GORDON RUSSELL DESIGN MUSEUM

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A NATURAL WORLD

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NOTES FOR TEACHERS

Why choose wood as a material? Wood is strong; reasonably light; warm; easily worked; takes a good finish; is tough; hard-wearing; usually in good supply and therefore cheap. Gordon Russell learnt about the qualities of wood from an early age working on the restoration of antique furniture in his father's business in Broadway. The Arts & Crafts tradition of remaining true to the material was never far from his design ideas.

AIMS OF THIS UNIT

This unit looks at the materials used in furniture manufacturing through the lifetime of Gordon Russell Limited. Predominantly this is exploring the traditional material of wood and its properties but also looking at some of the modern materials used in furniture production.

Paris Cabinet, 1925

There is an opportunity to explore how designers combine and organise the colours and patterns within wood and use nature as an inspiration in design.

CURRICULUM LINKS

KS2

- Art and Design - Unit 3B (Investigating patterns), Unit 5B (Containers, understanding materials)
- Design and Technology - All Units (Exploring the sensory and physical qualities of materials)

KS3

- Design and Technology - Unit 07bii (Developing an understanding of designing and manufacturing of products)

All Key Stages

- Science - understanding the physical properties of materials
- ICT - Research skills
- Literacy - analysis and comment, group discussion and interaction.

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QUICK NOTES

Some designers look to nature for inspiration in their work.

Nature can inspire the shape, the patterns or the materials used.

Furniture is often made from wood, a natural material but it can be made from man-made materials too!

Wood comes from trees.

Wood is strong, reasonably lightweight, hard-wearing and can be easily worked with tools.

Trees can be a hardwood and deciduous - they loose their broad leaves in winter.

Trees can be a softwood and evergreen (or coniferous) - they keep their needle-like leaves all year round.

There are thousands of different types of trees and woods around the world.

Not all species of trees grow in our country.

Trees are cut down and the trunks are sliced into long planks.

The wood has to be 'seasoned' or left to dry in the air and then a kiln (oven) before it can be made into furniture.

Wood can be used in solid planks or used to make plywood and other types of boards.

In recent years people have become concerned about the amount of trees being cut down each year world-wide and not being replaced.

The Forestry Stewardship Council was set up to tackle the issues of sustainability.

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DESIGNING

STARTING POINTS - DESIGNS FROM NATURE

The image below is the original design for the front of the cabinet to the right. It was made of English walnut inlaid with ebony, yew and box with handles in ebony and laburnum. The design was inspired by nature. The cabinet won the Gold Medal at the Paris Exhibition of 1925.

Inlaying is when thin slices of wood are cut into shapes and set into another type of wood with glue. The surface is sanded and sealed with wax.

This cabinet was designed by Gordon Russell in 1924 and made by William Marks, a cabinet maker at Russell and Sons Ltd.

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MANUFACTURING AND MATERIALS - ONE

STARTING POINTS - WOOD AS A NATURAL MATERIAL

Furniture can generally be made from:

- Natural materials such as solid wood, leather etc.
- Natural materials that are processed into new materials such as plywood, rubber, metal or glass
- Completely artificial materials such as plastics and man-made textiles.

Furniture can be made from a wide variety of materials. By the 1950s these materials included solid wood, plywood, blockboard, steel, brass, glass, plastics, linoleum, textiles, leather, leathercloth, hair, fibre, flock, rubber, zinc, vitreous enamel, cellulose, paint and aluminium.

There are thousands of different woods growing all over the world, many unknown in Britain. They fall into two broad categories of:

- Hardwood - such as oak, walnut and mahogany
- Softwood such as the pines and firs, usually used in building (roofs, cupboards, staircases, floors) but can be used for country-style furniture.

NATURAL WOOD

As trees grow in approximately circular sections there is a good deal of waste in cutting them into squares and rectangles. Under the outer bark there is sometimes up to three inches (8cms) of sapwood. This is 'unripened' wood through which sap has flowed during the spring and summer nourishing the leaves and tree growth. It is not usually used in furniture making.

