FY2022 WBC MEMBER-GENERATED RESEARCH TOPICS

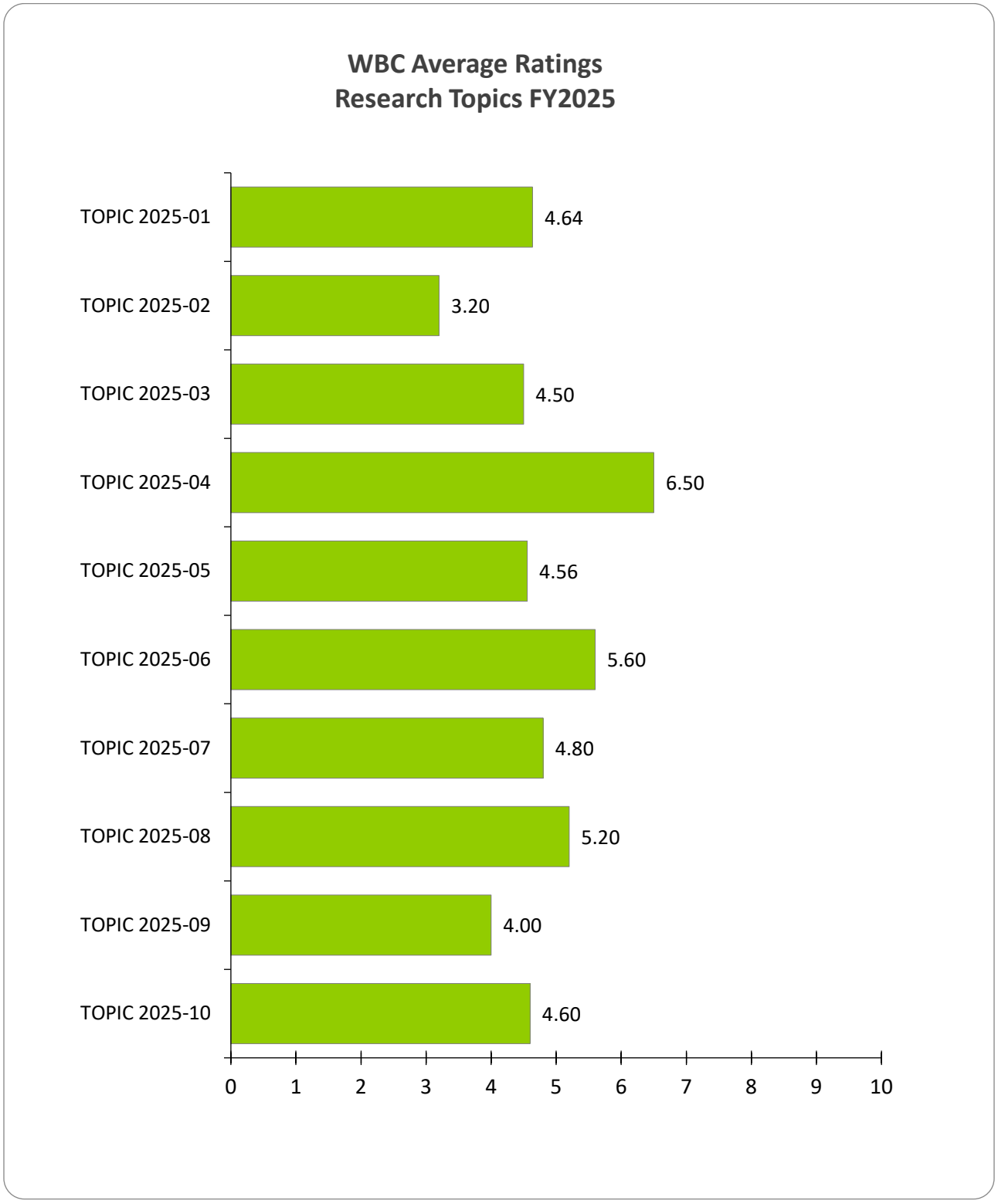
MEMBER RATINGS SUMMARY

We have received eleven New Research TOPICS from **6/11** member companies (**56% response rate**). Rating feedback was returned by **9/11 members (82% response rate**). The topics were rated based on the company's interest on a scale of 0 to 10, **with 0 reflecting "no interest" and 10, "highest level of interest"**.

