



Institiúid Teicneolaíochta Chorcaí  
Cork Institute of Technology

# **ARCHITECTURAL TECHNOLOGY**

## **Conservation 1**

**Historic building material and technology**

**Year 4**

**Semester 1**

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## Introduction:

The purpose of this report is to write a 'state of the art' review of the science, technology and practice associated with the repair and conservation of one external building material chosen from the building we have been assigned.

The material I have chosen to look at for the purpose of this project is timber and the building I have been assigned is the Quad building in University College Cork. The Quad has timber work in the form of timber frame windows, timber shuttering covering over gaps and timber doors. These are all located externally and are constantly being challenged by the elements of the rough Irish climate. This in turn means that the conservation of this timber is crucial in order for the building to maintain its original and natural appearance.

The project will be broken up into three sections which are as follows:

1. The chemical and physical properties of the solid oak which make it suitable for the way it is used in the quad
2. The repair and conservation methods available for the solid oak
3. The philosophical issues surrounding the repair and conservation of the solid oak, including availability, sustainability and conformity with accepted conservation principles.



## **1. Chemical and physical properties**

Timber is a building material that has been around for thousands of years. It is used in construction for both structural and aesthetic purposes. The timber I am looking at is oak which is used in certain places around the Quad.

This timber is facing the harsh elements of the rough Irish climate at all times and has been doing so for a long time. The chemical and physical properties of this timber therefore must be of a very high standard in order for it to maintain its strength and appearance over such a long time.

### **Chemical properties:**

Oak is natural building material and is a renewable resource. It is less vulnerable to atmospheric pollution and if used correctly, it will wear under wind and rain in such a way that its surface will harden instead of eroding or breaking down. It is also resilient to the most common type of attack on timber, the furniture beetle. This can only attack the sap wood of the oak, unless it has been damp over a long period. In order to ensure this doesn't happen the timber must be treated and looked after regularly.

### **Physical properties:**

Oak is a very strong and solid material. It has great physical properties and can be used in almost all forms of construction. It is a hardwood and is straight grained with medium to coarse texture. It is heavy, hard and strong with outstanding wear-resistance. It is very durable and can adapt to almost all conditions. If oak is used in the right conditions it will outlast most types of stone.

The chemical and physical properties which are listed out above are the reasons that the oak used in the Quad is suitable for its use. It is also the reason it has been around so long and why it will be around for so much longer. As long as the oak is well maintained and looked after it will remain suitable for its use in the building. All oak on the external of this building has been treated with some form of finish in order to protect it further. This can be seen in the photo section towards the end.

## **2.Repair and conservation methods.**

It is vital that the proper steps are taken when the timber is being repaired. In order for the building to maintain its original appearance and still look aesthetically pleasing, the proper restoration and conservation of all timber work must be carried out from time to time. The repair of timber in any historical building such as the quad, can be very demanding and controversial. When choosing a repair type it is important to take into consideration the character and age of the original timber, and any previous repair jobs that may have been carried out in previous years. Timber can fail or decay in a number of ways which are as follows: Fungal attack, insect infestation or splits and shakes caused during the drying out of unseasoned timber. The 3 main repair types available for the solid oak timber are as follows:

1. Honest repair
2. Like for like repair
3. Resin repair

The type of repair you choose to use will depend largely on the part of the building you are repairing, the significance of it and whether it is to be restored or conserved. There are many ways of repairing defects in the oak timber and sometimes a variation or mix of repair types may be required.

### **1.Honest repair:**

Honest repair can involve the reinforcing of timber with metalwork. it is a reversible form of repair. This method of repair is seen by many as altering the way in which various parts of timber panels or pieces are interacting. However metalwork provides a cost effective, efficient and structurally engineered way to repair.

Another form of honest repair is the use of steel plates. This uses the same concept as the metalwork only you are using steel plates instead.



Above is an example of honest repair, where a steel plate being used to repair a damaged beam in a conservation building. The same concept would apply if you were to use this method of repair on the external oak of the Quad.

## **2.Like for Like repair:**

When carrying out the repair of the oak it is important to select a material of the same nature. It must be from a reliable source and more importantly it must have a moisture content which matches to within 1% of the oak being repaired. If this is not done the different drying rates of the timber may cause a problem with any joints in the timber.

Scarfed repairs are a form of like for like repair and it involves the cutting away of the rotted or damaged timber and replacing it with a new piece. The new piece would be fixed back to the original piece that hasn't been damaged. This type of repair allows the maximum amount of original timber to be retained and kept as it is.