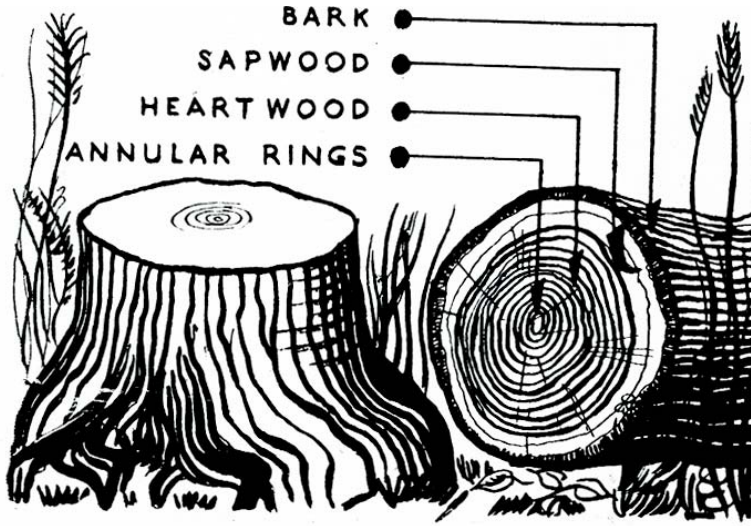

Image taken from 'How to Buy Furniture' by Gordon Russell

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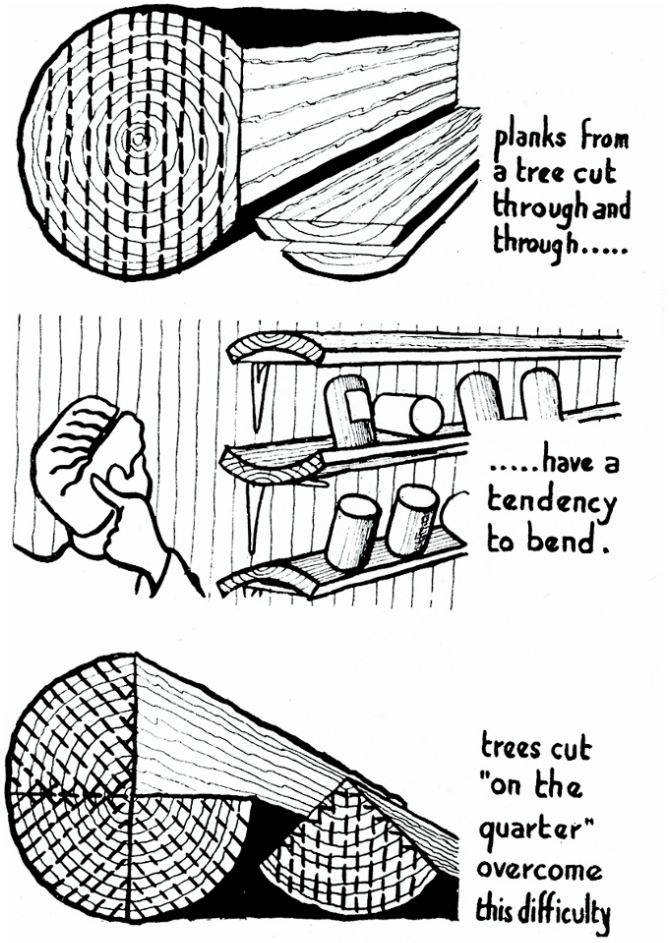
MANUFACTURING AND MATERIALS - TWO

There are different ways of cutting a tree trunk into boards and planks. A large circular saw, a frame-saw or a band-saw can be used.

- The quickest way to cut trees 'through and through' are with parallel cuts - like slicing a loaf of bread. The disadvantage is that as the sap of the wood dries out the shrinkage from circumference to the centre causes the boards to curl. This can be cured by staking the planks carefully.
- A more satisfactory way but more wasteful is to cut the trunks 'on the quarter'. It can also be the best way to show the wood grain.

Wood is usually 'seasoned' by leaving it to air-dry and then kiln-dry it in chambers where the heat and moisture can be controlled accurately. If it is too dry it shrinks, becomes brittle and will absorb moisture from the air and swell. If it is not dry enough it will eventually dry out and shrink.

Many of the woods chosen by Gordon Russell for furniture are native to the UK. Some are hardwoods, from broadleaf deciduous trees which shed their leaves each year. Others are softwoods from coniferous or evergreen trees which retain their needle-like leaves all year.



