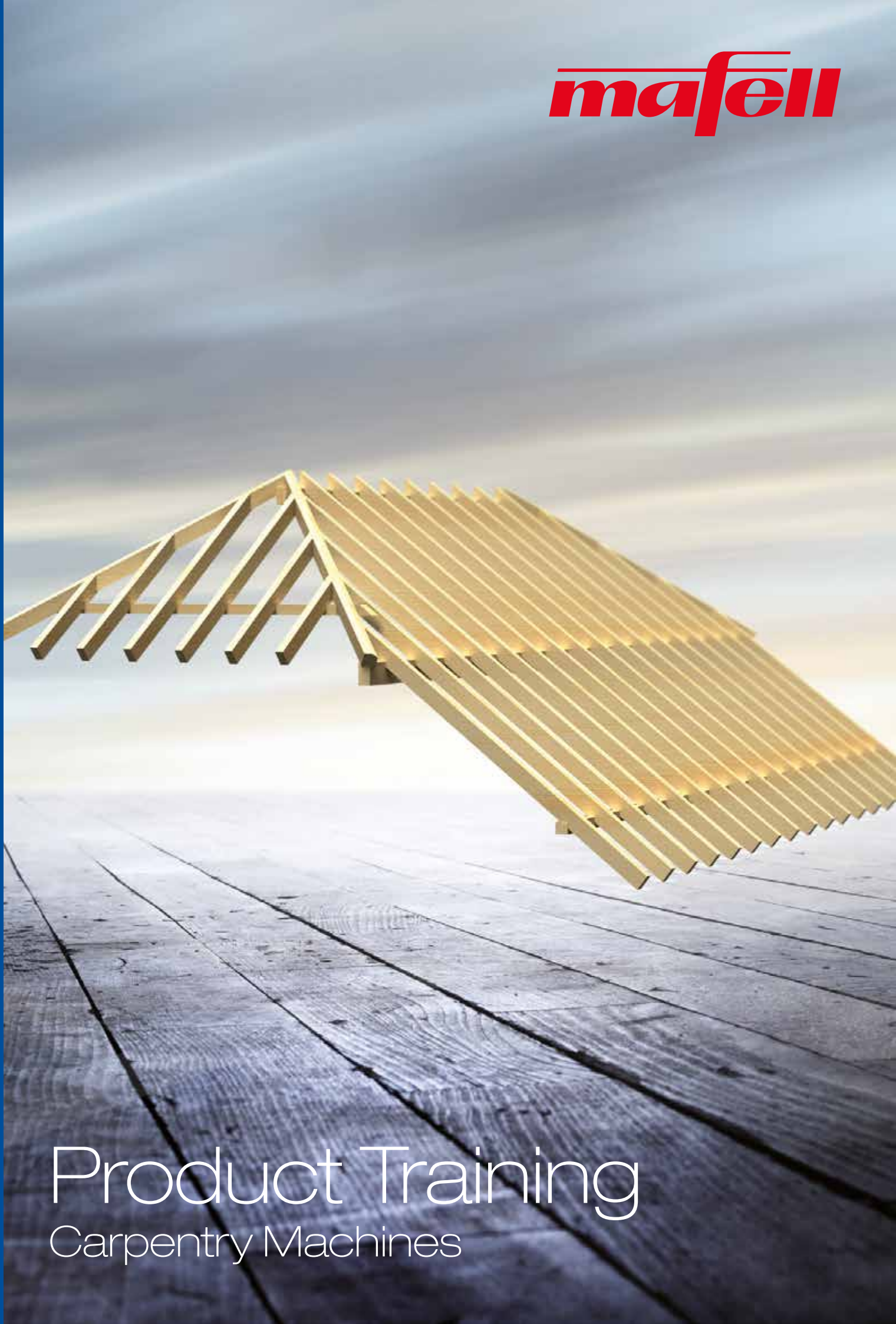


Product Training

Carpentry Machines

The MAFELL training center.

MAFELL training courses

With a view to providing customers with more than simple technical assistance, MAFELL offers its employees effective training courses in modern foreign languages, telephone management and customer relationship management, among many other subjects. Further training is essential if we are to remain our customers´ partner of choice on the issues that extend beyond engineering and technology.

MAFELL translates theory into practice.

In our newly furnished training center, we provide application and technical training courses for the MAFELL specialty dealers. All the MAFELL machines, in every product group, are examined and explained in active sessions.

MAFELL product training

Our technical seminars convey wellfounded, expert knowledge to all the participants. Our skilled instructors impart both valuable facts and practical hints.

Further information on our product training courses is available by phone on +49 7423/812-114.

*The MAFELL training center was planned and designed by:
Pro Architektur – Gerhild Hamberger

Contents

Introduction:

In the beginning there was wood

A desirable material since time immemorial

We are more familiar with wood than with any other material. None of the trades that have emerged in recent millennia could have flourished without wood. It is used for tools and workbenches, in carpentry and cabinet making, and as a fuel and raw material.

