

# Timber joints

In Dhajji construction







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RECONSTRUCTION AND LIVELIHOOD PROGRAMME, PAKISTAN

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#### Drawings for joint models

- Scale of the models 1:4 (4\*x4\* beam becomes a 1\*x1\* beam)
- · The joints must not be nailed together.
- Holes shall be prepared wherever a nail should be. Nails shall also be provided. For demonstration purposes, the nails will be put into the holes to show their exact position and function. But the nails must be removable without tools (therefore, holes slightly bigger).
- Nails must also be in scale, i.e. 3" nails shall measure ¼", 4" nails shall measure 1" and 5" nails shall measure 1 ¼".
- Prepare also the straps where straps are indicated on the drawings. The holes in the straps must correspond to the holes in the timber piece.
- · Joint to prepare:
  - 1. Scarf joint (1 pic)
  - 2. Lap joint (1 pic)
  - 3. Half tenon joint (4-5 pics)
  - Added blocks joint (2 pics): The blocks can be nailed directly onto the beams. Prepare also the diagonal boards.
  - 5. Truss joint 'onto' (2 pics)
  - 6. Truss joint 'against' (1 pic)
  - King post (1 pic)
  - 8. Truss model with 'onto' joint



• Scarf joint

• Lap joint





# Scarf joint:

- Length: 3 times size of beam (with 4"x4" beam = 1ft).
- Cut as on the drawing.
- Use a hardwood peg, cut into 2 wedges.





# Scarf joint:

 How to make a scarf joint.





# Scarf joint:

 How to make a scarf joint.





# Lap joint:

- Length: 3 times size of beam.
- Connect with 4" nails, 3 from each sides.
- First nail 4" from end of wood.





# Lap joint:

- Length: 3 times size of beam.
- Connect with 4" nails, 3 from each sides.
- First nail 4" from end of wood.





# Lap joint:

 A squinted end of the lap improves the joint against torsion.





#### Tenon and mortise:

To join the posts with the dasa, use tenon and mortise joints.







# Tenon and mortise:

• You can add straps...







# Tenon and mortise:

- You can add straps...
- ... or nails to secure the joint.

(here straps are better than nails).





#### **Corner joints**

 3 methods for the dasa-post joint in the corner:





#### **Quarter tenon:**

- Overlap the dasa in the corners.
- Then place the posts on the dasa.
- Add 5"nails to secure connection.





#### **Quarter tenon:**

 How to make the quarter tenon corner joint.





#### Quarter tenon:

 How to make the quarter tenon corner joint.





 Leave at least as much wood after the cut-out as the timber is wide.





- Cut first lap 1/3 deep.
- Cut the lap 2/3 deep.





 Then cut out half of the remaining lap of the top beam.





 Then cut out half of the remaining lap of the top beam.





Prepare the ulletpost by cutting a tenon 1/2 its width and as high as the remaining part of the dasa lap (2/3).





- Add a strap before you place the dasa on the foundation.
- Bend it through the joint.
- Nail it against the post with
  <sup>22</sup>3 nails.





- Add a strap before you place the dasa on the foundation.
- Bend it through the joint.
- Nail it against the post with
  <sup>23</sup>3 nails.





 Leave one foot of timber after the joint.





 Add 2"x4" blocks:





- Add 2"x4" blocks:
- 12" long on the outside
- 10" long on the inside.
- Nail them with three 4"nails each to the dasa.





• Add the corner post





- Add the corner post
- Fix it with two diagonal boards nailed as shown.





#### The 3 types of trusses











Short or long king post depending on the need for bracings





Rafter longer than 10 feet: use bracings





Rafters shorter than 10 feet: no bracings



- The rafters are 'stuck' onto the tie beam.
- This way, the tie-beam can work at its full capacity.





 Leave at least as much wood after the joint as the beam is high.





The inclination of the stop-splay should be half the angle between tie beam and rafter.





• Secure the rafters with straps...





- 1/4 3/
- .. or 5" nails put in the same position as the straps.











- Here the tiebeam is cut in two halves of 2"x4" each.
- They hold the rafters from the side.





- The 2"x4" tie-beams are nailed against the rafter from both sides.
- Use four 4" nails on each side.





#### Therefore: only two types of trusses should be used





#### **Additional truss details**





#### **Additional truss details**





# **King-post**

- Leave as much wood after joint as post is large.
- Secure joint with straps or 5" nails.





# **King-post**

- A king-post does NOT stand on the tie-beam.
- But it can be used to suspend the tie-beam if this one is very long.





#### **Additional truss details**





#### Braces

 You only need bracings if the length L of the rafter between the joints is longer than 10 feet.





#### **Braces**

 If L is shorter, you can make a short kingpost and secure it with two lateral boards.





#### The model maker

Confédération suisse Confédération suisse Confédération suisse Confédération Suisse Confédération Suisse Federal Department of Foreign Atfairs FDFA Swiss Agency for Development and Cooperation SDC Swiss Humanitarian Aid and SHA

HUMANITARIAN AID (SDC-HA) PAKISTAN

RECONSTRUCTION AND LIVELIHOOD PROGRAMME RLP

Mr. Mohammad Zubair Qureshi Woodworks Abbottabad Mobile 0304 936 08 50

13 March 2007

Subject: scale models timber construction

Dear Sir,

Last month you have produced for us a series of small scale timber models of roof constructions. I wish to thanks you for the excellent work done for us. The models are quite complex, but you have proved a great dexterity in making them precisely according to the drawings. It will be our pleasure to recommend you to whomever will be in need of quality timber work.

Yours sincerely,

Tom Schacher

Technical advisor Reconstruction and Livelihood Programme, RLP Swiss Agency for Development and Cooperation, SDC

Cc.

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