Rating of Research Topics

CODE	TITLE	Mean Score	SD	Min	Max
TOPIC 2025-01	*Develop small-scale fire testing protocol for screening of fire-resistant wood-based composites and provide guidance of performance in a large-scale test such as ASTM E84 and ASTM E2768.*	**4.64**	4	0	10
TOPIC 2025-02	*Study of corrosion seen in wood panel manufacturing processes and during end-product use and corrosion mitigations.*	**3.20**	3	0	10
TOPIC 2025-03	*Effect of Phenolic Resin Solids on the Mechanical Properties of Veneer Based Engineered Wood Products.*	**4.50**	3	0	8
TOPIC 2025-04	*Improvements in adhesive technologies*	**6.50**	3	0	10
TOPIC 2025-05	*Optimizing the Coating Type and Application Rate for Veneer-Based Engineered Wood Products*	**4.56**	4	0	9
TOPIC 2025-06	*Self-healing coating attributes*	**5.60**	3	0	9
TOPIC 2025-07	*Process Sustainability - Characterization of Key Substrate Properties Related to Finishing Wood Composites*	**4.80**	4	0	10
TOPIC 2025-08	*Reduction of fiber raise on profiled MDF faces following machining and exposure to ambient conditions or incidental water contact prior to or after finishing*	**5.20**	4	0	10
TOPIC 2025-09	*Bio-based alternatives for wood based composites*	**4.00**	4	0	10
TOPIC 2025-10	*Bio-based polyaldehydes for adhesive applications*	**4.60**	4	0	10

Four highest rated topics


WBC Average Ratings
Research Topics FY2025
TOPIC 2025-01
4.64
TOPIC 2025-02
3.20
TOPIC 2025-03
4.50
TOPIC 2025-04
6.50
TOPIC 2025-05
4.56
TOPIC 2025-06
5.60
TOPIC 2025-07
4.80
TOPIC 2025-08
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TOPIC 2025-09
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TOPIC 2025 – 1

Descriptive Title: ***Develop small-scale fire testing protocol for screening of fire-resistant wood-based composites and provide guidance of performance in a large-scale test such as ASTM E84 and ASTM E2768.***

Justification: Full-scale fire testing of assemblies is expensive in terms of cost, raw materials, and sample preparation. A small-scale fire testing protocol for use in R&D screening will help direct R&D decisions prior to conducting full-scale testing and will provide an indication of ASTM E84 and ASTM E2768 expected test results. For example, can ASTM E162 or a similar method be used for this sort of work?

Comments

Comment 1.1. As a screening tool, I believe this would be very beneficial. Not certain what lab-scale equipment may currently exist but have seen some. How well it aligns with the full-scale E-84 test vs. other R&D lab equipment would be key as cost is quite high to test at the certification labs.

Comment 1.2. We feel this topic has been studied extensively with no progress toward a viable method for common use.

Comment 1.3. Interested in this project. I hope that future proposals adopt recommendations from the last cycle.

Comment 1.4. Useful project –of definite benefit to the international wood products industry.

Small-scale fire testing can be a good area of research. But why the focus on the Steiner tunnel test? Steiner tunnel testing is much cheaper than fire resistance (i.e. ASTM E119) testing (maybe a factor of 50 times less expensive depending on the test).

Historically, the Forest Products Laboratory has developed a 2-foot tunnel test and an 8-foot tunnel test. Some data have been published by Forest Products Laboratory on correlations between these tests and the full-scale tunnel test. It may be difficult to locate these old publications but not impossible. A 2-foot or 8-foot tunnel test could already be implemented at many member companies if desired.

Outside of smaller tunnel tests, there has been a lot of work using other methods such as the cone calorimeter to predict flame spread rating. In general, there has not been a good correlation between testing with a radiant source and flame spread rating.

Given the decades of work on this topic, it seems unlikely that one WBC project would find a suitable smaller-scale version of the Steiner tunnel.

