

Trees give us the timber which is converted into required form and finally used. Before reaching this final stage, timber comes across many critical stages like growing without defects, cutting at the right time, seasoning, converting and using. Different types of defects occur in timber at these various stages.

## **Types of Defects in Timber as a Construction Material**

In general, the defects in timber are mainly due to:

1. Natural forces
2. Fungi
3. During Seasoning
4. During conversion
5. Insects

### **Defects in Timber due to Natural Forces**

1. Wind cracks
2. Shakes
3. Twisted fibers
4. Upsets
5. Rind galls
6. Burls
7. Water stain
8. Chemical stain
9. Dead wood
10. Knots
11. Coarse grain
12. Foxiness

13. Druxiness

14. Callus

## 1. Wind Cracks in Timber

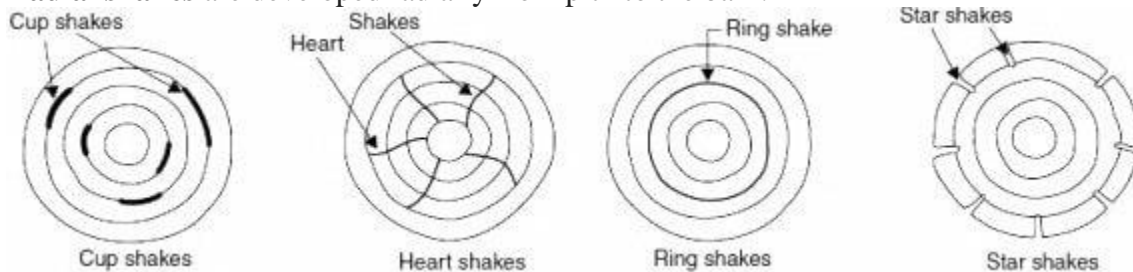
If the wood is exposed continuously to the high-speed winds, the outer surface shrinks and forms crack externally which are called wind cracks.



## 2. Shakes in Timber

Shakes are nothing but cracks which separates the wood fibers partly or completely. Different shakes are formed in different conditions as follows:

- **Cup shakes** are formed due to non-uniform growth of a tree or excessive bending by cyclones or winds. In this case, the shakes develop between annual rings and separates them partly.
- **Heart shakes**, the other type of shakes which develop in maturity approaching trees whose inner part is under shrinkage. The shake spread from pith to sap wood following the directions of medullary rays.
- **Ring shakes** are similar to cup shakes, but they completely separate the annual rings.
- **Star shakes** are formed due to extreme heat or severe frost action. They develop wider cracks on the outside of timber from bark to the sap wood.
- **Radial shakes** are developed radially from pith to the bark.



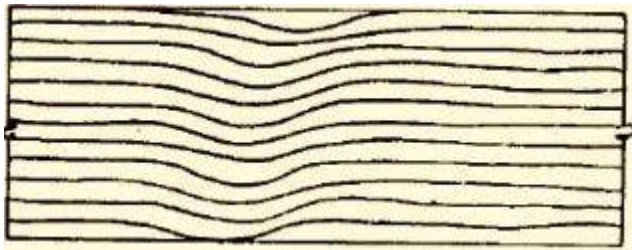
### 3. Twisted Fibers in Timbers

When the tree in its younger age is exposed to high speed winds, the fibers of wood gets twisted. This type of wood is not suitable for sawing. So, this can be used for making poles, posts etc.



### 4. Upsets

Upsets, a defect of timber in which the fibers of wood are crushed and compressed by fast blowing winds or inappropriate chopping of tree.



### 5. Rind Galls

Rind galls are curved swellings of trees which are formed at a point where a branch of the tree is improperly removed or fell down.



## 6. Burls

Burls are uneven projections on the body of tree during its growth. These are mainly due to the effect of shocks and injuries received by the tree during its young age.



## 7. Water Stain

When the wood is in contact with water for some time, the water will damage the color of wood and forms a stain on its surface. This defect is called as water stain.



## 8. Chemical Stain

Chemical stain is formed on the wood by the action of any external chemical agents like reaction by the gases present in atmosphere etc. The stain area gets discolored in this defect.



## 9. Dead Wood

The wood obtained from the cutting of dead tree is light in weight and is actually defected. It is reddish in color and its strength is very less.



## 10. Knots in Timber

The central part or stem of a tree is majorly used in the conversion of timber. Branches from the stem are removed and whole rounded stem is taken. But the base of branches forms a mark on the stem which results dark colored stains on the surface after conversion. This dark colored stains are due to the continuity of wood fibers. These dark colored rings are known as knots.



