

## **2027-28 RESEARCH FOCUS AREAS**

### **# 1 - Robotics and Automation for Roofing Operations**

#### **Purpose**

The Roofing Alliance invites universities and research institutions to submit proposals exploring the development, adaptation or application of robotics and automated technologies to improve safety, productivity and efficiency in roof tear-off, installation, inspection and maintenance operations.

The Roofing Alliance is particularly interested in practical technologies that can reduce the need for workers to perform physically demanding, repetitive or hazardous tasks on the roof while improving the efficiency and quality of roofing operations.

#### **Areas of Interest**

Proposals should focus on one or more of the following applications:

- Roof tear-off and material removal: Robotic or automated systems capable of assisting with or performing roof tear-off, removal, collection and/or transport of existing roofing materials.
- Roof installation: Robotic or automated technologies capable of assisting with or performing aspects of roof system installation, including material placement, fastening, application, handling or other repetitive and labor-intensive installation tasks.
- Leak detection and roof inspection: Robotic, autonomous or semi-autonomous technologies capable of identifying leaks, moisture intrusion, deterioration or other roof system deficiencies.

Applicable emerging technologies include robotics, drones, autonomous equipment, artificial intelligence, machine vision, and other sensors. Researchers are also encouraged to identify existing technologies used in other industries that could be adapted for roofing applications.

#### **Desired Outcomes**

Projects must seek to:

- Reduce worker exposure to hazardous or physically demanding roofing operations.
- Improve the speed and accuracy of roof inspections and leak detection, while also increasing productivity and efficiency.
- Evaluate the technical and economic feasibility of broad adoption of proposed technologies.

- Identify barriers to implementation in real-world roofing environments.
- Develop and test a prototype or proof of concept of the proposed technology, or test and evaluate the potential application of existing technology, to show its feasibility for broader adoption.

Projects must include participation from roofing contractors. Preference will be given to projects that include testing under actual roofing conditions.

**Subject line:** Roofing Alliance 2027–2028 Research Proposal – Robotics and Automation

## **#2 - Retention Economics: Quantifying the Cost of Installer Turnover and the Value of Retention**

### **Purpose**

The Roofing Alliance invites universities and research institutions to submit proposals to quantify the true financial and operational cost to a roofing contractor when an installer leaves the company and to identify retention practices that measurably reduce turnover.

Workforce recruitment remains a significant challenge for the roofing industry, but retaining skilled employees is equally critical. Contractors invest substantial resources in recruiting, onboarding, training and developing employees, yet the full cost of losing an installer—and the financial value of successfully retaining that employee—is not well understood or consistently measured.

The research should generate credible, roofing-specific evidence that enables contractors to answer three fundamental questions:

1. What does it actually cost to lose and replace an installer?
2. What is the financial value of retaining installers for longer periods?
3. Which retention practices produce the greatest measurable return on investment?

### **Research Objectives**

The project should seek to establish the actual cost of installer turnover within roofing companies and determine which retention practices have the greatest measurable impact.

The research must consider:

- Direct replacement costs, including recruiting, hiring, onboarding, training and management time.
- Time and costs required for new installers to reach full productivity.
- Lost productivity, overtime, additional labor and operational disruption associated with vacancies and employee transitions.
- Effects on crew productivity, scheduling, project completion, safety, quality, rework and customer outcomes.

Differences in turnover costs and the financial value of improved retention based on employee tenure, experience, skill level and reductions in turnover. The research also should identify and evaluate retention practices used by roofing contractors and other construction trades to determine which approaches measurably improve employee retention.

These may include compensation and benefits, onboarding, training and career development, mentorship, supervisor and crew-leader practices, recognition programs, workplace culture, communication, scheduling, advancement opportunities and other strategies identified through the research.

## **Desired Outcomes**

The Roofing Alliance is particularly interested in research that moves beyond general workforce recommendations and provides contractors with measurable, actionable information.

Deliverables should include:

- An industry-specific estimate or model for calculating the true cost of losing and replacing an installer.
- Identification of the factors most strongly associated with installer turnover and retention.
- Identification of retention practices demonstrated to produce measurable improvements.
- Analysis of the cost and potential return on investment of implementing those practices.
- Provide roofing contractors with evidence, benchmarks, financial models and practical tools they can use to make better retention decisions.

The research should use actual contractor workforce and financial data and examine differences based on company size, geography, market sector, employee tenure and other relevant factors. A plan for how this data will be collected and maintained must be included in the proposal.