Comment 1.5. This area of research is very important for composite wood product producers.

Comment 1.6. This is a recurrent topic. It needs to be scoped down to a specific test method – lab scale vs. small scale.

More research should first be done to develop a model that can correlate E84 and E2768 – as a predictor of material behavior.

Additional research can be done to correlate results from a cone calorimeter to an E-84, at least in a broader level. The ultimate goal of this topic is to have a test that can obtain consistent results, as there is also high variability within E-84 testing agencies.

Comment 1.7. The WBC has already done a great deal of work in this area.

Director's Comments

Frazier: VT engineering professors Scott Case and Brian Lattimer completed the following: Bench-scale screening test for ASTM E119, in 2021 or 2022. The student, Michael Gangi, was excellent. The project was successfully completed and highly regarded, but no continuation was requested by faculty or members. So I am uncertain how to respond.

Sinha: A WBC project was initiated at VT but the line of inquiry was not continued. With new infrastructure coming online at OSU in the next couple of years, there will be more opportunities and pathways to continue with this topic.

TOPIC 2025 – 2

Descriptive Title: ***Study of corrosion seen in wood panel manufacturing processes and during end-product use and corrosion mitigations.***

Justification: Corrosion is an issue in manufacturing, but the root cause is not always understood. Likewise, product end use can result in corrosion of fasteners. What are the root causes of corrosion in these examples and what are effective mitigations of corrosion?

Comments

Comment 2.1. Define the scope and justification to be more specific. Are you studying corrosion in manufacturing or the end product? Is the cause really unknown?

Comment 2.2. Interesting topic but this is a low priority for my company as we rarely have corrosion issues.

Comment 2.3. Not a high priority for our organization and stakeholders.

Comment 2.4. The Forest Products Laboratory has published over 40 papers on the corrosion of metals in contact with wood products over the past 20 years, a rate of 2 papers per year. Forest Products Laboratory has also published two major book chapters summarizing all known aspects of corrosion of metals in wood, including in-depth discussions about the root causes of corrosion.

If there is a specific issue at a member company, they may wish to reach out to FPL. However, this topic has been extremely well researched, and it seems like one WBC project in this area would yield few general insights.

Comment 2.5. Corrosion in manufacturing and application equipment to make the panels and/or post-production fasteners?

Comment 2.6. There is currently not much publicly available research performed in this area. This work is important for the building products industry. Studies of wood treatments for improved performance in other areas should include corrosion resistance testing. Impact on air quality and associated permitting should be considered for any mitigation proposed. Fastener recommendations for a studied assembly and equipment used at a job site should be included.

Comment 2.7. This project has a broad scope, as corrosion can happen on a simple level due to the wood species' pH. But in the case of composites, it can also be due to the additives incorporated during the manufacturing process, that can also react with wood and its extractives. Due to the nature of the additives, this research topic can be broken down to target specific wood composites.

There are several existing studies for end use (fastener corrosion) and the approach to the manufacturing side is more attractive, but the scope is too broad.

Comment 2.8. The topic is overly broad and undefined. It would be helpful if this topic were to study how wood influences the corrosion of fasteners.

Director's Comments

Frazier: Agree with the general consensus that more detail is required in this request. Specific examples help the best.

Sinha: More detail is needed. It is an interesting and exciting research area and can also be of interest fastener companies.

TOPIC 2025 – 3

Descriptive Title: ***Effect of Phenolic Resin Solids on the Mechanical Propertes of Veneer Based Engineered Wood Products.***

Justification: Solids content affect the cost of the resin. The results of the study will help manufacturers and resin suppliers with cost/benefit analysis when determining the best resin systems for the product/production in production.

Comments

Comment 3.1. Consider the implications of the type of resin and components of the mix on the results. This could turn into a very large study if not scoped properly.

Comment 3.2. From an EWP manufacturer's standpoint, the value of this project will be to evaluate under the range of "typical" manufacturing conditions. For example, you may be able to show adequate bonding with reduced resin solids on veneer in an optimal moisture content and temperature range with a good bonding surface, but, as these conditions fluctuate in practice changes in variable within the allowable tolerance can lead to poor bonding with reduced solids.