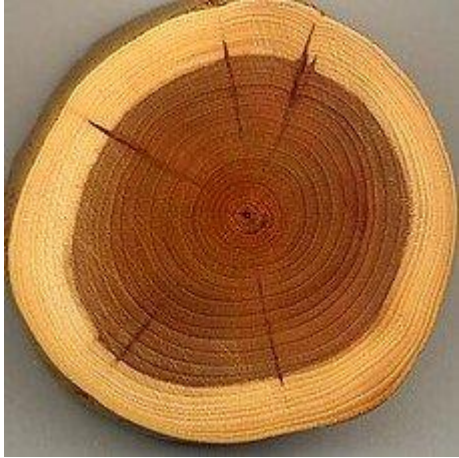
## **11. Coarse Grain Defect in Timber**

The age of tree can be known by the number of annual rings. For fast growing trees, the gap between the annual rings is very large. This type of trees are called as coarse grained trees and timber obtained from them is of less strength.



## **12. Timber Foxiness**

When the timber is stored without proper ventilation, the trees growth near the banks of water bodies and over matured trees may exhibit this type of defect. Foxiness is generally indicated by red or yellow spots.



### **13. Druxiness**

Druxiness is a defect of timber in which the top surface of timber indicates white spots. These spots will give the access to fungi.



### **14. Callus**

The wound of the tree is covered by a soft skin which is called as callus.



## Defects in Timber due to Fungi

1. Dry rot
2. Wet rot
3. Brown rot
4. White rot
5. Blue stain
6. Heart rot
7. Sap stain

### 1. Dry Rot in Timber

Dry rot is caused by certain type of fungi which actually eats wood for their living. They make food by converting timber into dry powder form. This occurs mainly when there is no ventilation of air or if the wood improperly seasoned.

Absence of sunlight, dampness, presence of sap will increase the growth of dry rot causing fungi. This can be prevented by using well-seasoned wood and also by painting the timber surface with copper sulphate.





## **2. Wet Rot in Timber**

Wet rot is caused by fungi which decomposes the timber and converts it into grayish brown powder form. Wet rot causing fungi grows mainly when there is alternate dry and wet conditions of timber.



## **3. Brown Rot in Timber**

The cellulose compounds of the wood are consumed by certain types of fungi which then makes the wood brownish and this defect is called as brown rot.



#### **4. White Rot in Timber**

Some types fungi attacks lignin of wood and leaves cellulose compounds hence the wood will turn into white color which is called white rot.



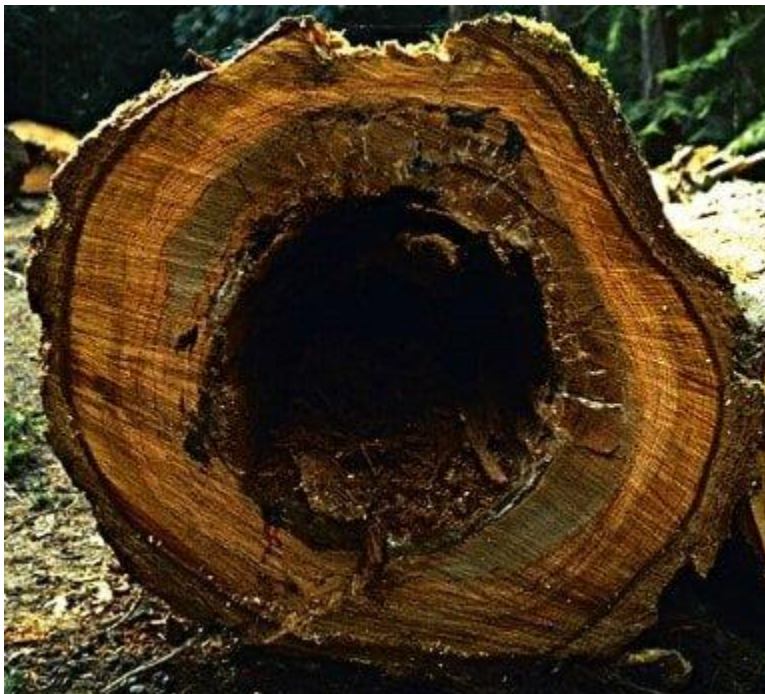
#### **5. Blue Stain in Timber**

Blue stain is a defect caused by some kind of fungi which makes the timber bluish in color.