Solid, split, machined, crushed, dissolved and burnt – wood remains an essential material.

It keeps us warm and clads our buildings, affording protection against cold and heat. The crib and stable in Bethlehem were made of wood. As paper, it carries and stores information. We eat and drink at wooden tables, sit on wooden chairs and sleep in wooden beds. We play with wood and make music with it. Smooth wood is warm and pleasant to the touch.

Constituents of wood

Wood consists of millions of cells, separated by insulating voids, with walls that absorb and expel moisture. Flooring, walls and furniture made of wood have identical properties and create a healthy climate in our living spaces. They can also be repaired.

Wood is infinitely renewable, so that we are able to use it in a sustainable way. Forests produce both wood and oxygen, protect the soil, safeguard clean water, offer a habitat for animals and other plants, and provide humans with a recreational environment.

Applications and processing

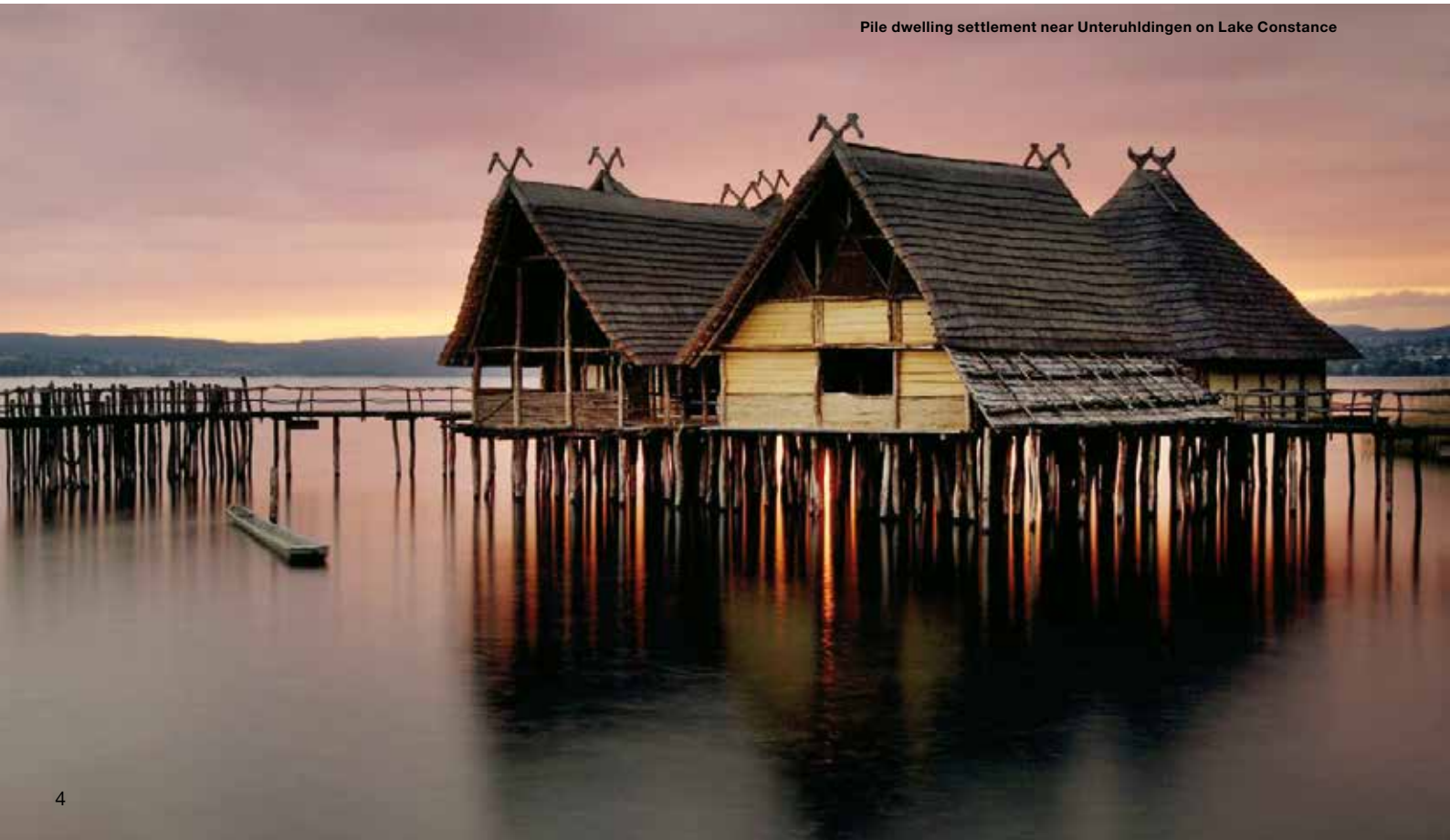
„Used“ wooden products are not past their useful life because they can still be exploited to recover energy. In many cases, they still harbor more (solar) energy than the amount consumed throughout their life cycle during production and disposal.

Products made of wood are beautiful and diverse. More than 25 indigenous species are used in Europe according to sustainable principles, and each one has special properties.