Comment 3.2. We would assume that there would already be a lot of prior knowledge and studies on this issue. However, the topic is of benefit to the international wood products industry.

Comment 3.3. I give it a low mark mostly because it is so vague I don't really understand the topic.

Comment 3.4. I would suspect that many adhesives suppliers are actively looking at this.

Comment 3.5. Looking at solids reduction only seems to be limited in scope for a research idea, and the idea itself seems to already have been considered in industry.

Comment 3.6. The topic should be focused more on the limiting factors that adhesive manufacturers experience, that limits them into producing a high solids adhesive, besides the economical hurdles.

Other potential topics could focus on the challenges that a high solid content resin could cause during manufacturing.

Comment 3.7. There are a lot of factors that affect the choice of solids in a phenolic resin. there would be some interest if the project were to study how fillers and extenders were affected by resin solids.

Director's Comments

Frazier: With the greatest respect, I read this project as "how to formulate adhesives in today's manufacturing environment." And it is our members that have this knowledge and capability. The great challenge for faculty is to produce anything of value in this context. If we could, then our resin suppliers would have to provide some

pathway towards useful research. In other words, there are things the university does well, and things the industry does well. As described, I don't think the university can do this research.

Sinha: The topic is of interest to many panel manufacturer and if scoped well, can answer several key questions on solid contents and its interactions with different parameters – temperature, moisture, etc. This topic should be explored further and scoped appropriately.

TOPIC 2025 – 4

Descriptive Title: ***Improvements in adhesive technologies***

Justification: Current research in adhesives is focused on the replacement of the adhesive molecules, but not a lot is done to understand the effects of next-generation fillers/extenders and additives. This topic goal is to broaden the discussion about fundamental research of new molecules that have the potential to be included post-adhesion (different than an extender, focusing after the main adhesive molecules polymerize)

Comments

Comment 4.1. Interesting and timely subject matter. Will the work include hardwood veneers? In addition to board adhesion, I would encourage the evaluation of downstream uses of the veneer surface (e.g. finishing). As hardwood veneers become thinner, more finishing defects occur. Outgassing resulting in blisters or other abnormalities results in product rework. Filler selection may/can impact these occurrences.

Comment 4.2. The topic is of benefit to the international wood products industry.

Comment 4.3. It seems that extenders have a function in the final adhesive, and the requirements of the extender will depend on the properties of the adhesive and application system used. It seems very premature to research extenders before the needs of the industry are even identified.

Comment 4.4. Please add more detail (be specific) about what improvements to the adhesive the additives will provide. Are we talking only about improvements related to adhesion or are we talking about adding different attributes to the adhesive, such as flame retardance or improved water resistance? Targeted deliverables would improve this proposal's rating. Interested to hear more about this proposal…

Comment 4.5. This project ties with topic 3.

What other potential molecules (milk, soy, corn, etc.) are available that can help improve the current molecules, besides lignin. This topic gives the opportunity to research into other chemistries that are not commonly used in the wood industry that could potentially improve the performance of existing resins, as well as to improve application rates.

The identification of the new molecules (eg. Catalysts) could help chemical manufacturers to develop new resin formulations.

Comment 4.6. It would help to have better definition of what a post-adhesion modifier is. Investigating some post adhesion components that bring extra value like acoustic properties or fire retardancy would be helpful

Director's Comments

Frazier: The first sentence of the description is very exciting: *Current research in adhesives is focused on the replacement of the adhesive molecules, but not a lot is done to understand the effects of next-generation fillers/extenders and additives*. Next generation fillers and extender sounds great! But what are we after exactly?

How do current fillers and extenders fail? But this is interesting if we find new types of biomass, or other feedstocks. I do not understand the second sentence; it speaks of “molecules” and for me this evokes the base resin, new molecules in or replacing the base resin. I don’t understand post-adhesion additives without some specific insights, or examples.

Sinha: Improvement in adhesive technology is needed and WBC funded research should be at the forefront of fundamental groundwork that is needed. The scope of this topic needs to carefully streamlined to be attainable. This has the potential of becoming one of those long-term project area.

