



Mechanical Engineering

Elixir Mech. Engg. 68 (2014) 22194-22196

Elixir
ISSN: 2229-712X

Exploration of various testing of wooden furniture

P.M. Pandharipande, A.K. Gupta, A.A.Khandait, S.A. Kesale, M.M. Wasu, K.V.Daigavane, C.K.Tembhurkar* and N.K.Mandavgade

Priyadarshini College of Engineering, Nagpur, India.

ARTICLE INFO

Article history:

Received: 6 January 2014;

Received in revised form:

22 February 2014;

Accepted: 3 March 2014;

Keywords

Wooden furniture,
Durability test,
Performance test,
Furniture safety,
Children's furniture testing.

ABSTRACT

There are various types of tests which are to be carried out in wooden furniture such as Chemical Testing, Furniture Flammability testing, Furniture testing for durability and Performance, Furniture Safety Testing, CARB Certification, Children's Furniture Testing, Furniture Inspection Services, Mattress Testing. Considering the safety aspects of the furniture which is being used from child to the senior citizens it is essential to have reliable and dependable tests to be carried out on the wooden furniture. This paper is aimed at defining the various tests to be carried out in wooden furniture.

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Introduction

The range of indigenous furniture available in India includes both residential and contract system furniture, with an increased concentration in office furniture. India was the biggest furniture importer in 2004-05, with a 17 per cent share in furniture imports worldwide. A total of 10,476 importers shipped furniture to India during this period. The current imports are mainly from Italy, Germany, Spain, China, Korea, Malaysia, Indonesia, the Philippines and Japan. The different types of test in wooden furniture are Furniture Chemical Testing, Furniture Flammability Testing, Furniture Testing for Durability and Performance, Furniture Safety Testing, CARB Certification, Children's Furniture Testing, Furniture Inspection Services, Mattress Testing. Considering the safety aspects of the furniture which is being used from child to the senior citizens it is essential to have reliable and dependable test to be carried out on the wooden furniture.

The Need for Testing :-

Before a system is delivered to the user or customer it will require to be tested. In fact it is good practice to include testing as part of the development process in order to minimize the effort prior to implementation. Failure to test the system properly can be expensive to put right in the future and will certainly cause poor customer relations since they will have serious down-time while the repairs are being made. Close attention was focused on detail during development combined with module testing at appropriate points during the project can help to minimize the testing phase. It is for this reason that we recommend that a user representative is on the development team - they can "test" the system at its various stages of development. This also assists with user training. We must be careful during testing that we do not fall into the trap of rewriting large parts of the system unnecessarily or even adding new coding. This can come about when it is obvious that not of the required functionality has been implemented. It can also happen when the user introduces new functionality which they had omitted from the original specification. Testing should therefore simply be ensuring that the systems meets its original

specification and accurately performs to that specification. Testing is an important phase of system development and it should not be neglected.

Different types of test performed on wooden furniture:-

Furniture Chemical Testing

Many international and national safety and quality standards have been established to test for chemical content in furniture. With the prevalence of green and eco-friendly products available on the market, today's consumers make a concerted effort to reduce the use of harmful chemicals and substances in their homes. Furniture chemical testing gives consumers and manufacturers peace of mind and allows them to embrace the eco-conscious trend in relation to furniture. Hazardous substances and excess moisture levels in furniture and the raw materials that make up each piece have been linked to a variety of health conditions, and can be especially harmful to children. A comprehensive solution for furniture chemical testing through our global network of laboratories.

Furniture Flammability Testing

Furniture flammability testing is designed to ensure that the furniture meets required standards and regulations established by many countries to help mitigate the intensity of household fires. Flammability testing focuses on checking fire resistance of furniture, cover fabrics and filling materials in accordance with international standards, such as UK Furniture and Furnishings (Fire Safety) Regulation 1998 and California Technical Bulletin 117. Extensive options for flammability testing for furniture, including:

- Cigarette burn tests
- Match burn tests
- Ignition resistance tests
- Flaming and smoldering screening tests

Furniture Testing for Durability and Performance

Although most furniture testing for durability and performance is entirely voluntary in many markets, it allows manufacturers to have third-party validation of their brand. Performance testing to national, international or industry standards gives you a competitive edge and adds value to your

Tele:

E-mail addresses: chetantembhurkar@gmail.com

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products. You can gain confidence in knowing how your product stacks up against the competition. Durability testing evaluates how well a product holds up when put to the test beyond its expected or designated function. We provide testing for furnishing fabrics, filling materials, furniture components and more.

Furniture Safety Testing

Consumers spend a lot of time researching and shopping for furniture to ensure they make a good investment that will withstand the test of time and daily use. Furniture safety testing is an essential part of ensuring that furniture will meet consumers' key considerations. It performs a multitude of safety tests, assessments, and inspection services to evaluate the physical characteristics, construction properties, performance and labeling of all types of furniture. Furniture safety testing is conducted in accordance with both international and national standards. These are important not only to ensure consumer safety, but also to promote and maintain a positive brand reputation built on the quality and durability of furniture products.

Children's Furniture Testing

Children's Furniture Testing is a critical requirement established by international standards. Building and buying safe children's furniture is key to manufacturers' and consumers' peace of mind.

Modulus of rupture

Modulus of rupture is the maximum load carrying capacity of a member. It is generally used in tests of bending strength to quantify the stress required to cause failure. It is reported in units of psi.