No two pieces of wood are identical. Each piece differs by location or the age of the tree and depending on whether harvested as heartwood, sapwood, roundwood or limbwood – there is a suitable wood for every purpose. It is durable, adaptable, attractive and practical. It is easy to work, frugal with energy and highly conducive to repair.

Wooden products are sustainable and for the future, and they represent value for money. A cross-section of a tree reveals its age, the plentiful and the meager years, and the changing pattern of overshadowing during its lifetime.

(Source: http://www.forst-hamburg.de/holz.htm)



Pile dwelling settlement near Unteruhldingen on Lake Constance

The history of carpentry extends as far back as primeval times.
Weather conditions and the need for protection against wild animals compelled people to build shelters even in the very early days. It has been found that prehistoric man first used the tree as a dwelling because it naturally afforded the best and most reliable protection.

Subsequently, underground and rock caves became the first dwellings to accommodate humans for thousands of years.

Not until much later did nomadic tribes live in portable tents made of poles and animal skins. The tent shape gave rise to a form of gabled roof with a ridge purlin or beam supported by two trunks with forked branches. The rafters rested on wooden sleepers on the ground.

These simple structures were followed by huts, which initially consisted of roundwood, rammed into the soil, carrying closely spaced roof timbers in a triangular formation, tied with bast rope. The framework was covered with reeds, grass and soil. The more substantial log cabin appeared around 4000 BC. In the earliest examples, the walls and roof were constructed from rough tree trunks.

It was the invention of tools, such as the axe, hammer and saw, that paved the way for the more sophisticated shaping of wood. The first wheel was made by slicing a horizontal section from a tree trunk, beams and planks were formed by slitting a trunk lengthwise, and the first joints – scarf and tenon joints – were produced by sawing.

The pile buildings in the Federsee bog in Württemberg and some lakes in Switzerland, especially on Lake Constance, bear testimony to timber construction in primeval times. The piles discovered there are still standing and estimated to be 5,000 years old. It is assumed that experts emerged and placed their house building skills at the disposal of their neighbors as civilization and human settlements developed. The craft of wood construction continued to be refined thereafter for many centuries.

Buildings of the 16th and 17th centuries
During this period, timber structures were consistently very solid and in most cases built far too strong for their purpose, which gave rise to the pointless over-felling of the precious natural raw material.

Although we still delight in the attractive half-timbered buildings from this era, many are marred by major design defects or are simply not fit for purpose.

This fact is attributable to the builders‘ lack of a theoretical understanding of statics and strength of materials. With the requisite knowledge now at our disposal, we are able to use wood in an entirely different, more purposeful and therefore economical way.

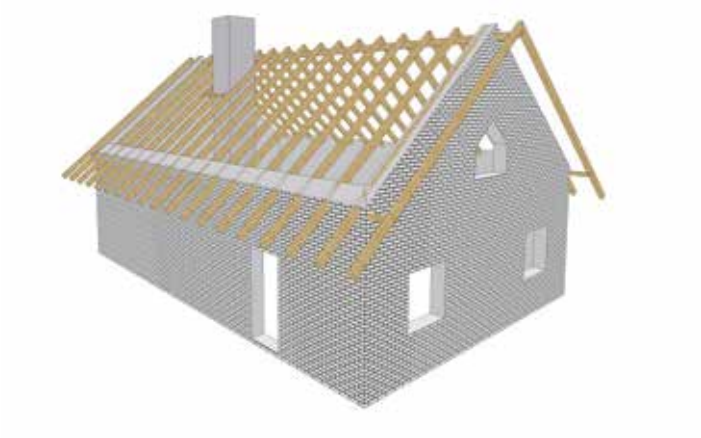
Timber frame construction will retain its appeal in some regions, even in the future, but stone and brick have gradually become the materials of choice in most cases.

The carpentry trade has kept pace with change, however, and abandoned its more or less obsolete skills in favor of new fields of activity, including modern, well-conceived building methods with half roof trusses, frame or stud wall construction, and timber-saving laminated beams and rafters.

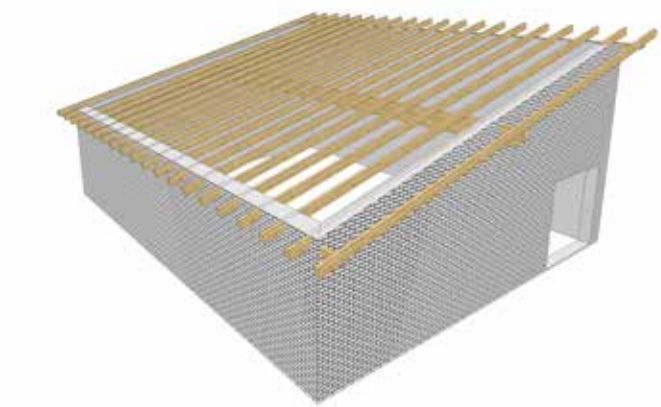
Two traditional half-timbered gables provide a fine example of the art of building.