Replacing an entire panel or piece of timber is another option. This would involve the replacing of a piece of timber (eg. a timber panel in the door of the Aula Maxima) with a like for like replacement. It is important that when you are replacing the timber you ensure it is of the appropriate moisture content and size. You would only do this if the full panel was beyond repair and could not be saved.



The above photo is an internal image of a like for like repair. The same concept would apply if you were to use this method of repair on the external oak of the Quad.

### **3.Resin repair:**

Resin repair involves the use of a resin to repair a damaged pieces of timber. It is a very controversial method of repair when it comes to repairing structural timber with resins. This is due to the fact that there is a lack of understanding of the technology behind it. It can cause the timber to become stiff and impermeable, which will cause a problem if it is connected to other pieces of unaffected timber. This is a relatively new method of repairing timberwork and therefore it is not fully known how well it will stand up over a long period of time.



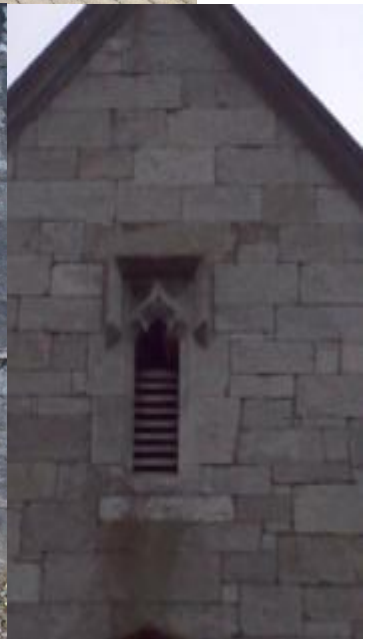
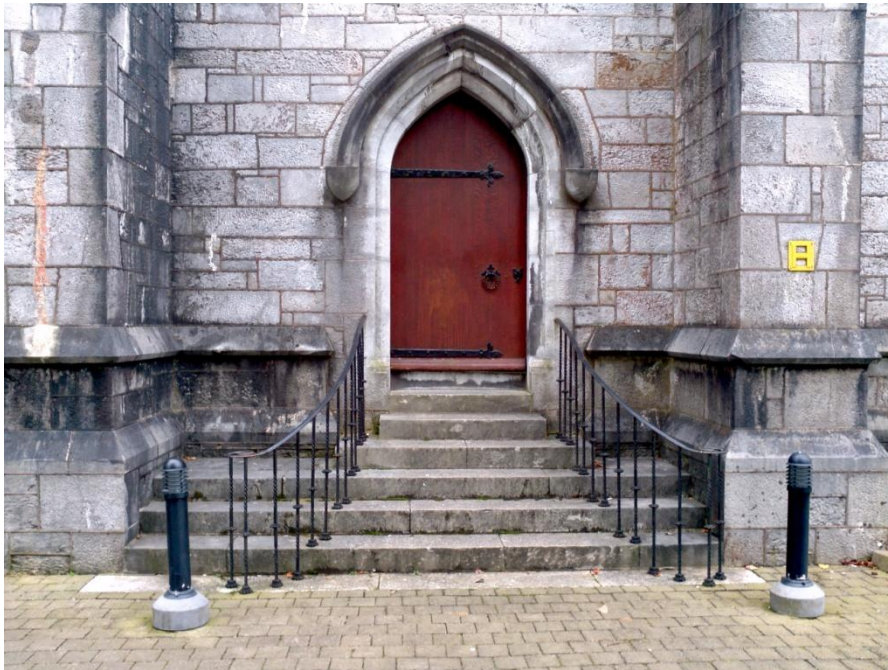
Above is a perfect example of resin repair. It shows the use of resins to repair an external window frame that has been damaged. The same concept would apply if you were to use this method of repair on the external oak of the Quad

### **Conclusion:**

There is a wide range of conservation repair methods available. Timber repairs are among the most used and favoured repairs. This is followed by metals and then resin repairs. The type of repair you use depends on a number of things, such as, Location and extent of damage. When repairing the damaged oak it is essential that you repair it in such a way that it cannot be damaged the same way again. Regular maintenance and monitoring of the repaired area is key in avoiding a reoccurrence of the same problem.

### **3.Philosophical issues surrounding repairs.**

**Images of external oak timber in the Quad:**





## **References:**

### **Sites:**

<http://www.buildingconservation.com>

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<http://www.woodbin.com/ref/wood/>

<http://library.cit.ie/>

<http://www.petercox.com/images/resin/beam-end-repair.jpg>

<http://www.periodliving.co.uk/sites/default/files/images/0411marianne-01.jpg>

[www.kierson.co.uk](http://www.kierson.co.uk)

### **Books:**

'Conservation Of Timber Buildings' by 'F.W.B. Charles' with 'Mary Charles'