

**Builders & Mold**  
**“more attention now could result in less headaches later”**  
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Mold has become an area of concern to anyone that makes a living building. The explosion of media coverage in the last few years has led to a near panic over mold. This media explosion, in addition to misinformation, profiteers, over eager attorney's and consumer perception has created a high risk situation for builders, inspectors, real estate agents, architects, engineers, management companies and others. It has also become a major concern to insurers which provide coverage to these professions.

Regardless of what your feelings are about the current situation with mold, prudent professionals will take the steps necessary to reduce their risks where mold is involved. The best way to reduce the risk is to take a pro-active stance on the issue. This article will address some of the pro-active steps which can be taken to reduce both the likelihood of mold and the litigation which can follow.

Protecting your company from a mold claim begins at the planning stages of a building. Having a company wide quality control and quality assurance program in place is the best starting point. As an investigator that is contacted to evaluate mold in buildings almost daily, I can say with some degree of certainty that many problems begin with poor quality control during the construction phase of the project. This includes inadequate employee training, poor supervision of employees and sub-contractors and ineffective project planning. New houses clearly have potential microbial contamination problems, even before the construction work has been completed. Often adequately designed construction is damaged by poor workmanship and negligence.<sup>1</sup>

Microbial growth is influenced by a number of environmental factors. For fungi and bacteria, which are the predominant contaminants, moisture is the most important factor controlling the growth. It is also the easiest control measure to achieve through proper quality control during construction. Many of the problems I discover during site investigations could be easily eliminated at little cost to the builder by simply implementing a training program for both employees and supervisors which details what causes microbial contamination in buildings and what steps can be taken to control these issues.

The photo in **Fig. 1** shows materials stored outdoors uncovered in the rain on a residential project. The materials had been outdoors for some time and already had visible fungal reservoirs growing on the material. The builder was using this material without concern. It is this type of negligence which is costing builders through higher insurance premiums, poor publicity and lost time. Further investigation on this project uncovered extensive fungal contamination throughout the building. This will cost tens of thousands of dollars to correct and could have easily been avoided by having employees and supervision properly trained in avoiding such problems.

With all of today's concern over good indoor air quality and the rising tide of litigation relating to environmental health and building construction prudent builders, designer's and others involved in building construction are beginning to educate personnel and employees about indoor air quality and the ever changing information relating to it.

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<sup>1</sup> Päivi Salo, **A PRACTICAL GUIDE FOR PREVENTING POTENTIAL MICROBIAL RESERVOIRS AND AMPLIFICATION SITES INTRODUCED BY NEW HOME CONSTRUCTION PROCESS**, *Proceedings of Healthy Buildings 2000*, Vol. 3, pg. 501-506.

Construction practices are changing dramatically as the result of better knowledge in achieving a healthier indoor environment. Today, more builders are paying attention to such issues as properly sizing HVAC systems, ventilation, filtration and bringing outdoor air into buildings. By assuring that employee's and supervisors are kept up to date on current knowledge involving the building practices and materials involved in building construction, the rising tide of litigation may soon level out, or even begin to decline.

Based on current knowledge we may conclude that today's IAQ standards, guidelines and recommendation combined with good engineering practice should result in well designed HVAC-systems. Unfortunately, the problems related to indoor air quality are not well known to building designers, engineers and professionals related to the construction and operation of buildings. The main problem is that there has not been a proper dissemination of available knowledge and information that have been accumulated over several years of research in this area.<sup>1</sup>

A recent study performed in North Carolina produced some interesting results which should be looked by everyone involved in the design and construction of new buildings. The study identified current practices and materials which are prone to fungal contamination in new single family construction. The findings included improperly stored building materials, inadequately sealed heating, cooling and ventilation (HVAC) systems, air infiltration from the crawlspaces, inadequate drainage, and construction debris left inside the HVAC ductwork and wall cavities.<sup>2</sup>

The findings of the study should make clear to designers and builders that much of the problem results from issues which could be alleviated through better quality control from start to finish on projects.



