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Reroof or Restore?

The right decision can save weeks of time and thousands of dollars

by Dan White – Technical Product Manager, APOC

Making the right roof repair decision can save time and tens of thousands of dollars, both in repair costs and downtime. Before making any business decision it's a good idea to gather as much information as possible. With good information the best course is easily charted.

Fortunately there are many high tech tools available today which help in the due diligence phase. Let's step through the process and discuss some ways to make sound roofing decisions that can save you time and money.

FACT FINDING

First step is determining the condition of the structural deck, the insulation and the membrane. Steel decks rust, wood decks rot and concrete decks spall and crack. Deck deterioration is greatly accelerated if there is water trapped in insulation sitting on top of the deck. Wet insulation must be located and removed. Large roof areas are suited for aerial infrared photography. This can give a building owner a general idea of how much insulation is wet. Smaller handheld infrared cameras are great for smaller roofs and a Tramex tool uses a different method to find moisture where infrared may not work.

Once the non-destructive testing is done its imperative to draw a detailed roof plan. Global Positioning Systems can speed up the process especially on acres of industrial and warehouse facilities. Instruments commonly used in the surveying industry can be used to pinpoint roof equipment and leak areas. It is a good idea to verify the Non – destructive test results with roof cores taken all the way down to the structural deck level. Wind uplift tests can also be performed on the roof. Membranes can become delaminated during a storm yet stay in place. The next big storm can then finish of the job by ripping the membrane completely off the structure.

Visual inspection of the roof can also give clues to the overall condition of the roof – a soft area underfoot is an indication of saturated insulation. Rusted deck seen from inside the building may help locate the worst areas of deck deterioration. Ponding water could be the result of a sagging structural deck. An experienced eye will quickly spot membrane problems with out any sophisticated equipment. The number one cause of BUR (built-up roof) membrane failure is splitting. The splits are much easier to see if the roof is smooth or has had the gravel and dirt vacuumed off. A vacuuming operation is an effective method of exposing the membrane surface so that membrane damage can be assessed. Old repairs are easy to spot if the roof has had all the loose gravel removed. Contractor bids will tend to be lower if the estimator has access to the roof and the roof surface has been exposed.

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A licensed structural engineer should be retained if there is any evidence of structural failure or additional loading of the roof. Additional loading can include materials stored on the roof, condensing units, blowers, metal screens, ballasted antennas, signs and decades of accumulated trash and debris.

The Fact Finding Phase – review:

- Non-destructive & destructive testing
- Make a roof plan
- Clean trash and debris off the roof and vacuum if gravel surface
- Identify problems on roof plan

COST ESTIMATES

Now that your roofing professional has used his trunk full of digital testing equipment to document problems it is time to move on to the cost phase. Contractors should be involved at this point to give estimates on the following:

- Cost to remove and replace the entire roof
- Cost to remove and replace only the wet insulation areas
- A unit cost to remove and replace deteriorated decking & smallest unit replaced
- Cost to make repairs to the roof membrane
- Cost to restore roof with solvent or emulsion based coating

ANALYSIS

This is the decision making portion of the process where all the factors which might impact the business are considered.

How long do I expect to be in this building? 2 years, 5 years or 100? A small retail store in the path of a new freeway obviously will have a shorter expected life than a famous museum. Proven roof solutions are available for both.

Talk to your accountant and CFO and ask whether a long term amortization of a replacement (reroof) or a single year write off repair would favor the business financial plan.

Are there plans to expand the building in the near future? It is generally more economical to reroof in conjunction with an expansion than to split the projects up into different years. Roof access and impact to building operations are greatly reduced if you can double up.

What time of year will the work be done? What region of the country is the building located in? A 30 story condominium tower on the Florida coast has very different wind, thermal shock, thermal bridging and UV exposure issues than a one story industrial plant in North Dakota.

Break the comparison down in cost per year of expected life. DO NOT use warranties in this exercise. Consult trusted contractors, architects and consultants to get a realistic idea of life expectancy for each system considered in your geographic area. Warranties are typically issued based on national models and marketing impact, which means they don’t necessarily reflect expected life.

Sample A
500 sq. building at $600 per square to tear off and reroof = $300,000
20 year expected life means $15,000 per year cost

Sample B
500 sq. building at $200 per square to repair and restore = $100,000
10 year life means $10,000 per year cost

SAFETY

Safety considerations – additional funds may need to be added to the contractor estimates to protect pedestrians with a sidewalk bridge, or redirecting pedestrian traffic. Material handling challenges if over looked can lead to collapsed decks. Dropped materials from a crane or helicopter can put your business on the front cover of your local newspaper.

Noise from demolition efforts can bother neighbors, drive away customers and force other businesses to close. Will work need to be performed at night, or during holidays to avoid nuisance or dangers.

Appearance can be a factor as well if it’s a retail business that relies on walk in customers.

BUILDING CODES

Research the building codes to see if a deck inspection is required and if so what the average wait is once the building dept. has been notified. Industry standards require putting the building back in the dry during the same day. If the wait is longer than a couple of hours a temporary system might be a way around building dept. red tape.

Slope may need to be increased which could require greater insulation depths at the perimeters and in turn increase costs of perimeter flashing systems and required parapet height increases. Additional wood blocking at the perimeter is required if there are no parapet walls. If the building uses a guttered edge design instead of an internal drain system, additional costs are incurred replacing the gutter and flashing the new gutter to the new membrane.

