



BY CHRISTOPHER O'BRIEN

# Getting a Hold on Mold

Mold and mildew have become a huge concern in construction and maintenance of buildings of all types, including correctional facilities. A mold problem can add costs and delays to a construction project and plague facility and maintenance personnel with an unending maintenance cycle. Mold thrives in warm, damp, poorly ventilated environments such as a shower area in a bathroom.

What is mold? Mold (and mildew) is fungus that is lightweight, small and travel on air. They are abundant and found almost everywhere throughout the world. Biologically, all fungi have defined cell walls, lack chlorophyll and reproduce by means of spores. The vast majority of fungi feed on dead or decaying organic matter—they are one of the principle agents responsible for the natural recycling of dead plant and animal life. They can be white, orange, green, black and almost any other color.

Mold has a root system, a vegetative stalk, and a seed pod. For mold, the root system is made up of hyphae (pronounced "hi-fee"). As hyphae grows into a mass during the vegetative state, it becomes a mycelium ("my-sill-ee-um"). The spores, designed for reproduction, are similar to seeds. Like a weed, mold needs food and

water to survive. For mold, the food of preference is organic matter such as organic dust and dirt, leather, skin flakes, body oils, etc.

Three keys are necessary for mold growth—available food source, appropriate temperature/humidity and considerable moisture. A correctional shower provides an ample supply of food (skin flakes and body oils), warm temperature, plenty of water and high humidity, making it the perfect habitat for mold growth.

Mold growth starts when mold spores land on a food source (even the oil from your skin that is left when you touch an otherwise unsuitable surface, like stainless steel, or the soap residue left from a shower will provide sufficient nutrients to support it) and remain there patiently waiting for moisture. If the substrate they land on should contain sufficient moisture, or water comes from another source, the spore germinates and hyphae develop. The hyphae grow, secrete enzymes to breakdown food, form the mycelium, and absorb nutrients which fuels rapid growth.

Hyphae seeks out ideal places to anchor such as porous substrates like tile grout and pinholes in



painted concrete and concrete block and proceeds to consume the substrate, it can also create its own anchor points by dissolving pathways into the material. This is one of the reasons it is so difficult to completely remove mold. If you remove only the surface growth, bits of hyphae remain, burrowed in the substrate ready, to re-colonize upon the return of moisture.

## Damage Mold Causes

Over the past few years mold has experienced high profile press coverage. There are a variety of inciting news reports concerning mold in homes, courthouses and other buildings. Insurers have refused to write policies covering mold damage and parents have refused to send their children to "sick" school buildings. While most mold groups cause little harm, it is important to note that all molds have the potential to cause negative health effects. Molds can produce allergens that can trigger allergic reactions or

even asthma attacks in people allergic to mold. Others are known to produce potent toxins and/or irritants. Potential health concerns are an important reason to remediate/clean up any existing indoor mold growth.

## Controlling Spread of Mold

As noted, mold requires an available food source, appropriate temperature/humidity and considerable moisture to grow. Because a correctional shower contains the perfect breeding ground for mold, it is extremely difficult to eradicate mold growth but it is possible to control mold growth.

A major contributor to mold growth is painting and caulking over mold and/or painting with products, such as oil based paints, which are actually a food source. Because mold is difficult to completely kill, once trapped beneath a fresh coat of paint or caulk it can rapidly grow undetected beneath a pigmented layer of food. Anyone who has placed a sealant in their shower at home has seen mold grow beneath, on and around the bead of caulk. Mold must be completely removed prior to painting and caulking and it is imperative that a product be installed that is not a food source for mold and preferably one with a non-leaching anti-microbial.

Poor ventilation is another key factor in rapid mold growth and uncontrollable mold infestation. Many correctional facilities fail to maintain adequate air flow and air exchanges in their shower areas. Most major mold outbreaks occur at or above 70% RH. Maintaining good air flow and RH below 60% (ideally 30-50%) will help control mold growth. It is important for correctional facilities to perform regular building/HVAC inspections and to maintain these systems.

An often overlooked culprit in mold infestation is bar soap. Bar soap often contains talc, animal fats and other components that become food for mold and worse become a Petri dish for mold growth. Over the past years Reed Ashpole, jail administrator for Carver County in Chaska Minnesota, has experimented with various soaps in his facility. Reed's findings were that liquid soaps leave little to no soap scum compared with the bar soaps he tested. The reduction of soap scum has had a direct impact on his cleaning procedures and has reduced his maintenance cleaning costs.

While it is impossible to eliminate water from a shower stall it is possible to eliminate standing water and water absorption. Proper sloping of shower floors and eliminating bird baths (puddling) and porous materials will help to maintain lower RH.

## Design Solutions

Showers in correctional facilities have typically been built using concrete (cast in place and precast) and/or concrete block (CMU). The finishes on these substrates have typically been tile or epoxy paint.

Tile has performed poorly because the grout used to fill the space between the tiles is extremely porous and holds water supporting mold growth. Epoxy paints do not adequately fill the concrete or concrete block providing abundant nooks, holes and crannies for the hyphae to root. Both of these finishes lack an anti-microbial to help fight against mold growth.

Over the past decade new finishes have come to market specifically designed for shower applications. These systems can be applied over concrete, concrete block, steel, gypsum materials and almost any substrate and provide a seamless fiberglass reinforced lining over walls, floors and ceilings in shower areas. These materials are non-absorbent, extremely hard and create unmatched bond strengths (in excess of 900 p.s.i. per ASTM D 4541). They are high build systems and completely fill and level the substrate, eliminating nooks and crannies. They also contain a non-leaching anti-microbial to repel hyphae and keep mold from gaining a foothold.

While mold may never be completely eradicated from shower areas it can be effectively mitigated. By understanding how mold grows, taking steps to make shower areas less hospitable to mold growth and utilizing the latest building materials, the costs, headaches and health effects associated with mold can be drastically reduced. \*

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