Note for COST E55 - Working group 2
From André Jorissen (a..j.m.jorissen@tue.nl)
Subject COST E55, Zagreb workshop in September 2008

Dear all,

In this note I try to translate the results of the Helsinki workshop on joint ductility and to identify the work wich has to be carried out between today and the Zagreb workshop.
The work to be carried out on the other subject within working group 2, the moisture induced stresses, is well identified by Staffan.

Introduction

Since the ductility is caracterised by the load slip curve, see figure 1, taken from [18], we agreed for the Zagreb meeting on the evaluation of available load-slip curves for connections and present them in a format suitable for probabilistic analyses.

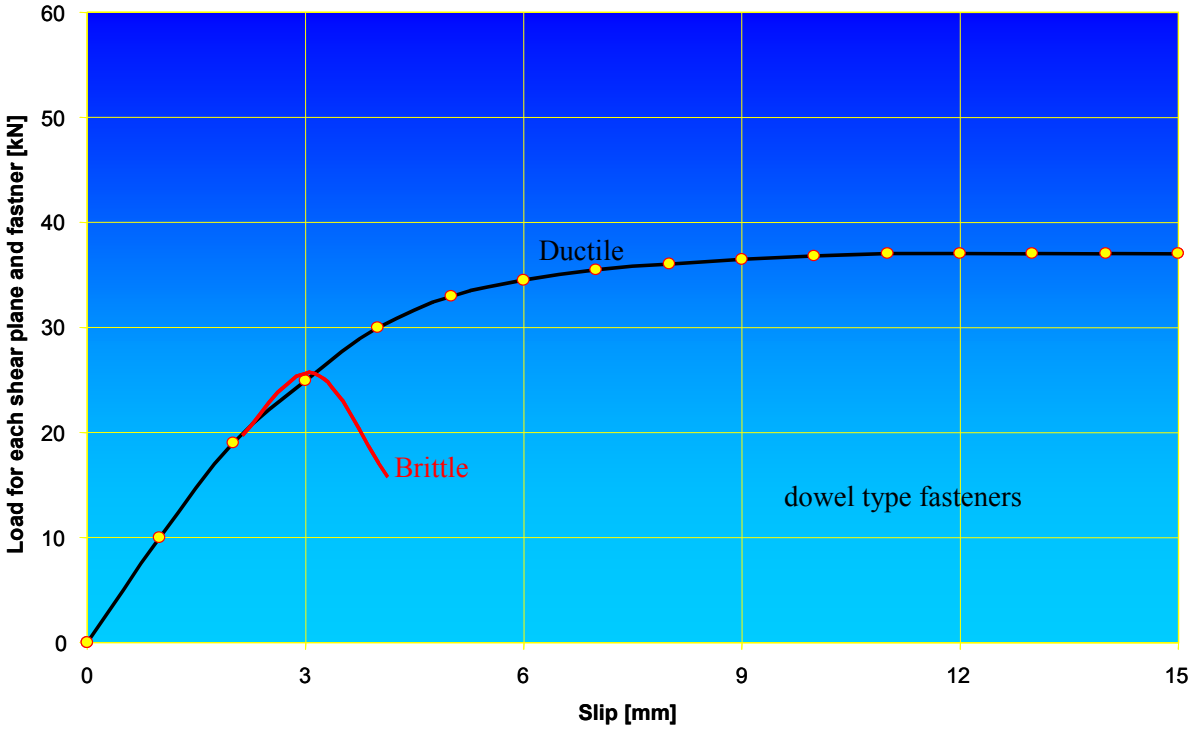

Figure 1: Load-slip curves [18].

Very different load-slip curves are obtained for connections with different fasteners as shown in figure 2, taken from STEP [12].
Regarding these different load slip curves, I suggest to split the evaluation of the available load-slip curves data into three groups, for load components both **parallel** and **perpendicular** to the grain.

(1) dowel type fasteners
    a. single fastener connections
    b. multiple fastener connections
(2) tooth plates, split rings
    a. single fastener connections
    b. multiple fastener connections
(3) and punched metal plates

The translation of load-slip curves into moment-rotation curves should be regarded as well.

