

Grade-reducing features in timber products

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Abstract

Non-permissible natural and processing features in appearance grade Tasmanian oak hardwood timber products cause significant downgrade in manufactured timber products. This study determined the potential quantity of recoverable timber from packs where natural and processing-induced features were present. Timber product manufacturers can achieve greater volumes of recovery and compliance to standardised timber grades by understanding the type and frequency of non-permissible natural or processing-induced features. The removal of such features by docking them out, or avoiding the production of non-permissible features in the initial stage of production, are just two options available.

This study identifies the importance for industry processors to investigate timber packs regularly to identify avoidable non-permissible features caused by processing practices, a lack of reflection on production and due diligence. This case study also demonstrates the importance of identifying which timber features are avoidable during the production stage, regardless of the standardised grading method and timber species, to prevent low product recovery.



Board assessment and collecting data – feature type and quantity

Introduction

Grade-reducing natural and processing features present in appearance grade timber boards inevitably reduce the recovery rate at the processing mill. Features such as natural timber characteristics (gum vein, knots and insect attack), and processing defects (mechanical damage and sticker marks), are key reasons for the downgrading of timber products during production. If a timber board fails to comply with the grade descriptions due to the presence of grade-reducing natural or processing-induced features, it cannot be sold as compliant with the standard. Unlike natural timber features, processing features are generally avoidable and negatively impact on the total grade recovery for timber boards.

Tasmanian oak case study

Grading processes in all timber species currently reject or downgrade a percentage of boards due to the presence of natural and processing-induced features in them. This research investigated the type and quantity of grade-reducing natural and processing-induced features common to generic Tasmanian oak production products to identify ways of improving board recoveries. Tasmanian oak is the name given to a combination of native regrowth Eucalyptus hardwood species – *E. delegatensis*, *regnans* and *obliqua* (Harwood, 2010). The boards were visually assessed according to AS 2796 and the cause of the board degrade noted. This data was used to determine ways of improving product recoveries by identifying avoidable processing-induced features throughout production.

Every board from two packs of Tasmanian oak hardwood flooring was visually examined and its characteristics noted. The data collected included the quantity of different features in each single board. This was collated into the total type and quantity of features found in this study.

The data presented in this study is context specific to Australian native forest Eucalyptus products. However, the principles of grading and identifying timber features in plantation Eucalyptus species grown in New Zealand is relevant (Nixon, et al., 2017; Fry, 1983).

Summary of results

Sixteen different features – 10 avoidable processing-induced and six natural – were identified in 653 finished processed floor boards. Highlighted in Figure 1, individual boards typically had one or a combination of two grade-reducing features. Surprisingly only one board had a combination of five, six and seven features. The type and quantity of features found in all the boards is shown in Figure 2. Most of the grade-reducing features

present were a combination of processing-induced features: tongue missing (14%), internal check (13%), mechanical damage (9%), shake from felling (7%), hit and miss (6%), under width (6%), split (5%), check (4%), sticker mark (1%) and mechanically-induced cross fractures (1%). This accounted for 67% of all grade-reducing features. The remaining 33% consisted of typical natural features found in the Eucalyptus species.

Discussion

By identifying the type and quantity of features in a board, resource quality can be assessed and grade recoveries can potentially be increased leading to significant value recovery by implementing or changing production practices. The differentiation of a grade-reducing feature, either processing-induced or natural, is vital to first understanding why the feature exists and second to implement practices to isolate, mitigate and eliminate it from occurring in future production. This is essential as downgrading occurs at the end point where the product cannot be re-streamed or removed and has been subjected to the highest possible processing cost.

Processing-induced features

A problem with processing-induced features is that most appear at the end of production, but are potentially avoidable if their existence is acknowledged and the cause actively addressed (see photos at the top of page 35). For example, the presence of processing-induced features (such as tongue missing and under width) is an indication of several possible scenarios.

Number of boards (653)

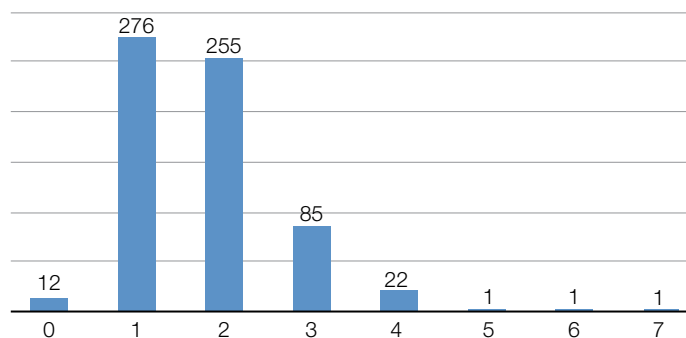


Figure 1: Quantity of grade-reducing features identified in individual boards

Frequency of feature (total 1163)