Images taken from 'How to Buy Furniture' by Gordon Russell

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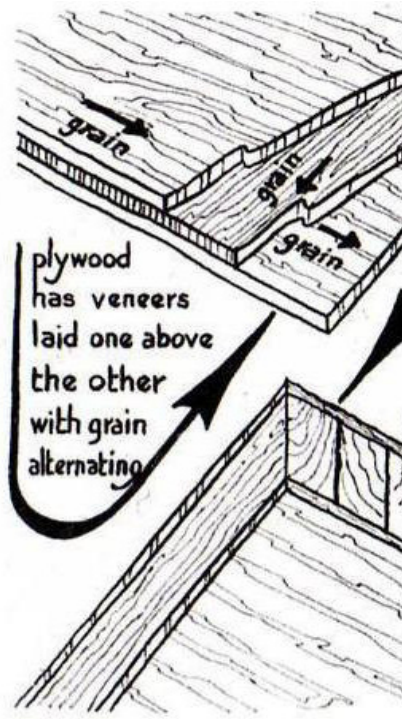
INNOVATION - ONE

NEW PROCESSES

One of the great attractions of wood as a material is its highly individual quality. Although it can be cut into accurately sized boards, and can be sorted into a great variety of different qualities called 'prime, first, seconds, thirds, fourths and fifths,' it cannot be fully standardised, which in mass-production terms is a disadvantage. Much research went into processed boards from materials of which wood is the main constituent. They come broadly under two headings of plywood and reconstituted wood. These materials are stable and undoubtedly would have been used by the great designers Messrs. Chippendale and Hepplewhite if they had been available in their day!

PLYWOOD

Veneers, thin slices of wood glued to a thicker base, have been used from very early times. The veneers were originally cut by hand and were very expensive as the process was slow - as much as half a tree was lost in sawdust. Veneers became cheaper with the introduction of a slicing machine which slices the steamed log, although not all logs can be cut this way. The rotary slicer takes advantage of the tree's circular shape. A log is put onto a lathe rotating the tree trunk. A long blade travels against the log as it rotates at a certain speed to give a certain thickness to the veneer



slice. The veneer can be up to a mile long. This is then cut with a guillotine into convenient lengths. The veneers are then dried and spread with adhesive and formed into large panels like a sandwich. The grains of the two outer veneers are then laid in the same direction, the centre on is laid at right angles. The result is a strong, light and stable board and has more of the qualities of metal rather than wood.

It can be made waterproof with appropriate adhesive and can be made in a variety of thicknesses or 'piles' e.g. 5,7,9 ply - always odd number so that the outer pair of the veneers matches. This makes the board stay flat.

Blockboard, or laminated board, is made by using thicker boards in the core, building up narrow strips and then veneered either side.

INNOVATION - TWO

RECONSTITUTED BOARD

These boards are made from wood waste e.g. chippings and sawdust to which an adhesive is added and the board is pressed. The amount of 'wood flour' (finely ground wood) and the pressure used determines the density of the board. These boards can also be veneered.

In furniture making up to 60% of a tree goes into shavings, chippings and sawdust, so it is obvious that reconstituted panels will find a use. Medium Density Fibreboard (MDF) is probably one of the best known today. It is a heavy material and it is essential to wear a face mask and work in a room with exhaust ventilation, as the dust is dangerous if inhaled.

OTHER WOOD MATERIALS

Solid wood and plywood can also be steamed and bent to make complicated shapes that are retained when the wood dries. Other products include wicker and cane and wood products made from wood by-products such as paper yarn cloth and paper yarn twine.

NEW MATERIALS

Metal furniture can be seen in both houses and offices. Composite furniture made from metal and other materials has improved with advancements of adhesive technology. Upholstery has moved on from springs lashed to webbing and covered with horsehair to modern spring units. Many of these ideas came out of the motor industry and brought upholstery into mass-production. Similarly the old wax or oil polishes gave way to French polish (a mixture of shellac dissolved in methylated spirits) which in turn has been overtaken by cellulose lacquer sprayed onto furniture. This technology emerged from the 'doping' (weatherproofing) of plane body material in the aircraft industry.

Plastics, rubber and textiles are also used, as technology advances and materials are adapted from other industries., particularly space technology in the 20th Century, glass also has a place, again influenced by new technological research into making it less likely to shatter.

SUSTAINABILITY

Increasing awareness of the fragile environmental issues surrounding the use of natural materials has resulted in customers, designers and manufacturers considering where and how wood is sourced and managed.

The Forestry Stewardship Council (FSC) actively promotes the issues surrounding global deforestation and good practice for anyone using wood as a material.

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NOTES FOR TEACHERS

Other materials are used in furniture making. See if you can find examples of these...

- ☐ brass
- ☐ chromium
- ☐ iron
- ☐ rush
- ☐ leather

Unscramble these woody words! Tick the box when you find an example in the museum or on the website.