TOPIC 2025 – 5

Descriptive Title: ***Optimizing the Coating Type and Application Rate for Veneer Based Engineered Wood Products***

Justification: The purpose is to educate the marketplace on the best coating/application rate for the specific application. Moisture management on the jobsite is critical for successful projects involving EWP and Mass Timber. Coatings can help with moisture management; optimizing the coatings can save costs of the material and moisture mitigation repairs.

Comments

Comment 5.1. We would be interested in this work and participating in the project. Of particular interest is coating type/attribute selection and application method/rate. Selection of test methods (ASTM D4446, D5401, etc.) and education regarding selection and qualification of test methods to predict specific surface degradation modes. Work should be done to validate composition and type of coating evaluated, as well as key coating physical properties (e.g. viscosity and surface free energy).

Comment 5.2. Be sure this is precompetitive research.

Comment 5.3. Is there a test method out there intended to evaluate different categories of moisture exposure that can be used to optimize against? There are various guide documents available on moisture management at the jobsite and typically factory coatings are only advised for minimal jobsite exposure.

Won't the coating/application rate for the specific application be the responsibility of the coating manufacturer to recommend based on the coating's properties and protection category?

Comment 5.4. The topic is of benefit to the international wood products industry.

Comment 5.5. I could see a project looking at moisture intrusion during construction, how much moisture enters as a result of defects of certain types, or as a result of certain permeability values of the coating, or the utility of different moisture tests in predicting moisture ingress in certain situations. This is outside my area and I don't know how well this has already been documented. Abstain out of ignorance

Comment 5.6. Coating during production or post-production?

Comment 5.7. Can this topic be expanded to include other substrates beyond veneer-based EWP? Is this coating work about protecting EWP products at the job site prior to installation (i.e., field protection) or about performance during its lifetime? If the broader goal is to reduce cost of production and improve performance, calling out application rate seems like only one of several opportunities for this work. Can the topic just be rewritten with the goal of optimizing coating technology, process, and performance? A literature review followed by an example study of coating rates (and associated application methods) on a selected substrate with performance testing could be a good starting point. Please define what tests would be appropriate to evaluate coating performance. The project could be run in phases over time.

Comment 5.8. This topic is vague. Is this looking into the performance of the coating – short term for product placement, or long-term protection? Is this for existing commercial products? Each coating is different, and producers keep the formulations secret, so there is high variability, and the research would be very specific per brand. This looks more like a commercial focused project, rather than a WBC one.

For the application methods, there is existing research done at UBC where they have developed a VR training for coating applications.

Director's Comments

Frazier: Smile with me here; our faculty are unlikely to educate the market place- the market place educates us! The description includes "coating-application rate" suggesting a liquid coating, not a hot-pressed lamination as is done with LVL for instance. Coatings! Yes, we want to do more coatings research. But this idea needs some detail. Faculty probably cannot address coating rates; those are formulation and production issues that only the members can address. The faculty can address new, or old, coating technologies in a new context. I hope we develop this topic more thoroughly.

Sinha: Coatings research is needed, and we would like to conduct more coatings research. Faculty and our research perhaps cannot educate the marketplace but can mount evidence on viability of one technology vs. other. We need to develop this topic further and scope out specific projects.

TOPIC 2025 – 6

Descriptive Title: ***Self-healing coating attributes***

Justification: Wood products that are exposed to exterior conditions have the requirement to be coated. If the coating gets damaged, water intrusion, insects, and other organisms can intrude into the wood causing decay. This also reduces the use life of the products. A self-healing coating could allow for the extended protection of wood surfaces, thus extending its use and protection.

Comments

Comment 6.1. Good subject matter. Self-healing will need to be defined (superficial surface scratches as opposed to more intensive failure modes). Impact of primer or sealer selection on topcoat self-healing properties should be considered. In the end the applied finish will be a system in all likelihood. Would recommend including specific evaluation regarding water repellency of the surface and finish.