The ultimate goal is to give roofing contractors a clear financial understanding of what it costs to lose an installer, what it is worth to retain that employee and which investments in retention deliver measurable results.

**Subject line:** Roofing Alliance 2027–2028 Research Proposal – Retention Economics

## #3 – Quantifying the Long-Term Financial Value of Roof Maintenance

### **Purpose**

The Roofing Alliance invites universities and research institutions to submit proposals to study and quantify the long-term financial value of proactive roof maintenance for commercial and residential roof systems, with particular emphasis on asphalt shingle roofing in the residential market.

While the roofing industry recognizes that regular inspection and maintenance can extend the service life of roof systems, prevent premature failure and reduce unexpected repair costs, building owners and homeowners often view roof maintenance as an expense rather than an investment in a long-term asset.

This research should develop credible, data-driven evidence demonstrating the economic value of proactive roof maintenance and provide the industry with practical tools to communicate that value to commercial building owners, facility managers and homeowners.

### **Research Objectives**

The project should determine the financial impact of proactive roof maintenance compared with reactive or deferred maintenance and, where possible, assign a measurable value to maintaining a roof system throughout its service life.

**Research proposals need to consider at least one of the following four areas:**

#### **1. Service Life and Replacement Avoidance**

Assess how proactive maintenance extends roof service life, delays major capital expenditures and reduces the likelihood of premature replacement, including for residential asphalt shingle systems.

#### **2. Lifecycle Economics and Financial Returns**

Compare the lifecycle costs of maintained and non-maintained roof systems, including avoided emergency repairs, reduced replacement costs and the appropriate annual maintenance investment relative to roof value and expected return on investment.

#### **3. Leak Prevention and Building Performance**

Evaluate how early leak detection and timely repairs affect roof performance, while also considering potential impacts on insulation, energy efficiency and other building components.

#### **4. System, Building and Market Differences**

Examine how the economics and effectiveness of proactive maintenance vary by roof system, building type, climate and maintenance practice, including differences between commercial roofing systems and residential asphalt shingle roofs.

The research should use actual contractor workforce and financial data and examine differences based on company size, geography, market sector, employee tenure and other relevant factors. A plan for how this data will be collected and maintained must be included in the proposal.

### **Desired Outcomes**

In addition to a comprehensive research report, the Roofing Alliance is particularly interested in developing a practical methodology, model or calculator that roofing contractors, consultants, facility managers, building owners and homeowners can use to estimate the long-term financial value and potential return on investment of proactive roof maintenance.

The ultimate goal is to provide the roofing industry with an objective, research-based business case demonstrating that commercial and residential roofs should be managed and maintained as valuable long-term assets.

**Subject line:** Roofing Alliance 2027–2028 Research Proposal – Roof Deck Assessment

## #4 - Technology for Pre-Reroofing Assessment of Existing Roof Deck Structural Soundness

### Purpose

The Roofing Alliance invites universities and research institutions to submit proposals to identify, evaluate and/or develop technologies capable of assessing the structural soundness and integrity of existing roof decks prior to the start of reroofing operations.

Existing roof decks may contain deterioration, corrosion, moisture-related damage, weakened materials or other concealed conditions that are not readily apparent during conventional visual inspection. These conditions can create significant safety risks once roofing personnel, materials and equipment are placed on the roof.

The goal of this research is to identify a practical means of evaluating roof deck conditions ***before workers and equipment are exposed to potentially unsafe areas.***

### Research Objectives

The project should investigate existing and emerging technologies capable of identifying structurally compromised or potentially unsafe areas of the roof deck without requiring extensive destructive testing.

Research should focus on at least one of the following:

- Identify and evaluate existing technologies from roofing, construction, infrastructure, aerospace, manufacturing and other industries that could be adapted for roof deck assessment.
- Assess non-destructive testing and remote evaluation tools, including ground-penetrating radar, ultrasonic testing, infrared and other imaging technologies, sensors, scanning systems, drones and robotics.

Evaluate artificial intelligence and data-analysis tools for interpreting assessment results, and identify opportunities to develop new technologies where suitable existing solutions are unavailable. The research should consider multiple commonly encountered roof deck types (e.g., steel, concrete, wood and other deck assemblies as appropriate). The research plan must also include industry collaboration, and an industry champion is required as part of the proposal requirement.

### Desired Outcomes

The project should seek to:

- Determine whether existing technologies can reliably identify compromised roof deck conditions by evaluating their accuracy, capabilities, limitations, cost, practicality and field usability.

