

# 2.6 Frame structures



Quick summary

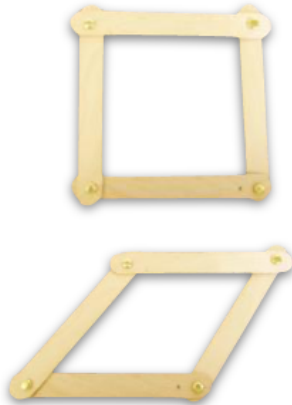


A structure is strong if it is **rigid**. Some shapes are more rigid than others. Triangles are the most rigid shapes for frames and they are used in almost all structures that need strength, such as the **trusses** which form a roof or the structure of some bridges. This theory is known as triangulation. Truss bridges have interconnecting triangular structures, which give them strength and **distribute** weight evenly along the length of the bridge.



Technical knowledge

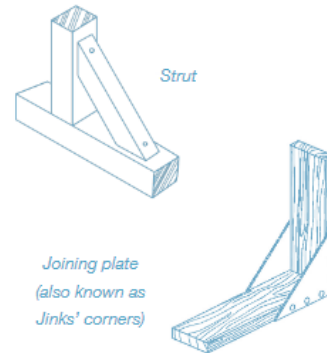
A square frame is not very rigid. It is easy to change its shape.



A triangle is rigid. It is very difficult to change its shape.



Frames can be made stronger by adding a **strut** or a **joining plate** to form a triangle shape.



Vocabulary

- rigid:** an object that is stiff and does not bend or change shape
- truss:** a structure made of triangles
- distribute:** to share out something that strengthens a structure
- strut:** something attached to a joint to strengthen it
- joining plate:** something attached to a joint to strengthen it



Technical knowledge



Practical knowledge



Design inspiration

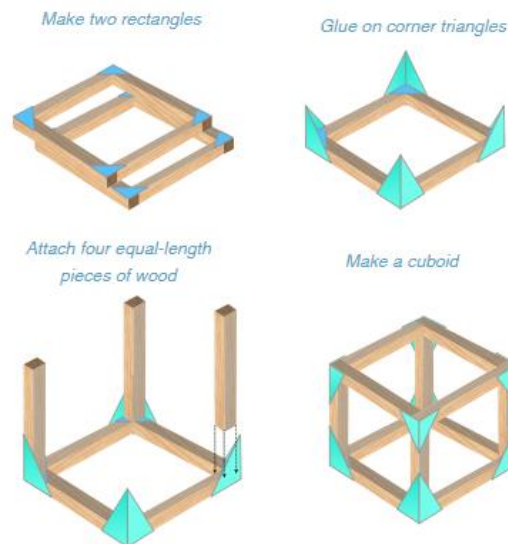
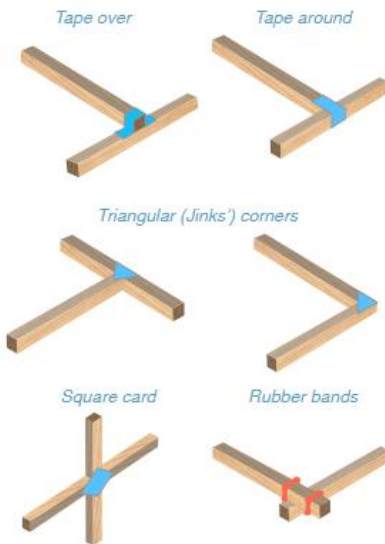


Design process

# Frame structures: finger fluency



Designers need to practise making things until their hands and fingers do things **automatically**, without much thinking. This is called **fluency**. By practising making frame structures in lots of different ways, your hands and fingers will become fluent in making and assembling. Square section wood may be joined in a variety of ways. Tape works well for thin pieces of wood whereas glued triangular card corners, known as Jinks' corners after the person who **pioneered** the technique, work better for larger pieces.



## Vocabulary

### automatically:

an automatic action is one that you do without thinking about it

### fluency:

if you are fluent in something you do it effortlessly

### pioneer:

one of the first people to be involved in or develop something



Technical knowledge



Practical knowledge



Design inspiration



Design process

# Frame structures: design inspiration



Quick summary



Designers take inspiration from existing products. They think about a product's purpose, the users and how it is designed. Below is a labelled image that shows the frame structure of a truss bridge.



Design inspiration

Steel girders  
Stone pier  
Rigid bottom chord



Rigid top chord  
Interlocking right angle triangles  
Steel deck



inspiration:

purpose:

user:

chord:

pier:

## Vocabulary

where you got your ideas from

the reason for which something is made

the person for whom the product is designed

the top or bottom of a truss structure  
a solid structure supporting a bridge



Technical knowledge



Practical knowledge



Design inspiration



Design process