Radio Frequency Wood Phytosanitation Technology Adoption Consultation for Large Scale Wood Pallet Manufacturers

Project Summary

U.S. pallet manufacturers are challenged to remain globally competitive in response to international wood phytosanitary standards (ISPM15). Conventional heat treatment (HT) via dry kiln has proven to be an acceptable approach, but pallet manufacturers are under constant pricing pressure, creating a need for more cost-effective solutions. Our research team at Penn State is developing a high throughput, radio frequency (RF) wood heat treatment unit that demonstrates significant efficacy for treating logs, pallet cants, stringer and deck board stock. We have developed pallet material runs with our pilot scale RF treatment cylinder which we are currently testing at Penn State with support from the USDA and The National Wooden Pallet & Container Association (NWPCA).

We are seeking a small number of select pallet manufacturers to partner with us to better understand the technology adoption case. In particular, we wish to engage members of your team in a consulting engagement to identify, develop and prepare the best-case RF technology adoption scenario for your company. Our goal is to clearly articulate a working technology value proposition that outlines the economic, operational and product development costs and anticipated returns for RF technology adoption for your operation. We anticipate company engagement demands to be limited to a small number of employees during our discovery and report review phases. Employee time engagement will be limited to a maximum of five days and a designated company lead contact over a period of two years. In concert, our team will collectively provide 10-15 days dedicated time to conduct RF technology due diligence for your company. A proposed engagement schedule is provided at the end of this brief.

RF Technology Summary

Our pilot RF wood kiln shown in Figure 1 uses radio frequency energy to heat the wood from within (similar to microwave heating). From left to right, Figure one shows the unit control panel, steel treatment cylinder and wood charge being prepared to load. In contrast to microwave heating, radio frequency can heat wood at greater depths. RF creates an electro-magnetic field that excites the water molecules present in wood, producing friction that rapidly generates internalized heat. The processes generates heat that results in the whole volume of the product being heated at once, not just the surface, which is referred to as volumetric heating. This provides an opportunity to heat large, tightly packed bundles of wood boards and cants quickly and effectively.

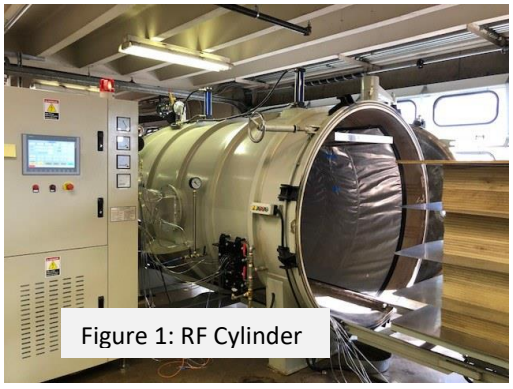

Figure 1: RF Cylinder

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RF has been used by companies for many years to dry wood and join wood substrates with adhesive bonding and has also been utilized in food processing. Figure 2 shows the loading of 6-inch by 8-inch ash cants that were RF heat treated to comply with the ISPM15 Standard. Our test cylinder is being used to develop standardized RF treatment schedules for a variety of wood species, dimensions and treatment factors such as wood moisture content and ambient fiber temperatures. Our current experiments involve use of sensors and heat scanning technologies to develop optimal heating conditions to phytosanitize wood from common wood pests (see Figure 3). A significant part of our engagement with your company will involve developing pilot RF schedules for common wood material that is utilized by your operations.

Figure 2: Charge Loading

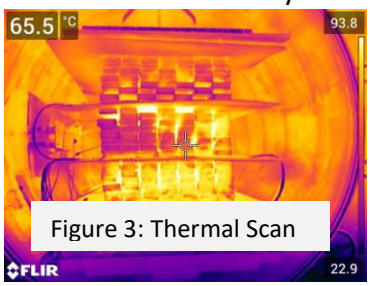

Figure 3: Thermal Scan

Project Team

Our business due diligence team is led Dr. Gagnon who is a business development professional and wood scientist with over 25 years of experience in the forest products industry. Drs. Janowiak and Hoover lead our technical development team with over 50 years combined experience in wood science and entomology respectively. An on-line link to the full project team and the Penn State RF Project is provided here https://abe.psu.edu/research/bio-based-products/wood-packaging. Our team is determined to make our involvement productive and valuable for your business.

Suggested Engagement Schedule

Obtaining RF technology feedback from manufacturers in the field is an essential element for the commercial development of university-generated technologies and is a core activity of Invent Penn State. Initially Dr. Gagnon will conduct research and engage your team to better understand your business and operational challenges and explore options for increased efficiencies. Specific emphasis will be placed on evaluating phytosanitation of wood fiber used in your operation and the potential adoption of a customized RF treatment solution. Proposed steps for engagement are listed below for a maximum project period between July, 2018 and June, 2020. We anticipate completion of engagements well before the project termination date of June, 2020.

- Initial connection with your company point-of-contact to discuss project and to organize an initial onsite visit with Dr. Gagnon
- Identify operational process, challenges and related client business needs
- Post visit will develop a mutually beneficial scope of work that includes the deliverable of a RF technology adoption working brief
- Engage our technical team for assistance and technical experimentation as mutually defined
- Conduct technical work at Penn State and on-site as needed
- Joint review round one RF technology adoption brief and review means for RF adoption improvement

- Conduct additional follow-up actions whether through additional economic due diligence or technical experimentation
- Prepare and jointly review final RF technological adoption report and outline future next steps and potential actionable recommendations

Contact Information

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