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ORIGINAL ARTICLE

Effects of manufacturing parameters on Performance Teak decay Parties enhanced with Polyethylene Films

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Abstract:Flexible decorative veneers. made by low temperature plasma treatment. improve.Interface ~ teak veneers, low density polyethylene (LDPE) films. veneers, films. then joined by hot-pressing.

Showed, peel, transverse tensile. most significantly impacted by hot pressing temperature followed by Plasma processing speed. Optimal technology. making. veneers. 0.8 MPa. hot-pressing pressure 135℃. Temperature150 s. pressure time, 3 m/min. plasma processing speed. 0.51 kN/m. peel 4.13 MPa. transverse tensile, good flexibility. veneers. achieved. above manufacturing parameters.

Keywords: Teak veneer;LDPE film;Flexible Decorative Veneer;Manufacturing

Decoration industry of rapid growth wood resources supply and demand contradiction especially Membrane as an enhanced and adhesive material processing manufacturing a kind of new plastic film enhanced

Flexible Decorative Veneer can improve high quality wood of utilization and students
Production process without sizing, no formaldehyde release products don't tou jiao, water resistance Of strong cost low has good of Market Prospects[1-4].But polyethylene film and decorative veneer between the difference in polarity of Bonding has a negative performance influence[1 5-6]Is Polyethylene Film Enhanced flexible?.

With veneer industrialization production of key technology problem. Teak wood is a kind of commonly used precious decoration but for its wood in contained of fat, fatty acid and pro-oily material hinder adhesive on wood surface of Wettability and physical Permeability, is not conducive to bonding layer in plastic nail mechanical combined with effect of formation influence bonding effect[7].

The author early the plasma modified decorative veneer and polyethylene film surface performance of Research proposed will plasma modified Pretreatment Technology for polyethylene film and decorative veneer surface of Modified processing[68]Make material surface in physical etching of at the same time generated a large number of active group help improve wood INTERFACE BONDING CHARACTERISTICS[9-13]But teak decorative veneer surface of plasma modified effect weak in other species decorative veneer. So the author specialized for Teak Decorative Veneer the and polyethylene film Hot Pressing composite of process parameters adjustment to assurance the meet finishes requirements[7]For plastic film enhanced teak flexible decorative veneer of preparation process provide technology support.

1. Material and Methods

1.1 Try Material

Teak (Tectona grandis) Decorative Veneer format210Mm × 210mmThickness0.2mmWater Content10%Average

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density 0.72 g/cm^{3}Purchased in, Beijing, dongba wood factory.

LDPEThin Film melting temperature125 ~ 130℃ Thickness0.03mmDensity0.92 g/cm^{3}Outsourcing.

0.2 Equipment Instrument Dielectric Barrier low temperature plasma processing device (by double electrode structure Into two electrode gap don't more3mm; Is set discharge power1 ~ 4 kWMaximum feed speed10 m/min),G-12Flat Hot Press,MWD-w10Microcomputer Control Wood-based Panel universal mechanical testing machine different diameter steel bar and.

1.3 Test Methods

Early study found in same plasma feed speed and work Rate conditions under Plasma processing of teak veneer surface of modified With obvious weak in red oak, Manchurian Ash and so on other species Veneer[8]So in preparation Plastic Film Enhanced teak Decorative Veneer when need to key the hot pressing temperature, plasma processing feed speed and process parameters.

According to the pre-test results select hot pressing pressure, hot pressing temperature, Hot-pressing time and plasma processing feed speed for test factor each factors4A level (Table1)$L_{16}(4^5)$ The Polyethylene Film Enhanced teak flexible Decorative Veneer preparation test[6]Each group conditions the two times test.

1.4 Test and Characterization

To stripping strength and transverse tensile strength as an Process Optimization of evaluation index. ReferenceGB/T 2791-1995The adhesiveTStripping strength test methods flexible material of detection stripping strength. Each test level under5A specimen total90A specimen Results take the average.

Verification test and test flexibility, immersion[5].

Flexibility in accordanceLY/T 2879-2017The decoration of provisions will veneer cutting120mm×75mmOf specimen the long150mm, Diameter respectively2,4,6,8And10mmOf steel bar to specimens in steel bar the crimp rupture when the diameter of the characterization. Take optimization conditions preparation6Block specimen the test results take average.

Immersion detection in accordanceGB/T 15104-2006The decoration veneer finishes wood-based panel of provisions observe the veneer and plastic film between whether stripping layered phenomenon with Steel Ruler measurement the edge stripping length. Take optimization conditions preparation6Block specimen the test results take average.

2. Results and discussion

2.1 Process Factors of Influence

1a,BRespectively for process factors polyethylene film by the enhanced teak veneer stripping strength and transverse tensile Strength Influence of effect curve Table2And table3Variance analysis results show that, the most important of influence factors for hot pressing temperature of teak veneer of stripping strength, transverse tensile strength were very significant influence; secondly for plasma processing feed speed, of the effects that the strength and transverse tensile strength have significant influence; hot-pressing pressure only of the effects that the strength have significant influence; hot-pressing time of the effects that the strength and transverse tensile strength no significant influence.