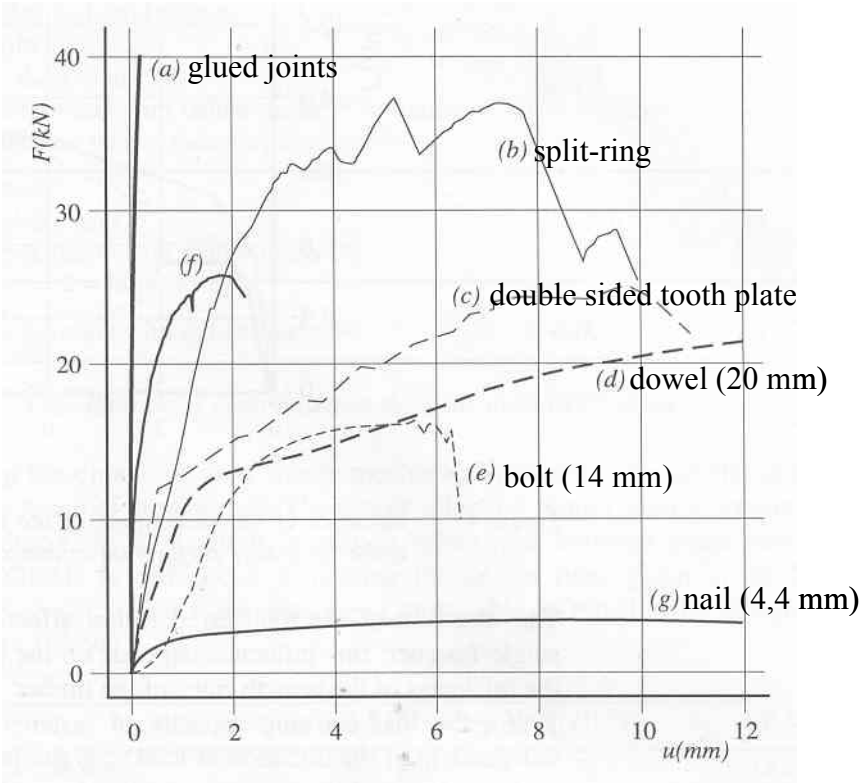

Figure 2: Experimental load-slip curves for joints in tension (single fastener connections) parallel to the grain [12].

Connections are useually tested according to EN 26891 [19], from which the procedure shown in figure 3 is an interpretation. For the comparison of the deformation characteristics it is not necessary to include only tests carried out according to EN 26891 as long we compare the values for the foundation modulus $k_s = \frac{0{,}4F_{est}}{\frac{4}{3}(\Delta_{04} - \Delta_{01})}$.

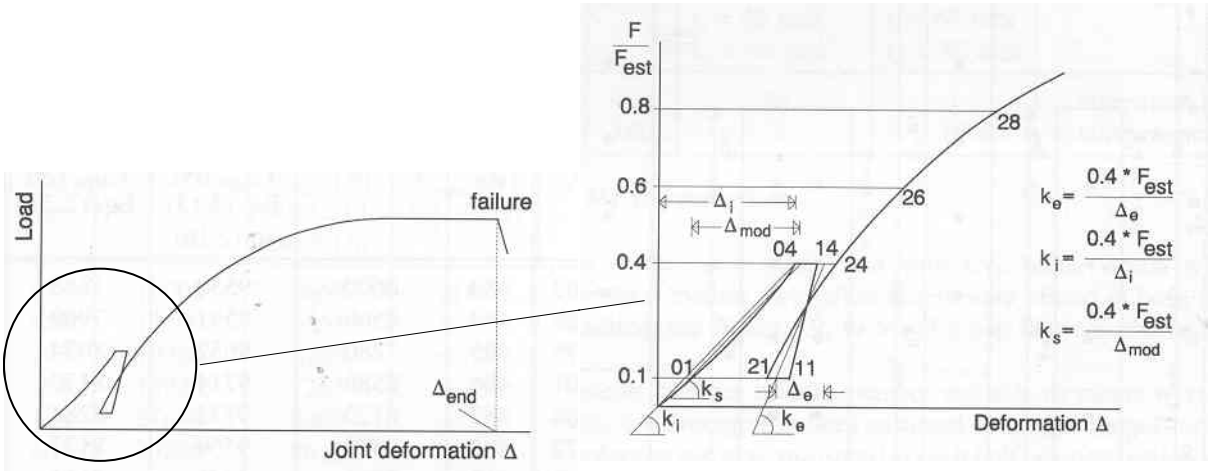

Figure 3: Loadslip curve and measurements according to EN 26891 [18].

Furthermore we have to define a ductility criterium. Several ductility measurements for timber connections are evaluated by Jan Siem [15], from which Helena Johnsson [16] suggests to define ductility as $D_f = \frac{u_f}{u_y}$. In this, u_f is the deformation at which the connection looses stability and u_y is

the elastic deformation. Clearly, high D_f values are identical to high ductility. An example for the determination of the values for u_f and u_y is shown in figure 4, taken from [16].

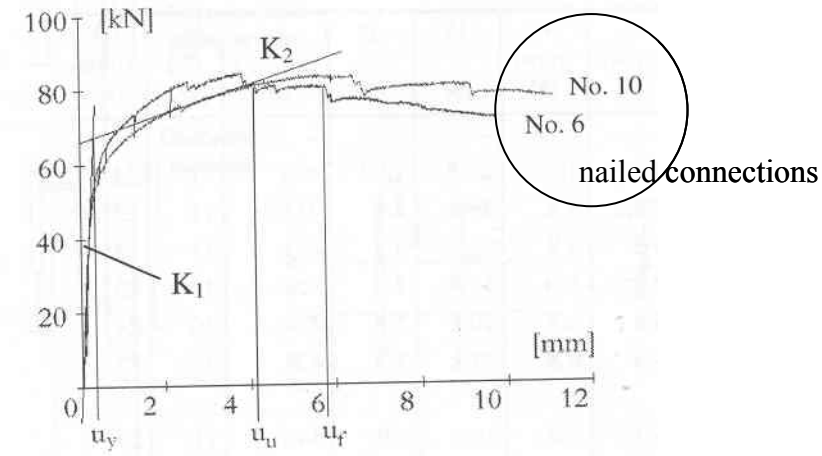

Figure 4: Load-slip measurement and difinition of parameters for nailed specimens 6 and 10 [16].

Work identified

Within the study into joint ductility for COST E55 - working group 2 – from each person participating some input is asked on at least one of the next topics for either dowel type fasteners, toothed plate connectors, split ring connectors and/or metal plate connectors.

- Connections, general
- Connections – test requirements necessary for the procedure described in EN 26891 [19].
- Connections – load-slip carracteristics (e.g. k_s, u_y, u_f, etc.)

I suggest that each participants prepares **at least two slides** on one or more of the topics identified.

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