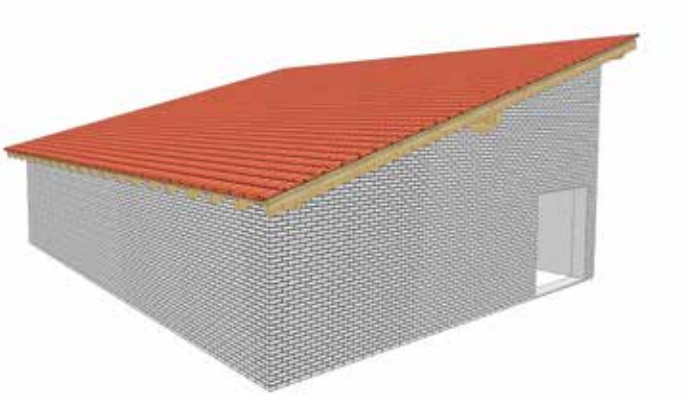
Roof shapes

Gabled: Two sloping roof faces, creating a peak at the ridge.

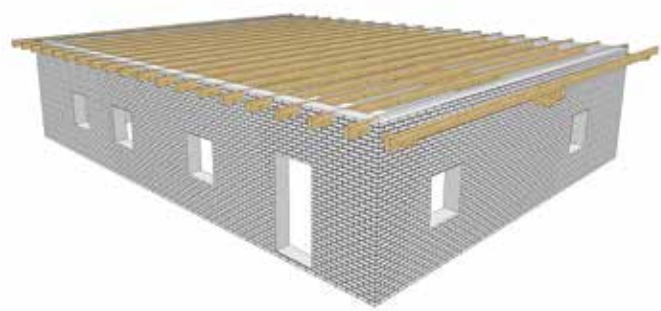


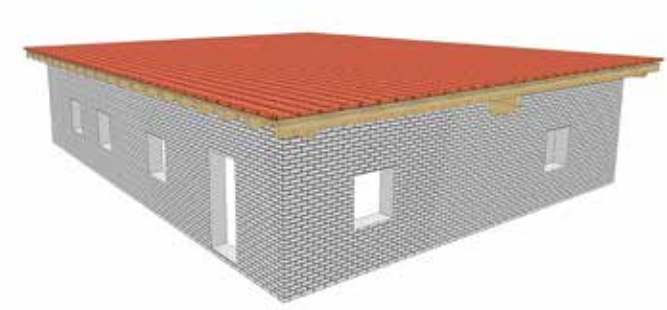
Pent or lean-to: Single sloping roof face.



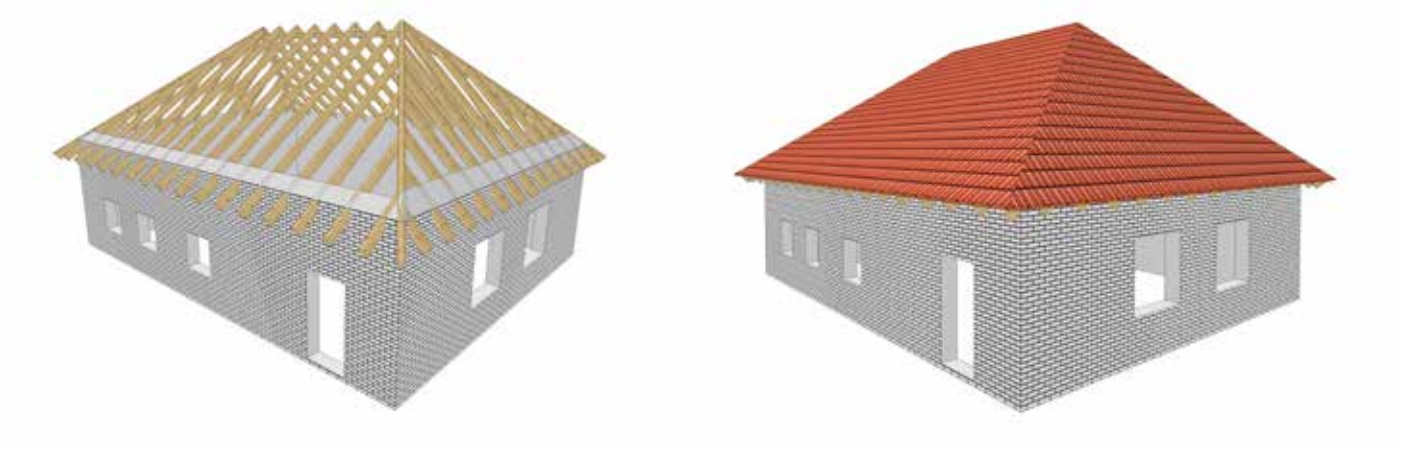


Flat: A single horizontal roof face.

