overseen countless others in five different states. As a consultant he specializes in moisture intrusion solutions and teaches key concepts to sales reps and field techs.

## Construction Industry Lags in Tech Adoption

A 2018 survey of construction and engineering industry chief information officers by KPMG showed that just 23% had a “clear digital business vision and strategy,” compared with 32% of all industries. Another 23% reported having a digital business strategy for certain business units, leaving 54% of construction/engineering firms entirely lacking a clear digital business strategy. Even so, that is a huge improvement over years past.