## 6. Heart Rot in Timber

Heart rot is caused in the trees when the heart wood is attacked by fungi through its newly formed branch. This type of fungi makes the tree hollow by consuming heart wood. This defect is known as heart rot.



## 7. Sap Stain in Timber

When the moisture content in the timber is more than 25%, some types of fungi attacks the sap wood and makes it discolored. This type of defect is known as sap stain.

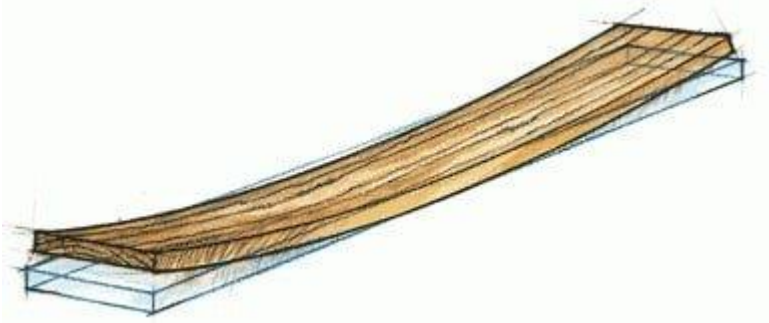


## Defects in Timber During Seasoning

1. Bow
2. Cup
3. Check
4. Split
5. Twist
6. Honey combing
7. Case hardening
8. Collapse
9. Warp
10. Radial shakes

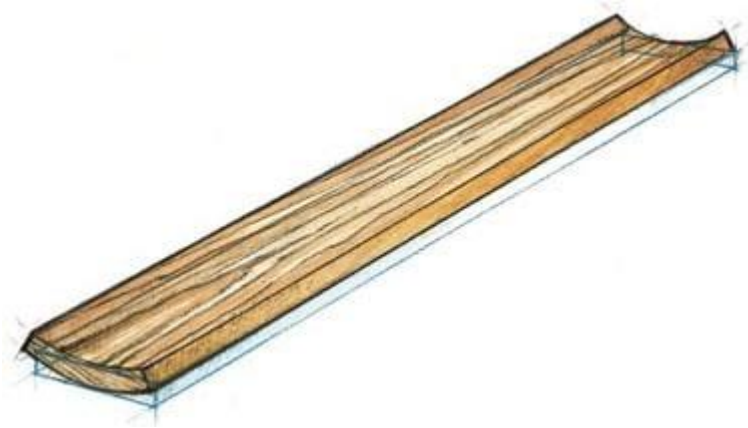
### **1. Bow**

When the converted timber is stored for longer time, some timber planks may have curve along its length which is known as Bow.



## 2. Cup

If the timber planks are curved along its width then it is called Cupping of timber.



## 3. Check

Check is formation of crack in the wood which will separate the wood fibers. They are formed due to over seasoning of wood.



## 4. Split

Split is formed when a check extends from one end to the other end which will split the wood into number of pieces.



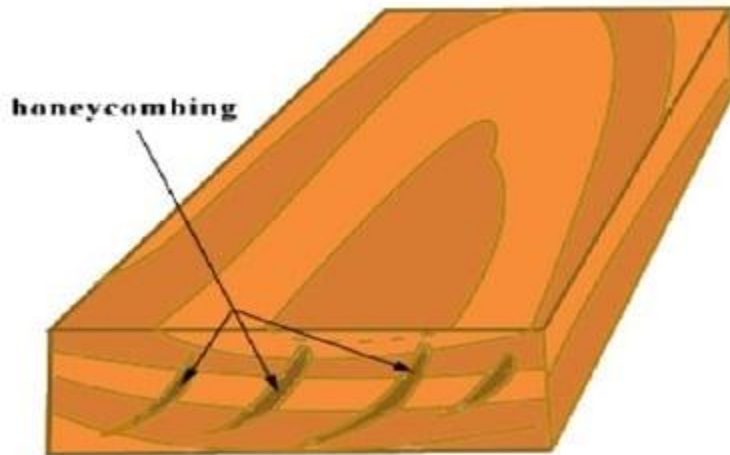
## 5. Twist

Twist is formed when the timber piece is spirally distorted along its length. It looks like propeller blade after twisting.



## 6. Honeycombing

Honey combing occur in the inner part of the timber which cannot be identified by just seeing. This is mainly due to stresses developed during drying of timber.