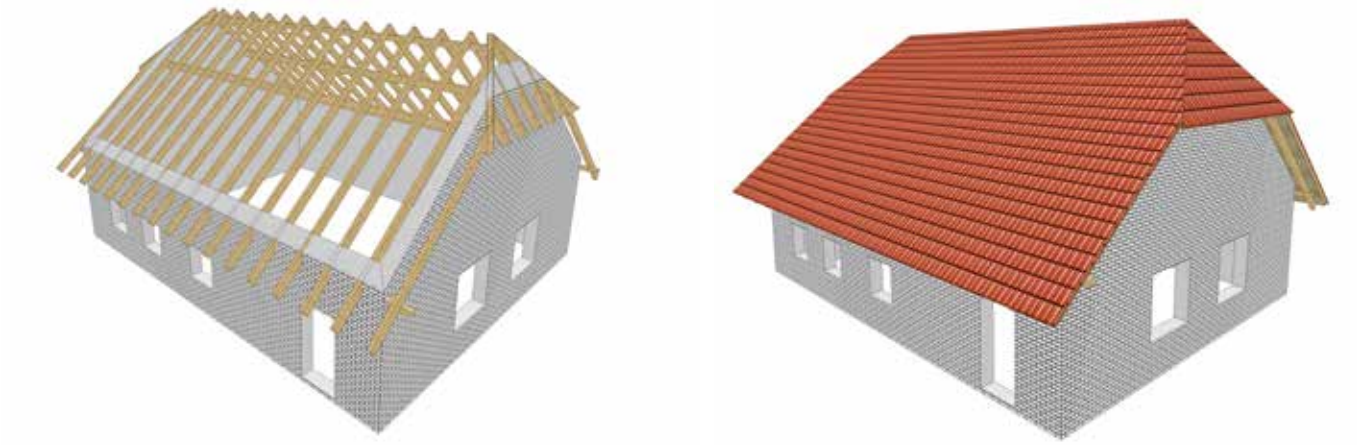




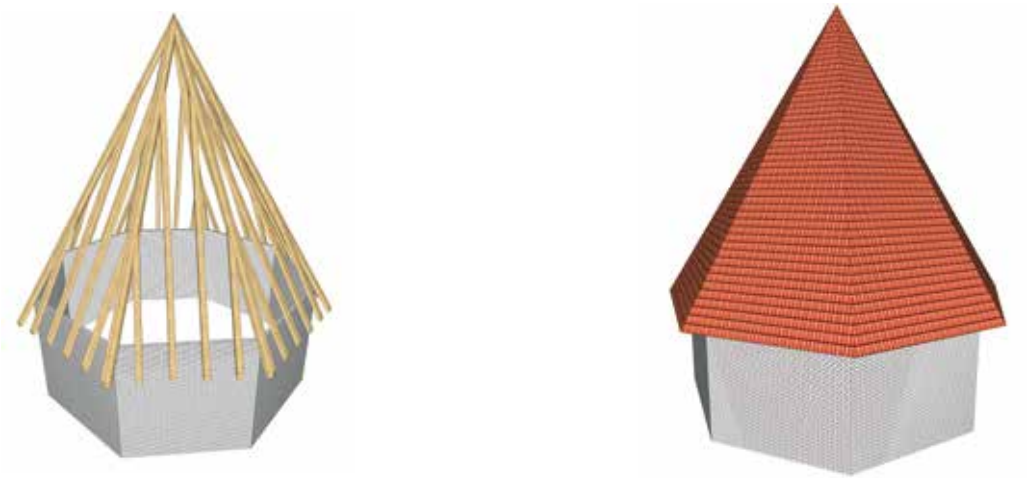
Hipped: Four sloping roof faces each with two hips rising to a ridge across the top. Hipped houses have a horizontal roof-to-wall junction.