**Figure 1 – Materials Stored On Site**

Some of the items which are easily correctable that were found during the North Carolina study included:

1. improperly stored materials and construction (exposed to rain, dirt, etc.)
2. inadequately sealed and improperly insulated HVAC system ductwork
3. poor drainage around foundations (this has been common on projects we have assessed)
4. debris left in walls and ductwork during construction
5. food residuals on sub-flooring
6. in some cases, there was urine and sewage found in the ductwork during the study

The North Carolina study shows that many of the issues causing problems for builders and buildings under construction is related to poor supervision and training. If a new homeowner has a problem with odors, etc. and urine is discovered in their ductwork, you could face some very bad publicity at the least.

<sup>1</sup> Sten Olaf Hanssen, **QUALITY ASSURANCE FOR IAQ IN THE CONSTRUCTION PROCESS**, *Proceedings of Healthy Buildings 2000 Vol. 4.*, pg. 51-64

<sup>2</sup> Päivi Salo, **A PRACTICAL GUIDE FOR PREVENTING POTENTIAL MICROBIAL RESERVOIRS AND AMPLIFICATION SITES INTRODUCED BY NEW HOME CONSTRUCTION PROCESS**, *Proceedings of Healthy Buildings 2000, Vol. 3.* pg. 501-506.

The North Carolina study shows that prudent builders should have a program in place where quality control is assured during the construction phase from start to finish. It is cheaper for a builder to hire a professional management company to oversee projects, train employees and develop policies for the company that it is to pay damages to a building owner that can prove urine in their ductwork.

Extensive wetting and surface condensation are the main contributors to the microbial growth on building materials. Wetting of materials is sometimes unavoidable during construction. However, unnecessary wetting and exposure to contaminants and reservoirs such as soil, food residues, and sewage must be minimized. Proper storage of materials provides a very cost effective way to reduce microbial contamination because it does not require any new equipment or steps in the construction process.<sup>1</sup>

It seems that accomplishing these small changes would be fairly straightforward, however on projects that I have visited for building owners, mentioning storing materials out of the rain has elicited some negative responses from contractors and sub-contractors on the project. These quality control items must start with the management of the building company and become enforced policies during the construction phase. It should be required that all supervision and employees attend a quality control meeting at the onset of all projects which will outline procedures to be implemented on the project to reduce exposure to liabilities. This should be followed up with construction site visits, which includes documenting any areas needing improvement that can be discussed at weekly meetings on the site.



**Figure 2 – Work in Progress**



**Figure 3 – Fungal Contamination**

Figures 2 and 3 above show a new home in which extensive fungal contamination is present due to poor construction practices. Figure 1 was taken on the same site. At the time of my site visit I discovered materials stored in pools of water and in the rain. The cost to the builder of this project will be substantial. In addition to poor practice in protecting materials, almost every other item on the list above was found during the assessment including debris in the ducts, water penetration into the building envelope, food residuals in walls, etc. Fortunately for the owner of this home, he had the knowledge and foresight to have the building evaluated after noticing some poor practices by the builder. Much of the fungal contamination, water damage and debris were already enclosed inside of walls and was no longer plainly visible. The owner of the building is currently in litigation with the builder and someone is going to have to pay a substantial amount of money to correct the mistakes and compensate for the loss of use of the building until it can be repaired.

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As more cases involving mold make their way through the courts, builders should stay current on rulings involving builders. In many cases, builders are being found liable for breach of implied warranties and negligence in mold related cases. In a 2001 case the Nebraska Supreme Court held that the builder was negligent in the construction of the house and breached its implied warranty that the house would be erected in a workmanlike manner.<sup>1</sup> And in a commercial project, the Florida Courts held that the builder of a courthouse which was infested with fungal contamination could be held liable to the purchaser. This \$14 million award was later upheld by the Florida Court of Appeals.<sup>2</sup>

In the Florida case, the court found in part, that the construction manager failed to properly supervise the construction of the courthouse. It is cases such as those cited that should make every builder aware of the potential liabilities they face and emphasize the importance of having a quality control program which is strictly enforced on every project. By properly training supervision and employees and having a site manager in place to oversee building projects and make corrections as necessary, builders could greatly reduce their exposure to liabilities. The cost of the site manager would be offset by savings on CGL policies and litigation.

