A P P L I C A T I O N N O T E

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Title: Wood Drying Under Vacuum Using Radiofrequencies
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Summary:
The technology of drying wood under vacuum using radiofrequencies (RFV) is an excellent alternative to conventional wood drying methods because it dries more rapidly and causes less damage to the wood. When wood is dried using RFV, it is essential to control its internal temperature in order to keep the heat from getting too intense. The FISO Technologies Inc. fiber optic gages, entirely made of dielectric materials, are the ideal choice to measure the wood's internal temperature during the entire RFV drying process.

Text:
When used for construction, the wood must contain less than 20% humidity (depending on the type of wood) for its mechanical properties to remain stable. It is worthwhile for a structural lumber producer to reach this drying rate as quickly as possible so that the wood may be put on the market almost as soon as it is cut. The producer can in this way adjust production to demand, etc. A commonly used method for drying wood is forced air convection drying. However, this process has some major inconveniences. One of these inconveniences is that it is a very delicate operation that can damage the wood (deformations, internal and superficial cracks, collapsing, coloration or discoloration, case hardening). Moreover, drying time is somewhat long and it may be difficult to optimize drying for a given type of wood.

The alternative to conventional drying is the technology of drying wood under vacuum using radiofrequencies, or RFV (*Radio Frequency/Vacuum*). Of all the drying methods, RFV is the one that offers the best drying time as well as minimal wood degradation. The RFV system automatically optimizes drying for the type of wood being treated. The result is wood that is uniformly dry, of an exceptional quality, even if it is stained.

A typical RFV wood drying oven consists in a large vacuum chamber equipped with radiofrequency electrodes. In an environment where the pressure is low, as is the case in a vacuum chamber, the temperature at which water evaporates is much lower than the atmospheric pressure. Moreover, high frequency heating is known as internal heating because the object undergoing this wave field generates heat itself. The energy penetrates the wood and acts directly on the water molecules to facilitate evaporation: the wood is therefore heated in a very short lapse of time. The result is a more uniform drying at temperatures lower than with conventional drying methods, which causes much less damage to the wood.

Temperature monitoring is the most important aspect of the RFV system: controlling the wood's internal temperature is essential throughout the entire drying process for a better quality finished product. Conventional temperature

measurement methods are not appropriate in an environment undergoing a strong high frequency field because they are affected by electromagnetic interference. The **FISO Technologies, Inc. fiber optic temperature gages** are entirely made of dielectric materials. They therefore have complete immunity to electromagnetic interference (EMI). They are the best choice for direct and reliable measurement of wood's internal temperature in the RFV drying chambers.

In a typical setup, small holes are drilled in a wood sample and four (4) **fiber optic temperature gages** are simply inserted in these holes. The gages are then connected to an **optical feedthrough**, which is installed on the inside of the chamber, and finally to an **optical signal conditioning assembly**, located on the outside of the drying oven.

Material used:

- Fiber optic temperature gage, model FOT-L
- Optical feedthrough
- Optical signal conditioner, model UMI-4 or 8 (up to 32 channels available)