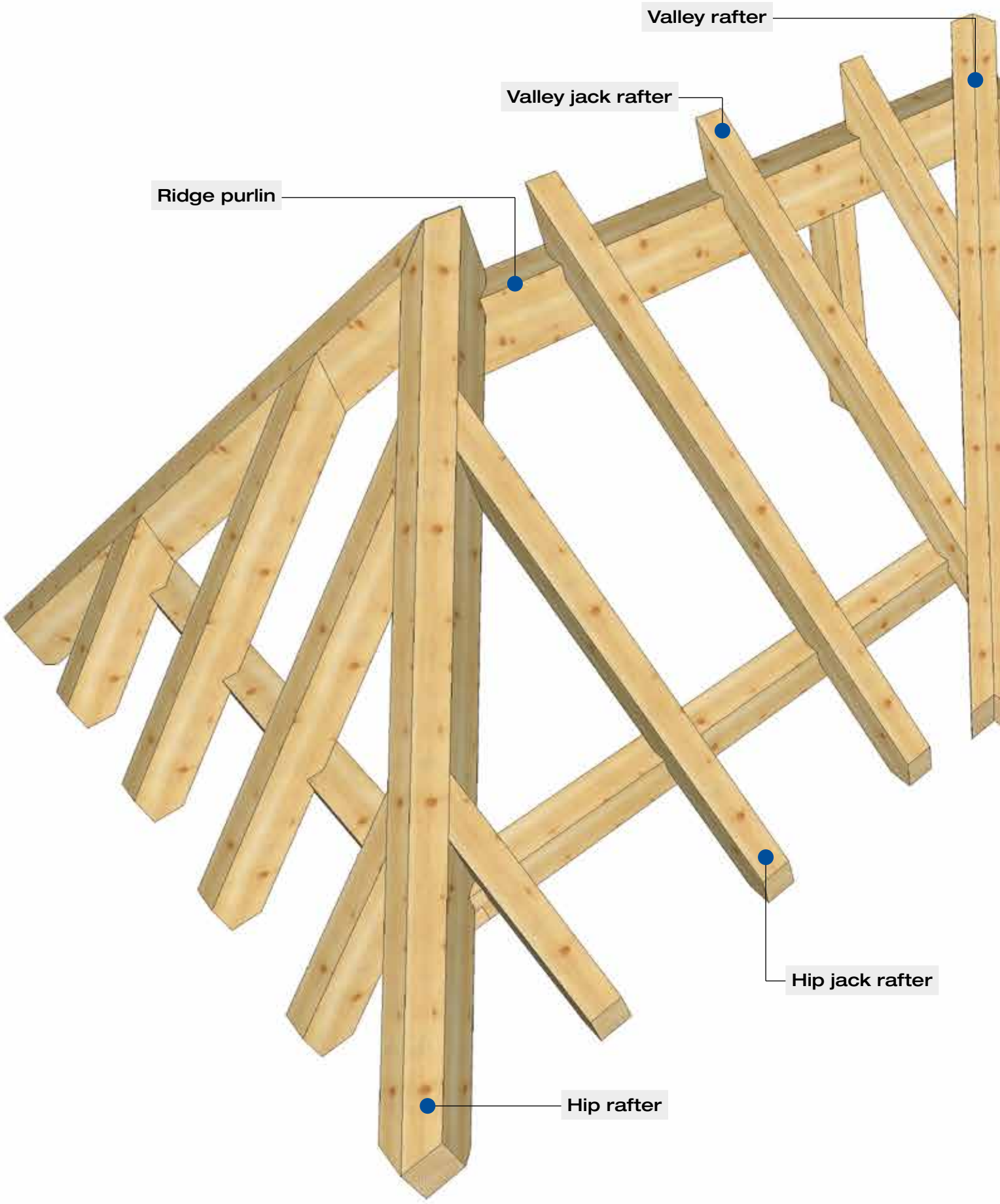
Half-hipped: Four sloping roof faces each with two hips rising to a ridge across the top. Half-hipped houses have a horizontal roof-to-wall junction on two sides and truncated gables on the other two sides.