- Identify conditions that affect testing reliability and develop recommended procedures or protocols for pre-reroofing roof deck assessment.
- Validate promising technologies through laboratory or field testing and identify opportunities for further adaptation or development.

The desired outcome is a validated, practical technology, methodology or assessment protocol that roofing contractors can use to reliably identify potentially unsafe roof deck conditions before roofing personnel, materials or equipment are placed on the roof and roofing operations begin.

**Subject line:** Roofing Alliance 2027–2028 Research Proposal – Roof Deck Assessment  
Questions regarding the RFP process may also be directed to Alison LaValley.

## #5 – Advancing Roofing Logistics and Supply Chain Through Technology and Innovation

### **Purpose**

The Roofing Alliance invites universities and research institutions to submit proposals examining opportunities to improve logistics, material movement and supply chain efficiency throughout the roofing lifecycle.

Roofing materials move through a complex chain—from manufacturing and distribution to job-site delivery, rooftop placement, installation, tear-off and disposal or recycling. Inefficiencies at any point can increase costs, reduce productivity, create safety risks, contribute to material waste and affect project schedules.

This research should identify opportunities to improve roofing logistics and supply chain practices and explore how emerging technologies—including artificial intelligence, robotics, automation and data analytics—could help create a safer, more efficient and productive roofing industry.

### **Research Objectives**

The project should examine current roofing logistics and supply chain practices, identify significant inefficiencies or pain points and evaluate practical opportunities for improvement.

### **Research should consider at least one of the following focus areas:**

1. Manufacturing and production: Opportunities to improve production planning, forecasting, inventory management and coordination between manufacturers, distributors and contractors.
2. Material delivery and job-site logistics: Technologies and practices that could improve scheduling, transportation, unloading, staging and movement of roofing materials from distribution through the job site and onto the roof.
3. Rooftop material handling and installation logistics: Opportunities to reduce manual handling, unnecessary material movement, crew downtime and safety risks during roof installation.
4. • Tear-off, waste management and recycling: More efficient methods for collecting, separating, sorting, transporting and processing roofing tear-off materials, including technologies that could support recycling and compliance with state or local requirements.
5. Material waste and sustainability: Opportunities to reduce excess ordering, unused materials, packaging and construction waste through improved logistics and supply chain management.

**The project should identify one of the following areas in developing the proposal and present how the selected technology will be investigated to support the presented research problem related to the focus areas above.**

- Artificial intelligence and predictive technologies: Applications of AI, machine learning and data analytics to improve demand forecasting, scheduling, inventory management, delivery coordination and project planning.
- Robotics and automation: Opportunities to automate or assist with material handling, loading, unloading, rooftop transport, staging and other repetitive or physically demanding logistics activities.
- Technology transfer: Existing technologies and practices used successfully in manufacturing, logistics, construction or other industries that could be adapted for roofing applications.

Researchers are encouraged to examine the entire roofing lifecycle while identifying the areas where innovation could deliver the greatest measurable benefit to contractors and the broader roofing industry.

Proposals must identify an industry champion as part of the project team. Preference will be given to proposals that include testing in a controlled lab or field testing in actual roofing conditions.

### **Desired Outcomes**

In addition to a comprehensive research report, the Roofing Alliance is particularly interested in practical recommendations and solutions that the industry in the near future.

Potential deliverables include:

- Identify the problem's effect on cost, productivity, safety, waste and project schedules.
- Evaluation of the specific technology for addressing the identified roofing logistics challenge.
- Development of practical methods or tools to improve material forecasting, ordering, delivery, staging, rooftop movement, installation, tear-off, recycling or waste management.

Deliverables must:

- Quantify potential benefits for roofing contractors, including reduced labor, material waste, costs, downtime, safety risks and schedule delays.
- Assess implementation requirements, costs, limitations and scalability for roofing companies, manufacturers and distributors.
- Produce a practical prototype, model, protocol or implementation guide that roofing contractors can use.
- Validate the proposed solution through laboratory, controlled or actual field testing with an industry champion.
- Provide recommendations for applying the solution across different roofing companies, project types and operating environments.

The ultimate goal is to provide the roofing industry with a research-based roadmap for using technology and innovation to move materials more efficiently—from production and delivery through installation, tear-off and end-of-life management; however, multiple funded projects are expected in order to address all potential challenges. Each submission should address the clearly defined constraints and limitations of the study and what stage of the lifecycle and area of the industry would most benefit from the study

**Subject line:** Roofing Alliance 2027–2028 Research Proposal – Roofing Logistics & Supply Chain