Comment 6.2. Sounds interesting

Comment 6.3. This is a practical problem that may prevent using coatings for moisture protection during construction. Do current coatings available in the marketplace have chemistries compatible with self-healing characteristics?

Comment 6.4. Interesting project. The topic is of benefit to the international wood products industry.

Comment 6.5. To bridge a scratch, the coating must flow, and therefore have a very low modulus. Therefore these self-healing materials are for limited environments: basically protected from mechanical wear, but need to prevent water/bugs. There is a place for this in wood products.

Comment 6.6. Self-healing coatings as a topic has been around for a while, but not typically considered for wood-based substrates. Interesting idea, but more is needed to show how this technology could be leveraged for wood products industry. Which wood coating technologies could specifically benefit from self-healing mechanisms? Which self-healing mechanisms are proposed for wood coatings? What are the deliverables for this project? Will a self-healing coating be developed or will known self-healing coatings on the market be evaluated?

Comment 6.7. This topic would require research on the current landscape of self-healing coatings. Similarly to the topic above, this would be very specific for each coating manufacturer. Also, can self healing coatings can be applied to wood products? is there existing ongoing research?

Comment 6.8. This topic needs to be structured in a way that avoids creating IP. Studying mechanisms of self-healing would be good for this,

Director's Comments

Frazier: Wow this is a fun topic! But I first want to answer a question posed in review: Do current coatings available in the marketplace have chemistries compatible with self-healing characteristics? Yes perhaps; but it's technology specific. One self-healing mechanism is to disperse micro- or nano-spheres containing a drying oil like linseed oil; when the coating is scratched, the spheres release linseed oil and polymerize upon oxygen exposure. That just fills the scratch, and don't know if the coating is otherwise compromised. Another type of self-healing involves aqueous equilibria, so this operates before cure; not very useful. Cost is always a concern, but if we had more specific objectives for this coating, then we can devise a plan, or suggest a change.

Sinha: Interesting topic. Needs to be explored. No further comments.

TOPIC 2025 – 7

Descriptive Title: ***Process Sustainability - Characterization of Key Substrate Properties Related to Finishing Wood Composites***

Justification: There is a sustained trend in the North American furnishings market to use wood composites, such as MDF, HDF, and particleboard, as primary substrates for cabinetry doors, frames, moldings, and more. Traditionally, these composites have been veneered or covered with overlays before finishing to protect the wear surface. The current industry trend is to not utilize a protective overlay prior to finishing. This shift requires additional finishing steps for profiled or machined areas to ensure a uniform film build, similar to that of non-machined areas, solid wood or veneered surfaces. The emphasis on sustainability and reducing finishing steps highlights the need for a better understanding of profiled or machined surface structure and morphology/topography of wood composities.

Potential project outline:

- Identify board manufacturing and composition variables that can be optimized for finishing
- Boards are not produced for finishing properties – what compositional changes could be developed or implemented to produce boards for finishing?
- Evaluate machining or tool design for finish as opposed to machining for application
- Current methods – began as solid wood methods then adopted to composite methods
- Improvements – tooling geometries and speed; balanced with through put
- Edge treatments – heat treatments for absorption and hydrophobicity (lignin flow)
- Align board variables to finishing characteristics
- Performance and aesthetics
- Finish absorption
- Substrate adhesion and raised fiber

Comments

Comment 7.1. Timely work considering increased use of wood composites in as primary wear surfaces. Identifying changes to current machining/milling processes or development of new processes that reduce fiber raise can reduce overall manufacturing costs, improve a given finished articles sustainability profile, and provide a point of differentiation for the composite manufacturer.

Comment 7.2. No interest rating reflects applicability to my company. I would support if it is valuable to multiple WBC Members

Comment 7.3. Not a high priority for our organization and stakeholders.

Comment 7.4. Virtually all panel products can go into furniture, and large volumes are used. Therefore there is a broad industry utility in better understanding and finding better ways to finish panel edges.

Comment 7.5. Broad interest for the group. Good for growth opportunities for building products industry.

Comment 7.6. This topic would require research on the current landscape of self-healing coatings. Similarly to the topic above, this would be very specific for each coating manufacturer. Also, can self healing coatings can be applied to wood products? is there existing ongoing research?