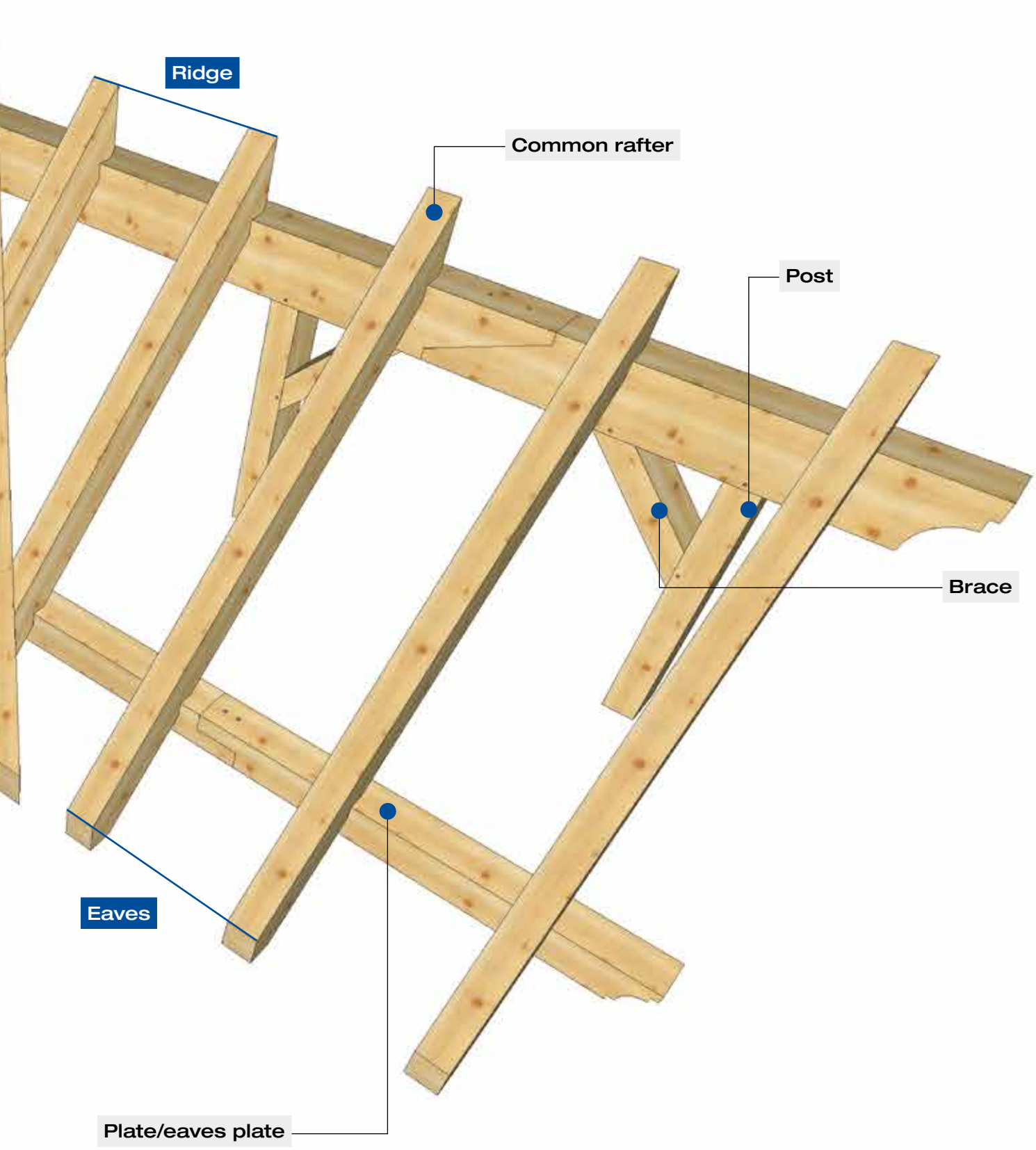


Turret: Several steep sloping roof faces each with two hips rising to a peak at the top.