WHY RECOVERS OR RETROFITS CAN BE A REALLY BAD IDEA

A recover is typically defined as leaving the existing membrane and insulation in place and installing another layer of insulation board and membrane over the existing.

In most cases this is a bad idea for the following reasons:

If wet insulation is left on the deck, the deck will continue to deteriorate. Maintenance workers have fallen through rusted decking causing injury and death.

The extra weight can be the straw that breaks the camels back when added to snow load or flooding. The biggest reason against recovering is that finding and locating future leaks is darn near impossible. You have just installed an unmaintainable roof if leaks cannot be found. If they cannot be found they cannot be fixed. If the roof membrane cannot be fixed it must be torn off and this time there are two roofs to tear off not just one.

THE CASE FOR REPAIR & RESTORATION

Repair and restoration is the most cost effective roofing operation for bituminous roofs. The very nature of bituminous roofs makes them ideal for repair because the original waterproofing bitumens are easily bonded to new modified repair mastics and coating materials. Bituminous membranes have been around for over 150 years. Standardized repair procedures have been perfected and the repair materials have only improved with time. A 50 year old coal tar built-up roof can be reheated with a torch after

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spudding the surface gravel to provide a clean bonding surface equal in sealing ability as the day it was installed.

A successful restoration requires three essential steps:

1) Preparation
2) Repair & Reinforce
3) Recoating of surface

Preparation – remove the trash, vacuum loose gravel, sweep and blow dust from smooth surfaced roof membranes. On gravel surfaced roofs spudding or scraping of the gravel is required at all repairs of splits, penetrations and perimeters. The spudding operation creates a smoother flat surface and exposes fresh asphalt or coal tar in the process. Bituminous repair materials whether hot, cold, solvent or emulsion based, asphalt or coal tar will not stick to dust and dirt. The repair surfaces must be clean.

Replace wet insulation and re-roof with membrane and insulation of like kind and quality per the roof plan developed during the fact finding phase. If bad decking is encountered have decking on site equal to the existing in strength, profile and size configurations.

Fix the leaks – splits, blisters, punctures, ridges, loose edges of felts all must be repaired. The most critical of these are splits since splits will let the greatest quantity of water into the building. Because splits will be areas of focused movement they should have the most robust repair materials applied. Heavy polyester reinforcing mats coupled with elastomeric mastics offer strength and movement capabilities that will insure a one time repair effort.

Reseal perimeters with mastic and polyester mats appropriate to the coating being used. Seal around vent pipes with high grade, modified mastics. Replace rusted flashings and duct work. Water test the drains – make sure they are not clogged. Reseal around drain flanges, retap ring clamping holes and replace cracked clamping rings and baskets. Add drains in low areas if severe ponding exists.

Remove unused HVAC units, fans, vent pipes, drains, pitch pans, and equipment supports. Get that extra weight off the roof.

Replace cracked sky lights or redeck and close in the opening. Fix roof hatch doors and ladders and install walk pads where the current traffic patterns are found.

HIGH TECH COATINGS

Coatings are not a cure-all. There are amazing coatings available today that when applied to an acceptable substrate will add 10 to 15 years to the existing roof membrane. What coatings will not do: they will not fix splits; they will not substitute for a sound roof membrane. They will close up small punctures that may have been missed in the major repair operation. They will add years to the life of the membrane by acting as an extra layer of UV protection. They will act as an adhesive if the roof is re-graveled. On smooth surfaced roof membranes Aluminum and White coatings will greatly reduce the surface temperature compared to black surfaces or gravel.

Decide which coating option is best suited to your roof type:

1) Gravel surfaced – solvent based is the coating of choice in the North East

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2) Smooth surface – emulsion – chopped glass – popular in the desert southwest
3) Reflectivity – white or aluminum? White will provide a cooler surface than aluminum. Aluminum with rubber modifiers is ideal for Northern climates.

Years ago coating options were limited to static aluminums and black colored materials. Most were subject to rapid deterioration with natural weathering. Solvent based black asphalt coatings provided short term waterproofing solutions. The newest versions are highly rubberized and blended with compatible asphalt. Aluminum coatings are now available in polymer modified versions that will expand and contract with temperature changes that occur every day. Roofs expand when heated and contract when cooled. This cycling occurs on a daily cycle from day to night; weather induced from clear skies to cloudy with chilling rain and seasonally winter to summer.

White surfacing materials are tough, durable, and able to retain color, in addition to being elastomeric. The world of roof coating options has improved dramatically in less than 20 years.

The advantages of a repair and coating project:

1) Financial – Totally deductible in year work is done. No need to amortize cost over 39 years according to current IRS law.
2) There are no lateral pathways for water to travel
3) There is minimal noise and disruption to the business
4) Fast – less work than a tear off and reroof
5) Less dust and debris in the building – critical in plants and processing facilities
6) The quality of the coatings and mastics has greatly improved

MAINTENANCE

All systems at the very least need to have drains and gutters checked yearly to make sure they are not stopped with debris at the strainer or in the drain pipe. Most roofs are exposed to damage by repair trades, storms and vandalism. I remember one story out of New York City where passers by threw an old engine block out of their truck onto a commercial roof below an elevated highway. That roof needed some maintenance. There are stories of ice chunks falling off commercial airliners. Pitch pans if not eliminated need periodic resealing. The most amazing stories involve the drilling of holes in a roof by plumbers or electricians who neglect to tell a supervisor of the need to flash the new pipes in. Metal copings loosen in the wind and expansion joint covers need regular maintenance.