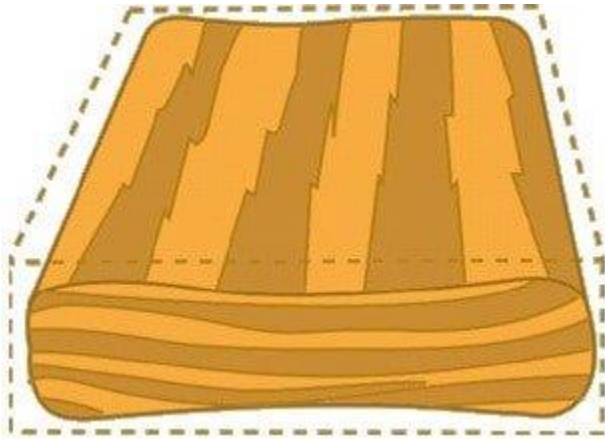
## 7. Case Hardening

Case is nothing but the top surface of wood which dries rapidly during seasoning but the inner part didn't. Then this defect is called as case hardening.



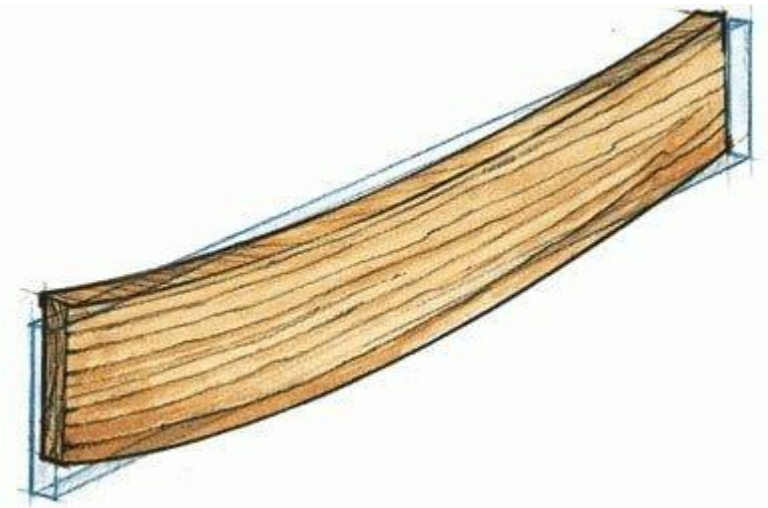
## 8. Collapse

During drying, some part of the wood may dry rapidly while some may not. Because of this improper drying shrinkage of wood occurs which results the defect called collapse.



## 9. Warp

The loss of shape of wood due to stresses developed during drying is called warping. Cupping bowing, twisting of wood come under warping.



## 10. Radial Shakes

Radial shakes are developed after the tree being felled down and exposed to sun for seasoning. In this case, the cracks run radially from bark to the pith through annual rings.





## Defects in Timber During Conversion

1. Diagonal grain
2. Torn grain
3. Chip mark
4. Wane

### 1. Diagonal Grain Defect in Timber

During conversion of timber different cutting saws are used. The cutting should be done properly. If there is any improper cutting by saw then a diagonal grains will appear.



### 2. Torn Grain

In the conversion many tools are used. If any of the tools or any other heavy things are dropped accidentally on the finished surface of timber it will cause small depression which is called as torn grain.



### **3. Chip Mark**

When the timber is cut through planning machine the parts of machine may form chip marks on it. Usually they are indicated by chips on the finished surface.



### **4. Wane**

The edge part of the timber log contains rounded edge on one side because of its original rounded surface. This rounded edge is called wane.



## Defects in Timber due to Insects

1. Termites
2. Beetles
3. Marine borers

### 1. Termites in Timber

Termites also known as white ants which forms a colony inside the timber and eat the core part of the timber rapidly. They do not disturb the outer layer of timber so one cannot identified their presence. The trees in tropical and sub-tropical regions are mostly affected by these termites.

However, some trees like teak, Sal etc. cannot be attacked by termites because of the presence of termite preventing chemicals in their cellulose part.



### 2. Beetles in Timber

Beetles are a type of insects which destroy the sap wood of the tree and makes a tunnel like hole from the bark. Usually the diameter of hole is around 2 mm. They convert sap

wood into powder form and these holes are used by larvae of these beetles. Almost all hardwood trees can be prone to damage by these beetles.



### **3. Marine Borers in Timber**

Marine borers are usually found near coastal areas. They do not consume wood but they make large holes of diameter up to 25mm in the timber to live inside it. They excavated up to 60mm deep in the wood. The wood attacked by marine borers is of less strength and discolored. They can attack all types trees present in their region.

