

The Assembly Line of Roof Consulting:

Moving Beyond Cut-and-Paste Approaches and Getting Back to True Design

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Figure 1. On-site roof work for preparation of roof design.

Development of automated systems such as roof uplift calculators, pre-engineered computer-aided design drawings, and copy-and-paste specification preparation has all but eliminated the art of traditional roof design engineering. These advancements certainly have driven the industry forward, and the achievements that have been accomplished should not be diminished; however, if the principles behind design are lost and we simply rely on automated systems, we are doing the industry a disservice. In Cal Newport's 2016 book, *Deep Work: Rules for Focused Success in a Distracted World*, he notes that in the era in which we live, "anything Internet related is understood by default to be innovative and necessary." The charge throughout this article will be to challenge this idea. We contend that innovation, while necessary, should be used to help

guide, rather than dictate, how we approach roofing design.

Most design professionals would agree that roofing technology and design-related developments are advancing more rapidly now than in any time in history. One of the benefits of working for a firm that has been around for 50-plus years is the library of resources that has been made available to us. From that library, we pulled volume 1, issue 1 of the *International Journal of Roofing Technology*, published by the National Roofing Contractors Association. The editorial of that journal points out that prior to 1960, technical literature related to low-slope roofing was essentially nonexistent. It was not until the mid-1960s that technical papers on roofing began to find their way into the hands of industry professionals. What drove the industry to push research and publish those findings? Failing roofs! The question we pose now is this: With 60 years of industry research

and advancement, why do we continue to have failed roofs?

Neglecting material failures, the bulk of the blame has been placed predominantly on installation practices and the lack of proper oversight from both the general contracting firm and the roofing subcontractor. Skilled labor has become a contentious issue in the industry and is frequently blamed for the problems with the quality of the roofing installation. While failures related to worker-related defects such as unadhered membrane laps or improper securement are readily seen, failed systems are often attributable to unique details that are not properly designed or installed. So, when thinking about the skilled labor question, we must consider how it relates to roofing design professionals and the necessity of properly designing and accounting for a project's unique conditions.

One of the largest challenges for our industry is the lack of design professionals who truly

understand both the technology and the history necessary to generate adequate designs. Just as roofing contractors are responsible for ensuring installation is done correctly, roofing designers are responsible for ensuring design documents are complete and appropriate for the project. When critical components are left out of the design, questions from the contractors have to be solved either through the request-for-information process or through the “what has always worked before will work here” approach. We have continued to see a shift in the industry, due largely in part to the lack of funding and competency, in which designers have moved away from due-diligence design to limited designs that rely more on the contractor’s experience. To ensure the future of the roof consulting practice, we should, as an industry, challenge this approach and return to the due-diligence methods that were once required (Fig. 1).

Roofing design has progressed drastically

from rag felts and coal-tar pitch. As U.S. building codes and standards increasingly emphasized the heating and cooling of buildings, additional roofing components and technological advancements were necessary to meet the new design requirements. The added complexity of these roofing systems forced designers to think deeply about transitions, interfaces, attachment, compatibility, and end-user maintenance. As more research and advancements continued to be introduced, pre-engineered systems were developed and incorporated into project documents. In the current state of roofing design, it is not uncommon for designers to select a pre-engineered system based on where the project is; use a computer program to calculate the wind uplift, drainage, and insulation requirements; select details from a library of standard details; and copy and paste specifications. More recently, technological advancements have been introduced to provide aerial earth imagery measurements of roof areas.

There has even been discussion about whether there is a real need to get on a roof prior to producing design documents. It is our opinion that overreliance on and overconfidence about such pre-engineered systems, as well as the absence of proper mentoring and training, have diminished the end products and hindered the growth of design professionals.

As it relates to reroofing design, there is, and will always be, value in having boots on the ground. There is value in measuring a roof by hand, walking the roof, looking at challenging details, checking for signs of previous leaks, making roof openings to verify existing conditions, measuring slope, testing fastener resistance, and doing so many other things that can only be accomplished in the field. Verifying the type of roof deck is probably the most important element of reroofing design, and it is best accomplished while on site (Fig. 2).

Figure 2. Pull testing to evaluate existing roof deck.



PROFESSIONAL MENTORS

Both authors of this paper have been fortunate in their careers to have worked at one of the founding and most premier roof consulting firms. Both began their careers as consultants working under the leadership and guidance of Stuart Sutton, the owner of Stafford Consulting Engineers (since acquired by Terracon). While neither author was able to work directly under Robert M. Stafford (the founder of Stafford Consulting), they have been guided by many of the principles of roof design work that he shared with Sutton.

Furthermore, the ability to train and mentor upcoming design professionals with a hands-on approach is fundamental to the future of the industry. The lessons the authors have learned through hands-on experience from mentors such as Stuart Sutton are invaluable, and we believe such lessons to be one of the greatest factors for growth. Elimination of these fundamental processes, we would argue, would denigrate consulting to commoditization. The successful future of roofing design depends on the designer's ability to learn in the field, correctly use technological systems that have been developed, and understand why and how these systems work.

It is our opinion that every specific transition, penetration, and termination should be detailed; however, project budgetary constraints often no longer allow the time required to generate those details. Furthermore, providing a set of project specifications that clearly align with the design drawings is necessary for proper implementation. Including project specifications directly on the drawings has become a recent trend, but care should be taken to avoid excluding the information needed by the installer to properly install the systems. As a design community, we have relied heavily on project submittals. Stamps are readily affixed on project submittals and are given the authority to dictate how the project is executed. Specifications should not be executed during

the design process as a checklist; rather, they should be a companion document to the drawings and carefully cross referenced to ensure proper guidance during the installation process. Submittals should serve as confirmation of the project documents rather than as a substitute for the project specifications. Standard drawings and specifications should not be substituted for true design.

The reliance on standardized project documents such as predefined specifications and



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computer-aided design drawings perpetuates inadequacy and, in turn, calls into question the overall value of working with a designer. For most owners, a roof replacement project is one of the larger expenses they will pay for as they maintain their asset. As designers, we must ensure that the efforts placed on these projects are given the amount of attention that is due, and we should align our consulting fees with the specific project's complexity and quality, rather than allowing fees to be dictated based on the owner's budget. For our industry to survive, we must challenge the status quo, perform the necessary due diligence, and provide services of real value for projects, rather than relying on end products that take away from understanding and true design. The addition of a consultant to the project should provide owners as well as contractors with peace of mind. Establishing quality deliverables from the design through to the contract administration phase is how true value should be defined.

George Santayana famously wrote, "Those who cannot remember the past are condemned to repeat it." Hopefully, this article has challenged your opinion of this quote, which we would respectfully revise as, "Those who do not combine history with technology are condemned to failure." 

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