Fix Me! This page is not fully translated, yet. Please help completing the translation.
(remove this paragraph once the translation is finished)

CLTdesigner User manual

Version 6.0

General

System requirements

- Java SE Runtime Environment (JRE 8)

A free version of JRE can be downloaded from www.java.com/download/.

Design methods

Further details to implemented calculation methods can be found here.

Standards and guidelines used

Base documents:

- **DIN EN 1990:2010-12 and ON EN 1990:2003-03 respectively:**
  Basis of structural design
- **DIN EN 1991-1-1:2010-12 and ON EN 1991-1-1:2003-03 respectively:**
  Actions on structures
  Part 1-1: General actions – Densities, self-weight, imposed loads for buildings
- **DIN EN 1995-1-1:2010-12 and ON EN 1995-1-1:2009-07 respectively:**
  Design of timber structures
  Part 1-1: General - Common rules and rules for buildings
- **DIN EN 1995-1-2:2010-12 and ON EN 1995-1-2:2011-09 respectively:**
  Design of timber structures
  Part 1-2: General - Structural fire design

National Annexes:

- **Germany**
  - DIN EN 1990/NA:2010-12
  - DIN EN 1991-1-1/NA:2010-12
  - DIN EN 1995-1-1/NA:2010-12
- **Austria**
  - ON B 1990-1:2004-05
  - ON B 1991-1-1:2006-01
  - ON B 1995-1-1:2009-07

    - ON B 1995-1-1:2014-11
    - ON B 1995-1-2:2011-09
- **Sweden** Fix Me!
- **Netherlands** Fix Me!

Translations

It is specifically stated that the versions of the CLTdesigner in other languages are translations of the Austrian version. Therefore, any potential dissimilarities with engineering design standards in other countries cannot be ruled out. When differences due to translation are identified, the version in German shall take precedence.

General Program build-up

Modules

Currently the CLTdesigner consists of 7 modules.

The Module „CLT-Plate 1D - Continuous beam“ offers the required verifications for the ultimate limit state (ULS) with respect to bending and shear for permanent and transient loads as well as accidental (fire) design situations, and the verifications for the serviceability limit state with respect to deflection and vibrations according to EN 1990 or EN 1995 for continuous systems such as cross laminated timber plates.

After specifying the internal forces and buckling lengths, the Module „CLT-Plate 1D - Internal forces“ carries out the required verifications of the ultimate limit state with respect to normal and shear forces for permanent and transient loads as well as accidental design situations.

The Module „CLT-Plate loaded in plane“ carries out the required shear stress verifications for a CLT cross-section in the ultimate limit state for permanent and transient loads as well as for accidental design situations based on a given shear force in plane per unit length.

The Module „Compression perpendicular to grain“ calculates the $k_{c,90}$-coefficients for various load situations (point or line load introduction or transmission) and carries out the required verifications.

The Module „Ribbed slab“ offers the required verifications for the ultimate limit state (ULS) with respect to bending and shear for permanent and transient loads, and the verifications for the serviceability limit state with respect to deflection and vibrations according to EN 1990 or EN 1995 for ribbed slabs made of CLT plates with ribs of GLT or solid wood.

The Module „Horizontal load distribution on shear walls“ calculates the distribution of horizontal loads from wind or earthquake on the load-bearing wall elements.

The Module „Stiffness matrix“ calculates the stiffness values necessary for a two-dimensional FE calculation and offers an export opportunity to Dlubal RFEM 5.

Menu bar

The menu item **File** offers the following selections:

- Creates a new project
- Open a project as well as show recently used projects
- Save a project
- Create a pdf-format summary of the specifications and results
- Quit the program

In the menu item **Edit** the project information and settings can be entered or changed.

In the menu item **Window**, one can move between the two modules.

In the menu item **Help** the user manual as well as further information concerning the CLTdesigner can be accessed.

Buttons

A window with settings/preferences will open by clicking on the left button in the first series of buttons, another window with information about the CLTdesigner will pop up by clicking on the middle, and help information can be accessed by clicking on the right button.

By clicking on one of the buttons in the second series of buttons shown in the following figure, the language can be changed. The current version offers German, English, French, Italian, Spanish and Dutch translations.

Settings/Preferences

The settings are divided into the categories:

- General
- Loads

- Analysis
- Verification
- Documentation

Fix Me! Within the category **General**, it can be specified if the single pages of the report (pdf format with security settings) should be also exported as pictures and if so, in which format (png or jpg). Furthermore, by ticking the second box, one can (de)activate the warning notice for the symmetry conditions of the cross-section. The default units of the cross-section properties can be changed by clicking the "Units..." button.

Fix Me! The settings regarding the type of calculation for the dead load, as well as the type of load position can be configured within the category **Loads**. The load combinations can be also adjusted here. As for the combination factors, they can be chosen according to EN or NA, but can be also user-defined. Furthermore, an option is offered here to simultaneously apply either snow load or wind actions together with the imposed load on roofs (category H). For the automatic generation of load combinations, it is also necessary to define wether the distributed and single loads should be considered as a one load group. This is due to differences which arise in combinations where the leading actions come from variable loads.

Fix Me! The method of analysis can be chosen within the category **Analysis**. Currently, two approaches are provided: (i) shear analogy method and (ii) Timoshenko beam theory. The number of calculation points of the field can be specified in two ways: either by specifying the number of subdivisons of the fields or by specifying the maximum size of the subdivisions. When selecting the latter one, it needs to be further chosen between the height of the plate (element size according to selected cross-section) and a fixed element size.

Fix Me! It is also necessary to specify whether the National Annex should be considered in verification and if so, which one. Furthermore, partial safety factors for the ULS verification need to be specified by selecting either EN, NA or user-defined from a drop-down list.

Fix Me! The deformation factors (values according to either TU Graz, EN, NA or user-defined), as well as the limit values for deformation need to specified in the "Deformations" tab within the subsection regarding the SLS verification. By ticking the first box, the weight of the plate g_0 will not be considered in calculation of instantenious deformation w_{inst} at t=0. Furthermore, here can be also specified whether the Base Document should be taken into account in deformation analysis or not. Likewise, here is also given an option to neglect the short cantilevers in deformation analysis.

Fix Me! Additional verifications of vibration can be activated in the **Vibration** tab. In addition to

verification according to Eurocode 5, other implemented analysis include: the simplified verification according to DIN ($w_{perm} \leq 6$ mm), the verification according to suggestion of Hamm/Richter given in the BSP Handbuch, as well as its modified form. Furtheremore, here is offered an option to include or neglect the shear deformation in calculations of the natural frequency and/or the deformation w(1kN) or w(2kN) at the stiffnes criterion.

Fix Me! In the **Documentation** settings, one can choose whether, and if so, which detailed results should be included in the pdf report as an appendix.

Information

The information window includes the contact address, the terms of use, and a button for feedback.

Project information

Project information can be entered by clicking on „Edit | Project information“. Here, a project name and a description of the component to be examined can be inserted. Furthermore, the name of the author or a person in charge can be included. The date of creation, the date of the latest change in the project, as well as the storage location are created automatically.