Comment 7.7. It is an important topic to some in the MDF industry

Director's Comments

Frazier: This is very interesting. Allow me to insert some institutional memory. Historically, members don't want us close to technology development; they want fundamentals. So in the Potential project outline, the 1st two items strike me as product development: 1) Identify board manufacturing and composition variables that can be optimized for finishing, 2) Boards are not produced for finishing properties – what compositional changes could be developed or implemented to produce boards for finishing? Maybe these ideas can be recast from the fundamental perspective. As for, "Evaluate machining or tool design for finish as opposed to machining for application" this maybe suggests a contoured hot-press platen. Can we address such a technology change? Let me restate that, "Can the faculty actually effect change here?" Maybe the MDF manufacturers could ask this question with specific direction to current production variables. I see the objective clearly, but not sure how we could use anything besides flatpanels that are machined. So I keep reading this as coatings research on machined composites.

Sinha: Dr. Frazier has summed it up well. Interesting topic on coatings.

TOPIC 2025 – 8

Descriptive Title: ***Reduction of fiber raise on profiled MDF faces following machining and exposure to ambient conditions or incidental water contact prior to or after finishing***

Justification: The use of MDF as a finished surface for interior furnishings, such as cabinets and furniture, has increased over the past decade, now extending into high-end market segments with greater performance and aesthetic demands. A persistent issue with MDF is its susceptibility to water exposure, which can cause fiber raise and swelling both during processing (e.g., after machining, requiring extra finishing steps) and in service (e.g., in unfinished areas, leading to damage). There is a need for an economical solution to mitigate these issues. Increasing the resin or wax content in MDF can improve its water resistance but also raises costs and reduces sustainability. A new approach is needed to create a board with a uniform density profile, superior machining characteristics, reduced fiber raise after machining, and enhanced water resistance. This would result in MDF with better finishing properties and improved long-term performance in humid conditions.

Comments

Comment 8.1. Topic relates to 2025-7. Targeted machined surfaces include those stated as well as moldings and trim. Fiber raise after machining is a manageable problem. Its control involves incorporation of a mediating step between milling and finishing, or application of additional coating step during finishing. Reducing either will improve the $/ft2 of the finished article and provide an increase in sustainability for the manufacturer.

Comment 8.2. No interest rating reflects applicability to my company. I would support if it is valuable to multiple WBC Members

Comment 8.3. Not a high priority for our organization and stakeholders.

Comment 8.4. Abstain

Comment 8.5. Important for MDF industry.

Comment 8.6. This topic is interesting on its focus to the profiled material, compared to 7, that is focused on the surface. This makes it more valuable as it includes the modification of the surface, and how the coating can help maintain factory performance of the substrates during installation.

Comment 8.7. MDF can be difficult to make correctly in a lab. This project might require an industrial partner. Studying ways of making the surface more durable would be a good direction to go.

Director's Comments

Frazier: I also read this as similar to project #7. And let's address the last comment above, "MDF can be difficult to make correctly in a lab." In fact, in the lab, MDF cannot be made correctly at all; MDF is the most complex material in our industry, and members would even question results from one of the few pilot plants on Earth.

There are ways to use coatings and additives to reach the goal, but changing the wood, as in thermal treatment, might present competing problems.

Sinha: Not a subject matter expert. I agree with Dr. Frazier's comments.

TOPIC 2025 – 9

Descriptive Title: ***Bio-based alternatives for wood based composites***

Justification: Generally, adhesives used in wood-based composites are obtained from non-renewable resources and consist of petroleum-based sources. These petroleum-based resins like urea-formaldehyde (UF), melamine-formaldehyde (MF) and petroleum-formaldehyde (PF) are still used in the production of composite wood despite increasing environmental concerns. Lignin is a natural phenolic polymer consisting of hydroxyl, carboxyl, and aldehyde groups making it a perfect candidate for replacement of non-renewable resources used in composite formation. In addition, lignin can be combined with other renewable resources to produce formaldehyde-free adhesives. This topic welcomes proposals that intend to use bio-based alternatives as a replacement for petroleum-based adhesives in formation of wood-based composites.

