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## **Fireproofing archaic/historic construction poses a different set of challenges and requirements**

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Whether it is an old New England mill being renovated into residential condominiums or a historic theater being restored, archaic construction poses a different set of challenges for the specification and application of fireproofing materials. Unlike new construction which is designed to meet or exceed current building codes and incorporate new construction products and methods, older buildings tend to represent decades if not centuries of different materials and construction techniques yet the renovation requires they meet our current building codes.

Albi Manufacturing, a division of StanChem, Inc., has been manufacturing fireproofing materials since the late 1940s. StanChem, along with Albi has been located in Connecticut for even longer. As a leader in the development, design and manufacture of fireproofing materials, Albi continues to introduce innovative products geared at providing solutions to the fireproofing marketplace for new construction, the renovation of older buildings such as parking garages built in the 1970s-1980s to the preservation of historic properties.

### Archaic Construction and Renovation

The Beach St. buildings located in the Leather District in Boston originally were leather manufacturing facilities and many of the residences in them maintained rough hewn wooden floors with hand hammered nails, pressed tin ceilings and large open spaces. The developer for the Beach St. residences took on the task to make these beautiful and spacious lofts code compliant. The fire code issues for this project would normally require strapping and layers of type X gypsum board to cover or protect the entire archaic medium wood timber and heavy wood timber construction. The architect and developer decided that keeping the feel and ambiance of this historic construction was a priority and sought out alternative fire compliance for this preservation project. To do this each floor / ceiling assembly had to be identified and all the existing steel structural members, straps, gussets, bolts and wood members were assessed for their individual fire endurance capabilities.

There are various means generally accepted by the uniform building codes for determining these endurance times. The most commonly used are: 1. A publication developed by HUD titled "Fire Ratings of Archaic Materials and Assemblies", 2. The Component Additive Method (CAM), 3. The codified formulas for the loaded fire endurance times for wood beams and columns.

These wood formulas are also broken down further to determine fire times on both beams and columns affected by fire on 3 and also 4 sides. Using these resources you derive an engineered assessment of the existing fire endurance of all these individual structures. Using the HUD publication you can look up specific archaic building materials and assemblies to find the minutes of fire resistance assigned to each material without any fire protection provided. This data was developed by NIST for this specific purpose.

The second method for determining the inherent fire resistance of an assembly is the CAM. Code

groups have and do recognize and accept this practice. The CAM method allows a fire protection engineer to calculate the total fire resistance of a built up assembly, consisting of different components and adding up each component's individual fire resistant property expressed in terms of minutes of fire resistance.

The third method assesses all of the wood structural elements and the conditions in which they will need to prevail under load. Whether they are 3 sides exposed wood joists or beams or 4 sides exposed support columns, each has a calculation formula and a specific fire time and load bearing curve.

When a comprehensive listing of all the fire code issues is identified, fire test data can then be interpolated and engineered to fit a wide range of very specific construction practices for new and old construction. The CAM process may reveal a 20 minute short fall in the total assembly, the HUD book may have a listing that is identical or close enough to find an accepted fire time. The wood calculations may corroborate the other findings or redefine structural elements as requiring more protection. The Beach St. project did just this and specified different amounts of applied intumescent thickness with regard to these assessments. They also decided on applying a comfort margin on those floor / ceiling areas that by assembly method and HUD confirmed a 1-hour rated fire time. The application of a substantial amount of fire resistant ASTM E 119 (not retardant ASTM E 84) intumescent was used to render all exposed wood non combustible for a period of time.

#### Renovation/Upgrades to modern structures

Renovation construction is not found only in archaic/historic construction. Many times buildings dating from the late 1960s through the 1980s are improved and upgraded. Aside from the more obvious architectural or aesthetic improvements this also includes bringing the building or structure up to current code requirements. In terms of fireproofing materials this can include replacing old failing materials or adding materials to meet the more stringent fire resistance code requirements. An example of this type of upgrade is the renovation to the parking structures of a large enclosed mall in New York. The owner was faced with need to replace the older failing material which had been installed over 25 years ago. His choice was to totally remove all of the existing material and redo the fireproofing with modern materials. As the parking structures represented over 250,000 s/f of surface area this was an expensive problem which had to be addressed before the Christmas shopping season started.

The remedy was to utilize the Albi DriClad system to provide a 2 hour fire rating for all of the structural support steel in this parking garage. Although 30%-40% of the failing material had to be removed to facilitate this more permanent system no primer or paint needed to be applied nor did the removal of the old fire proofing require anything more than reducing the thickness to expose the steel's outside dimensions. The Albi DriClad installation process had several advantages that minimized the disruption and the scheduling on both the owner and the public. The Albi DriClad fiberboard fireproofing system encloses structural steel and is comparable in price to soft fireproofing. Because DriClad goes on dry and requires no water or mixing, nor special staging or work-area encapsulation this pre Christmas installation moved through each cordoned off area regardless of the below freezing temps. The DriClad is a mineral board comprised of volcanic rock and resins that can be pre-cut for easier on-the-job installation, in all weather conditions. This project's installation utilized a fabrication area where all of the material would be cut and then distributed to each cordoned off area. During the Christmas shopping season the mall was able to provide parking at approximately 80% of capacity at all times in the garage. The DriClad did not

have the issues normally encountered with spray applied fire proofing allowing the public and vehicles to pass in close proximity to the work being done.

When completed the final inspection and certification were done visually. Because Albi DriClad's density and thickness are factory-controlled for uniformity of application, the UL design requirements for thickness are obvious and assured. The fastener spacing, joints and above the beam corrugation fillers (using fitted DriClad) are also verified during a walk through. There was no need for thickness measurement testing, pull testing for the application or dry applied density testing because nothing is sprayed or bonded, no chemicals used at all.

Britt Whitney is president of Spray Tech Systems, Inc., Boston.

New England Real Estate Journal - 17 Accord Park Drive #207, Norwell MA 02061 - (781) 878-4540