2.1.1 Hot Pressing Temperature

This test is set hot pressing temperature range125 ~ 140℃ With the hot-pressing temperature of improve teak veneer of stripping strength gradually improve; in 135℃ When stripping strength to maximum. This in due to hot pressing temperature L high,LDPEMembrane resin melting full flow exhibition and into the wood organization formation plastic nail to increase material of bonding performance. When the hot pressing temperature continue to rise140℃ When,Resin full of Financial in is long time pressure role under resin penetration excessive and wood matrix strength decreased cooling after production students is big of stress, but weaken the veneer of stripping strength and

transverse tensile strength.

2.1.2 Plasma body processing feed speed

Decoration thin wood and polyethylene film surface by Plasma Modified processing after surface contact angle were reduce surface wettability to improve

CElements relative content reduceOElements relative content increased,O/COf than increased surface generated a large number-OH,-C = OAnd-O-C = OGroup to both of interface glue.

With the plasma processing feed speed from6 m/minReduce3 M/minProcessing time extended ,-OHContent first was increase trend after tends to be stable ,-C = OChange not and more of group was oxidation-O-C = OThese discharge process in generation of oxygen-Containing Polar group for to increase the decorative veneer and plastic film of Surface Wettability and bonding of play a positive role. And when plasma processing feed super

Of3 M/minWhen plasma processing time relative for as long as sample surfaceOElements of content increase and to balance plastic film resin melting permeability good and points cloth uniform plastic membrane and veneer between "nail" structure the most stable to improve the poly, ethylene membrane enhanced pomelo wood veneer of stripping strength and transverse tensile strength.

2.1.3 Hot Pressing pressure

When the hot pressing pressure0.4 ~ 0.8 MPaWhen hot pressing pressure of increase led to plastic film full penetration into a with veneer cells structure in formation stability of plastic nail structure; when the hot pressing pressure to increase again1 MPaWhen Matrix rigid decreased stripping strength has decreased.

With the pressure of increase pomelo wood veneer of transverse tensile strength some fluctuation but change is smooth. And red oak and Rosewood veneer compared,

Teak veneer required of hot pressing pressure phase on is big about0.8 MPa.

2.2 Optimization of Process Parameters

By table2.The results show that: with peeling strength as the evaluation index, the influence of hot pressing temperature is very significant, and the plasma is processed.

And the influence of hot pressing pressure is obvious.$A_3B_3C_3D_1$., I .e., hot pressing pressure0.8 MPa, Hot Press Temperature135CHot Pressing Time150 sPlasma, processing feed rate3 M/min.

By table3.The results show that the transverse tensile strength and degree are the evaluation indexes.

The Influence of hot pressing temperature, plasma, feed rate, hot pressing pressure and time is significant.

Chemical Process combination$A_3B_3C_2D_1$., I .e., hot pressing pressure0.8 MPaTemperature

135 C, timeInter120 sFeed Rate of plasma processing3 M/min. Due to heat, compression time itself against polyethylene membrane reinforced teak veneer

The peeling strength and transverse tensile strength have little effect. When hot pressing time is 150 sWhile the peeling of teak veneer leaves the best strength and is relatively stable.120 And 150 sUnder the conditions, the transverse tensile strength of teak veneer varies very little and can reach the relative optimal state. Therefore, in order to ensure the peeling strength, the optimal process parameters are determined as follows: hot pressing pressure0.8 MPa, Hot Press Temperature135Temperature, hot pressing time150 sThe feed rate of plasma processing is3 M/min.

The plasma feed rate of teak veneer should be slowed down compared with the previous study on the optimized polyethylene membrane to enhance the flexible decoration thin such as red oak and pear.[6, 8]That is, the plasma processing time is longer, the hot pressing temperature is also significantly improved, and the hot pressing pressure is relatively large.

Using the above optimized process conditions, the polyethylene membrane reinforced teak veneer wood samples were prepared.24Performance test, the results are: Strong peeling

0.51 kN/mTransverse tensile strength4.12 M Pa; Steel bar crimp diameter4mmExcellent flexibility; dipping peel performance test

GB/T 15104-2006Medium I, Class dip stripping test requirements.

3. Conclusion

1.) Teak, wood contains fat, fatty acids and other lipophilic substances, which hinder the wettability and physical permeability of plastic film on the surface of decorative thin wood. Through pre-treatment of Plasma modification before bonding, the surface of teak veneer was coarse, the surface roughness was increased, and the filler was precipitated, thus improving its interfacial bonding performance with polyethylene film.

2.) In this study, the optimal process parameters of polyethylene membrane reinforced teak veneer were as follows: feed rate of plasma treatment.3 m/m inHot Pressing pressure0.8 MPaTemperature135C,Time150 s.

3.) The polyethylene membrane reinforced teak veneer made by the optimized process has excellent flexibility, and the diameter of the steel rod can be as low as that of4mmPeel Strength1 kN/m 0.5, Transverse tensile strength up4.1 2 MPaDipping and peeling

GB/T 15104-2006Class I requirements.

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