Comments

Comment 9.1. Good and timely topic. Sustainability and HCHO free adhesives are of continued interest, assuming that the cost impact is minimized or the market will accept higher prices for their use. What is the targeted application? All wood composites (both fiber and veneer based)? If veneer based, it would be interesting to compare performance impact based on surface veneer thickness. Specifically, the impact that the adhesive can have on the performance and properties of the primary surface.

Comment 9.2. No interest rating reflects applicability to my company. I would support if it is valuable to multiple WBC Members

Comment 9.3. Not a high priority for our organization and stakeholders.

Comment 9.4. abstain

Comment 9.5. A lot of work has and is being done on the use of lignin, it would be good to see what other bio-based alternatives are suitable in making equal or better performing adhesives.

Comment 9.6. Interesting enough topic, but much has already been done in this area. A novel approach is needed to differentiate this work from previous studies.

Comment 9.7. This topic is similar to topic 4.

There has been historic research on lignin as an adhesive since the 70's and no viable commercial product has been developed to date. Even though is a very interesting molecule, it would be good to also see into other less used chemistries outside of the wood industry.

Comment 9.8. Cost and economics of production will be big hurdles to overcome. This topic is always of interest for member companies.

Director's Comments

Frazier: In this topic, I assume lignin means technical lignins like Kraft lignin, and these are not similar to natural lignin. Technical lignins are the antithesis of the petroleum industry; they are variable and unpredictable. Native, natural lignin is actually closer to our desires; it's much more uniform than technical lignins, and there is a new way to pulp wood to produce it- it's a new lignin-based adhesive. I am very excited about this technology, and I hope to get federal funding to work on it. Here is a non-technical review I wrote about the discovery: https://www.nature.com/articles/d41586-023-02864-3

Personally, I could not advise a company, or faculty, to study technical lignins for use in wood adhesives. I do not believe they will produce commercially viable products. On the other hand, the new lignin-based adhesive does have potential. Furthermore, there are other natural molecules to consider, so this objective remains a high priority. I just don't think technical lignins can do the job.

Sinha: Interesting take on the use of lignin for wood adhesives. Not a subject matter expert in this. Will abstain from comments.

TOPIC 2025 – 10

Descriptive Title: ***Bio-based polyaldehydes for adhesive applications***

Justification: In wood adhesives, there is a desire to replace both formaldehyde and fossil-derived raw materials. Formaldehyde is important because it helps the resin set quickly by creating strong bonds (aldehyde functionality crosslinks the resin). Other aldehydes typically have lower reaction rates leading to longer press times. One way around this problem is to add polyaldehydes, which have a higher molecular weight. Dialdehyde starch regularly shows good performance in adhesives, but is not economical. Metal catalyzed peroxidation of starch to create polyaldehydes or enzymatic modification of starch, for example, are technically possible but also costly. It would be interesting to explore the potential benefits and challenges of using polyaldehydes in adhesives and find more affordable routes of bio-based polyaldehyde generation.

Comments

Comment 10.1. Interesting subject

Comment 10.2. Good project. Very beneficial for the international wood products industry.

Comment 10.3. abstain

Comment 10.4. It may be more feasible to focus on utilizing polyaldehydes as a raw material instead of trying to find affordable routes of polyaldehyde generation.

Comment 10.5. Similar to topic 4 and 8.

This topic seems very interesting and relevant, especially as it focuses on the replacement of formaldehydes with a concrete option for research. Also, with current proposals of new regulations around formaldehydes, this option looks viable and worth of potential funding with the WBC.

Comment 10.6. Cost and ease of production will be a big challenge for this. Also it would be good to see some rationale behind why polyaldehydes would be faster even though they are slower reacting.

Director's Comments

Frazier: Me, I love aldehydes, and I love formaldehyde! I would like to include renewable formaldehyde as a goal, because I don't think it's ever going away. Poly-aldehydes could work well; this is very interesting, but it's far away, and always had to compete with formaldehyde. Polyacetals are forms of poly-aldehydes, and I am very interested in acetal chemistry.