

## D7+

### Rafter Purlins

#### Application options

The D7 application allows the calculation of rafter purlins. Rafter purlins combine the functions of rafters and purlins. They are supported by trusses and run parallel to the eaves.

#### Available standards

- DIN EN 1995
- ÖNORM EN 1995
- NTC EN 1005
- BS EN 1995
- EN 1995

The software designs

- single-span purlins,
- tie purlins and
- articulated purlins

for roofs with an inclination of up

to 45°, which are loaded by self-weight, snow and wind.

The loads can be selected in accordance with EN 1991 (+NA). The design is performed in accordance with EN 1995 (+NA) and the respective superposition regulation is considered.

The snow and wind loads as per EN 1991 (+NA) can be defined by selecting a climatic zone specific to the respective country or in Germany, by selecting a municipality. The loads are automatically assigned to action groups.

In the output, the actions, the combinations of actions and the results are presented in detail for each load case and each load case combination.

The decisive verifications of the load-bearing capacity and the

serviceability complete the output documentation.

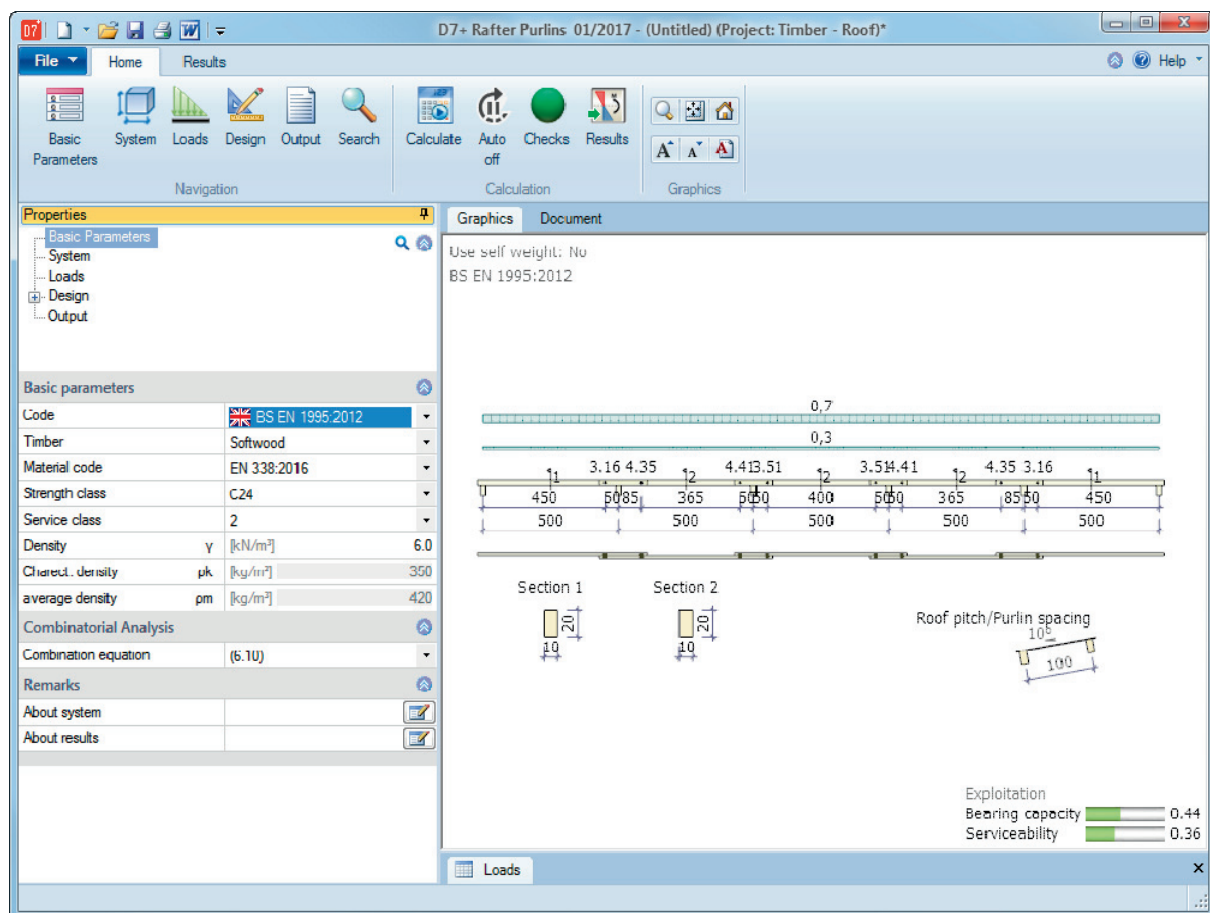
The verifications of the fasteners are performed in accordance with EN 1995 (+NA) and are also included in the output.

#### Tie purlin

Currently, systems with equal span lengths exposed to uniformly distributed loads can be calculated.

Available fasteners for the design of the tie points:

- Nails (round wire nails and plain-shank nails as well as special nails with profiled shanks)
- Special dowels



### **Articulated purlin**

For articulated purlins, the user can choose between structural systems with equal support distances and systems with smaller end spans. The latter option offers the benefit of identical cross sections, hinge forces and hinge spacing. The first hinge can be in the first interior span or in the end span. For reasons of stability after the failure of a span, hinged spans and hingeless spans (Gerber girders) should alternate in the selected structural system.

The following fasteners are available for the design of the hinges:

- Bolts
- Special dowels

Depending on the design of the hinge additional verifications might be required.

### **The following applies to all systems**

All load case combinations are examined and the actions decisive for the design are determined.

Cross-breaking strength analyses are performed in accordance with EN 1995.

The stiffness of the fasteners in the connections is not considered in the determination of the stiffness and of the internal forces.

The deflection of articulated purlins is calculated as for a continuous beam. The stiffness of the double cross sections above the supports is not considered. According to the reference literature, this method balances out the disregard of the stiffness of the fasteners.

The purlins must be secured against tilting and uplift at the supports. A separate verification of the uplift resistance is required in the area of the intersecting building edges.

In connection with large span lengths, bends could occur at the hinges and must be considered in the constructive layout of the roof skin.

### **Basis of calculation**

The basis of the calculation of single-span purlins, tie purlins and articulated purlins is provided by EN 1995 and its national loading regulations for EN 1990 and EN 1991.

It is assumed that the purlins are installed underneath the roof skin and are sufficiently secured against tilting and uplift at the supports.

The structural calculation of the decisive internal moments, the bearing forces, the deflections as well as the overcoupling geometry is performed with the help of coefficient tables.

Bearing stress, shear stress, tilting stability and man-load resistance verifications are neglected in the cross-section design. If required, these stresses and loads must be considered in addition.

### **Features in the development stage**

Enhancement of the fastener selection and freely selectable supporting widths are planned.