- ☐ kao
- ☐ oeybn
- ☐ cader
- ☐ lyhol
- ☐ urmurnlba
- ☐ oseworod
- ☐ ymahaon
- ☐ eyw
- ☐ tulawn
- ☐ rurb mle

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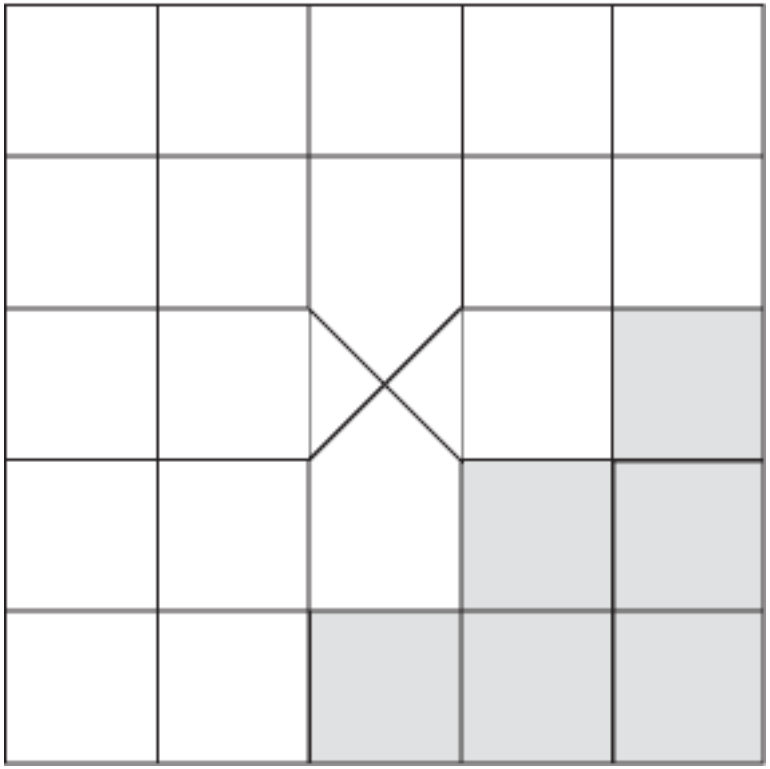
ACTIVITY 2 - PATTERN

TASK! Have a go at completing the burr elm pattern on the drop front writing bureau



What do you think is meant by 'naturalistic' designs?

How have the designers in the museum used the 'grain' (pattern) of the wood?

Why do you think designers like to use ideas from nature?

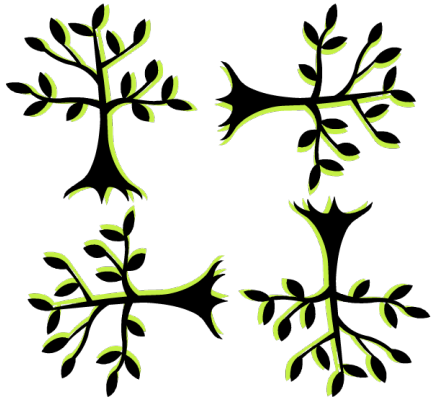
TASK! This is one of the doors of the Paris Cabinet, 1924. Look closely at the naturalistic veneer design and see if you can copy it.

Can you think of any 'naturalistic' designs you have seen outside of the museum...maybe a pattern on a piece of material, a piece of metalwork or on some pottery?

FOLLOW UP IDEAS

These are ideas to try out back in the classroom or studio

- Make a class collection of as many different objects made from as many different examples of wood as possible. Do some research on the web or in books to classify them (group them) as to whether they are hard or soft woods. Do any of them come from sustainable sources?
- Collect images of wood grain patterns and colours and create a collage.
- Print off a rectangle filled with one of the wood grain patterns found in the colour fill on most paint programmes on the computer. Word also has a small selection if you use the 'fill colour/fill effects' and then select 'texture'. Use the papers to cover 3D furniture models or even non-furniture models!
- Make a class collection of objects from nature with good pattern qualities. Use a viewfinder to concentrate on a small area of pattern. Divide a sheet of good quality cartridge paper into six, nine or twelve equal sized boxes and fill each with close up line drawings of the different patterns.
- Try photocopying the sheets of line drawings and cut them up, rotate and flip to create different patterns. You could also scan the images into the computer and cut and rotate to create new patterns.



This small design was created with clipart so you don't even have to be good at drawing!

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