The site manager is responsible for developing and implementing training programs, staying current on construction methods and materials, working with on-site supervision to assure that quality control goals are being met and keeping critical records which show that goals are being met and lower costs are being realized. The site manager will also develop and implement public relations strategies that shows potential clients that the company pays strict attention to quality control and customer satisfaction. Such a program can develop into added profits for the company by adding a competitive edge during contract bidding. Training programs are developed to keep both supervision and workers up-to-date on procedures and materials which can reduce the overall risk of water problems and ensuing damage during the planning and building phase of the project. On-going support can also be developed for maintenance staff of the building once the owner has taken possession. On-going support programs for building owners and their maintenance staff can train workers to spot potential problems early on and rectify the situation before the problems get out of control. Such programs can help to develop an on-going relationship of trust between builder and building owner. This can be a cost effective approach for all parties involved.

In the event that problems arise on a building project, either during construction or after the owner takes possession, the builder that has a site manager that is up-to-date on construction defects, microbial contamination and remediation procedures can limit the costs involved in correcting these issues and assure that the problem is dealt with efficiently and in a cost effective manner. A well qualified site manager can document the conditions present at the time a complaint is received in a manner which will be defensible later.

In developing a quality control program to be followed on building projects, the program should be kept on each project and gone over with staff at the onset of each stage of construction. Supervisors can then oversee the implementations as work progresses and list any areas which need to be addressed. Moisture control during construction should be at the top of the list. This begins with having adequate protection for materials on site and proper planning of material deliveries, etc. to avoid exposing porous building materials to moisture for prolonged periods of time. Project hygiene is another important issue which everyone involved should be aware of. As noted in the North Carolina study, food residuals on flooring, inside of walls, etc. can all lead to microbial activity, this should be minimized by having proper disposal containers for all such waste on the job site and by showing zero tolerance for not using those waste containers.

Another common area in which we find problems is poor maintenance of the duct system. It is common to go to job sites and find brand new duct installations full of construction debris.

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<sup>1</sup> Mondelli v. Kendel Homes Corporation, 262 Neb. 263, 631 N.W.2d 846

<sup>2</sup> Centex-Rooney Construction Co. v. Martin County, 725 So.2d 1255 (Fla. App. Dist. 4 02/03/1999)

This debris can become a food source when humidification is introduced into the system and fungal amplification can begin. Ductwork should be protected during the construction phase and inspected at the completion of construction before the owner takes possession. Fig 4 & 5

The inspection of air ducts is primarily carried out through the access doors of the ducts. The sufficient number of inspection points and the properly selected location points are the most important factor for the evaluation of the cleanliness of the ductwork. According to NADCA (1992), the number of sampling points depends on the length of the ductwork.<sup>1</sup> In addition to inspecting the system for cleanliness, the ducts should be evaluated for proper connection and seals. Leaking ductwork can also contribute to problems within the building.



**Figure 4 – Ductwork (New Construction)**



**Figure 5 – Ductwork (New Construction)**

Digital camera's are also an excellent tool in inspecting ducts after construction is complete. If the ducts have visible dust and debris they should be properly cleaned before completion. Keeping ductwork sealed with plastic until use is a good idea for keeping ducts free of debris. I recommend that the builder change the filter and turn the air handler on (continuous) at completion of the project and let the system operate for at least 24 hours.

A proactive approach to construction defects and mold is the best way for builders and their sub-contractors to avoid the ever increasing list of companies hit with mold suits. Showing an on-going effort to train employees and minimizing risky construction practices on the job site may be your defense in the event of litigation. The savings from one lawsuit in which you can show an in place program could pay for any additional costs incurred in implementing such programs.

Builders, inspectors, construction & building managers, real estate professionals, architects and others involved in designing, planning and building should make the necessary changes in policy that allows for better distribution of current information to those in the field concerning construction methods and materials, mold, remediation and other pertinent information. The best way to achieve this goal is by developing a relationship with an environmental company that is experienced with all of the items mentioned as well as in monitoring building projects and training of all parties involved. The prudent builder will look at the rising tide of mold and construction defect litigation and begin building a defense to such a claim

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<sup>1</sup> R Holopainen, J Narvanne, P Pasanen and O Seppänen, **A VISUAL INSPECTION METHOD TO EVALUATE CLEANLINESS OF NEWLY INSTALLED AIR DUCTS**, *Proceedings: Indoor Air 2002*, pg. 682-687

in advance. A written program, including accurate on-site records will provide evidence that the builder has meet their duty in providing a safe and defect free building when turned over to the owner. Such a program, over time, will also develop good habits for those in the field.

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