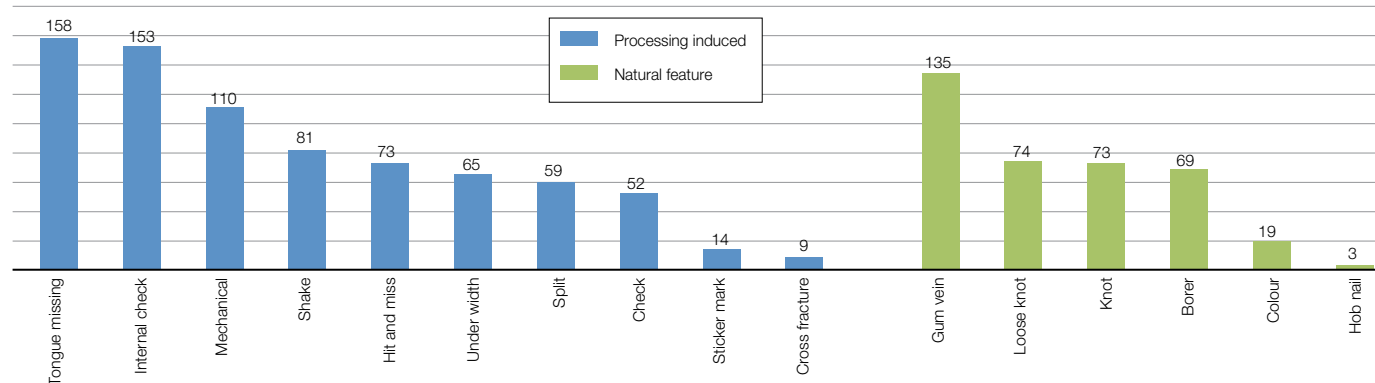


Figure 2: Type and quantity of grade-reducing features

In the first scenario, boards sawn from logs are cut too narrow or the shrinkage rate has been too high, and after drying and processing are unsuitable for the type of profile chosen for that particular timber product. Another scenario is that too much material was removed from the width of the board when it was squared during profile processing and therefore the tongue and groove profile was not properly cut. In another scenario, the hit and miss feature (face skip) could result from unrecoverable collapse (common in Australian Eucalyptus) after inadequate reconditioning of dry boards, or excessive collapse resulting from the drying technique starting at the green mill.

As identified by Innes (1996), significant board collapse can be managed (if not avoided) through proper drying regimes, as can issues like internal checking and surface checks, whereas end splits can be managed in the handling and processing of logs. Finally, proper product handling and care can prevent mechanical damage and sticker marks throughout the production cycle. Note that these scenarios about the presence of features are possible explanations and are not the definitive cause for each feature's existence.

Natural features

Natural features, as shown in the photos at the bottom of page 35, are generally unavoidable and require management and appropriate allocation of board to timber products that can accept the presence of natural features, either in appearance products or non-visual products. Natural features such as gum vein and loose knots can be identified early in board production. If green boards are categorised in a group with similar obvious features, more cost-efficient processing decisions can be made to manage and stream the product with natural features. This avoids lower product recovery and additional handling if they are mixed with the general product pool, and allows for separate marketing strategies to be developed for high feature materials.

Processing-induced features can (and should) be reduced during the production of timber products to improve product value and resource efficiencies.



Processing-induced features – mechanical, hit and miss, split and check

Natural features should be managed and segregated into appropriate product streams that allow grade-reducing features for products that are not intended for appearance applications, or industry grade systems developed for markets that will accept such features in an area where they are desirable or specified.

Conclusion

This study investigated the type and quantity of grade-reducing processing-induced and natural features found in native regrowth dressed Eucalyptus timber boards. The overall quantity and type of feature found was quantified by visually grading each individual board. Grade-reducing processing-induced features identified in the timber products accounted for 67% of the total features present. Dominant avoidable grade-reducing processing-induced features were tongue missing (14%) and internal check (13%), and this was identified via end cutting and visible pocketing after machining.

The levels of degrade caused by these features indicates key production practices (sawing and drying) that should be investigated to determine the reasons why they are present in such quantity. Also, improved care in product handling is an immediate and simple practice that could reduce levels of processing-induced features such as shake, cross fractures and sticker marks. By identifying the primary sources of avoidable degrade we anticipate that improvements will be made to processing practices that could lead to improved grade recoveries and better profitability for both the processor and grower.

References

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Natural features – gum vein and loose knot