Modulus of elasticity

Modulus of elasticity or Young's modulus is the ratio of stress to strain. Within the elastic range below the proportional limit, this ratio is a constant for a given piece of wood, making it useful in static bending tests for determining the relative stiffness of a board. The modulus of elasticity is normally measured in pounds per square inch (psi) and is abbreviated as MOE or E. Values for E relating to wood properties are commonly in terms of million psi; for simplicity, a board with a modulus of elasticity of 2,100,000 psi.

Moisture Content

Moisture content for a given sample of wood is defined as the weight of water in wood expressed as a percentage of the weight of wood fibrous material (which is considered to be the oven dry weight of the sample).

Density

Density is the weight or mass of a unit volume of wood, and specific gravity the ratio of the density of wood to that of water.

Tensile

Tensile stress elongates or expands an object. Measurements of tensile stress perpendicular to the grain are useful for quantifying resistance to splitting. Examples of such stress include splitting firewood, driving nails, and forcing cupped boards to be flat. Wood is relatively weak in tension perpendicular to the grain but it is very strong in tension parallel to the grain (visualize a board being pulled from both ends). Due to difficulties in testing and the limited use for such data, tension parallel to the grain has not been extensively measured and/or reported to date. Tensile stress is measured in psi.

Compression

Compression stress shortens or compresses the material. For the woodworker, the primary types of compression to consider are parallel to the grain and perpendicular to the grain. Compression parallel to the rain shortens the fibers in the wood

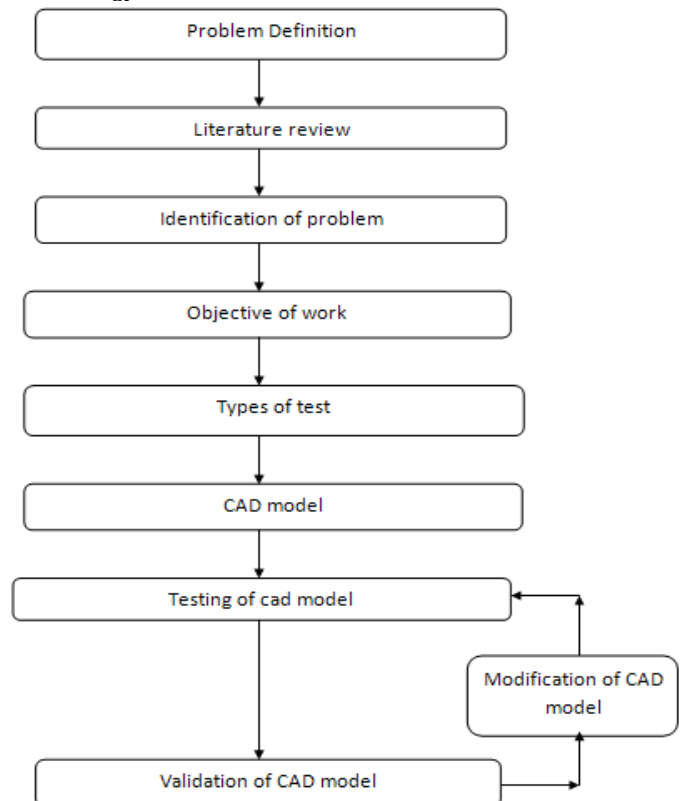
lengthwise. An example would be chair or table legs which are primarily subjected to downward, rather than lateral pressure. Wood is very strong in compression parallel to the grain and this is seldom a limiting factor in furniture design. It is considerably weaker in compression perpendicular to the grain. An example of this type of compression would be the pressure that chair legs exert on a wooden floor. If the applied pressure (weight) exceeds the fiber stress at proportional limit for the wood, permanent indentations will result in the floor. Compression stress is measured in psi.

Objective :-

The various tests are carried out in order to ensure human safety and the wood used for making particular product should be durable. The following are the objectives:-

1. To identify the various test in order to ensure safety and durability
2. Explore the various national and international standards and determine the requirements of the standard.
3. To find out the various test which are carried out in local furniture industry.
4. To study the existing set-ups, their development, their utility in the industry.
5. To explore the test which are required as per the standards are not carried out.

Methodology



Conclusion

The various testing methods used for wooden furniture has been discussed in paper. The advantages and drawbacks of these methods are discussed. The methodology for testing of some parameters have not presently used for small scale industries. Some tests for wooden furniture are yet to be carried out and for these tests. We have to develop the CAD model, testing and validation of this model will be useful for further study.

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Sr.No.	Types of test	Test used for	Product Categories
1.	Furniture Testing for Durability and Performance	It will help to evaluate the quality and life-cycle of furniture.	Small Office/Home Office furnishings, Kitchen Cabinet etc.
2.	Furniture Safety Testing	It will help to evaluate physical characteristics, construction properties, performance and labeling of all types of furniture.	Office/home Kitchen cabinet, institutional purpose, etc.
3.	Furniture Chemical Testing	It will help to detect hazardous substances and excess moisture levels in furniture.	School/office and institutional purpose.
4.	Furniture Sustainability Testing	It is used for testing for water, air, electrical, chemical, material, and Sustainability, for products.	School/office and institutional purpose.
5.	Modulus of rupture	It is generally used in tests of bending strength to quantify the stress required to cause failure.	Plywood Products
6.	Modulus of Elasticity	It useful in static bending tests for determining the relative stiffness of a board	Domestic purpose
7.	Internal Bond Strength	It helps to know the strength of the bond between the wood particles in the panel.	Timber products
8.	Moisture Content	It help to know the weight of water in wood expressed as a percentage of the weight of wood fibrous material	Plywood, Timber
9.	Tensile stress testing	It is useful for quantifying resistance to splitting. Examples of such stress include splitting firewood.	Firewood
10.	Compression stress testing	It is use for Compression stress shortens or compresses the material	Chair and table legs

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