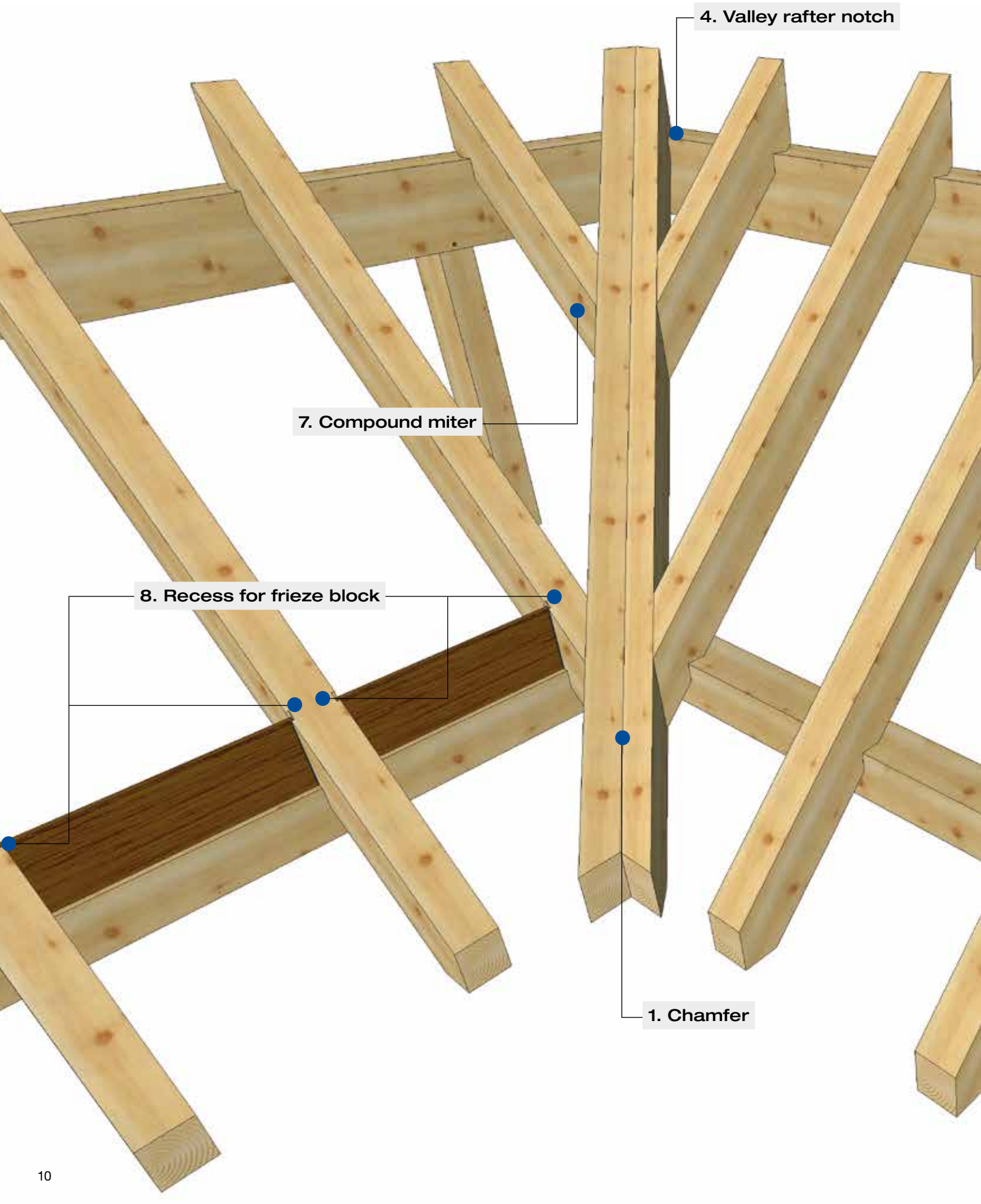
Terminology



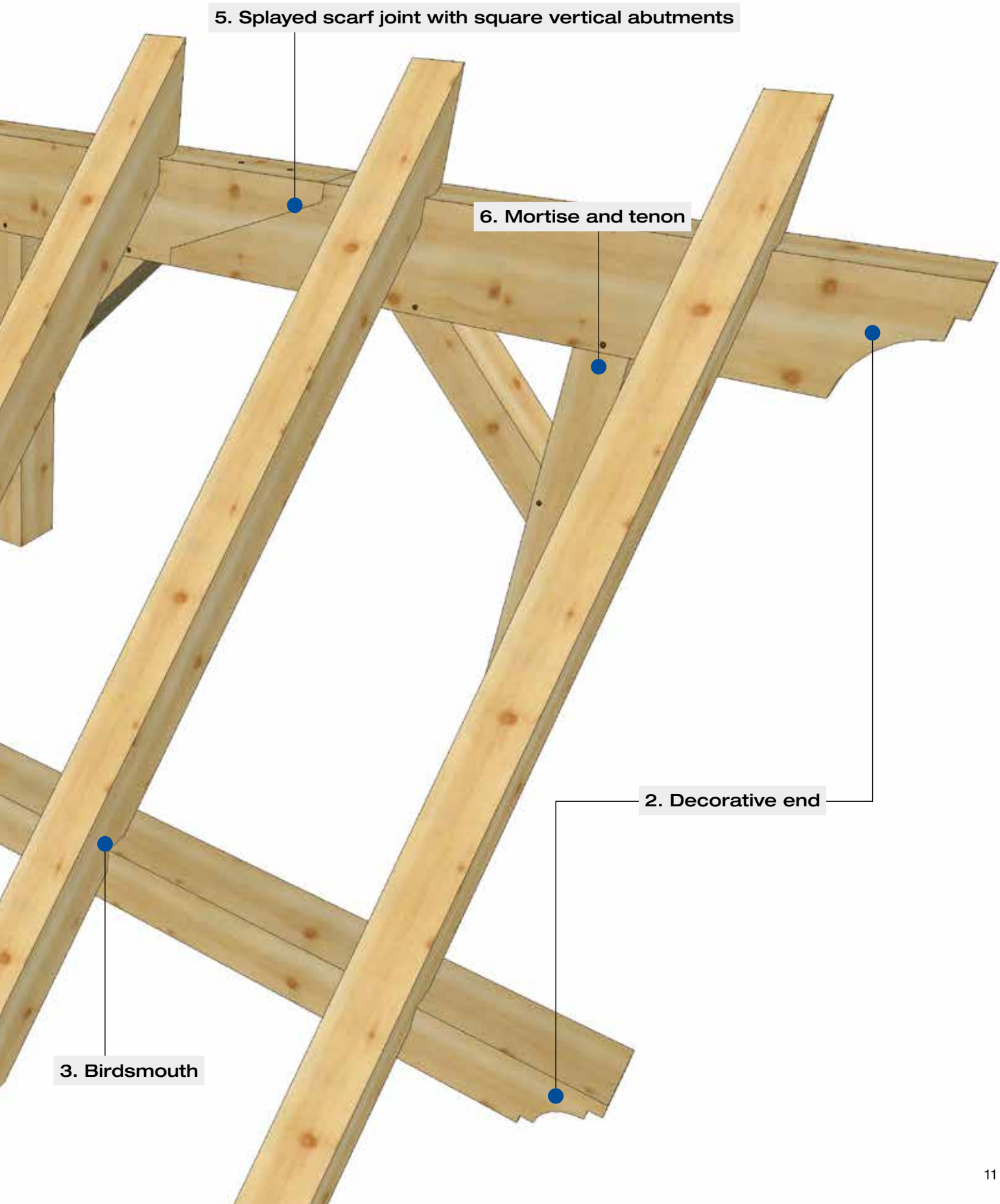

Ridge
Common rafter
Post
Brace
Eaves
Plate/eaves plate

Classic

Cross-hipped roof.



All machining detail on page 12-13.



Classic wood joints:

Machining detail.

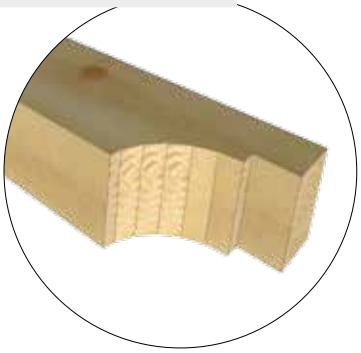
1. Chamfer

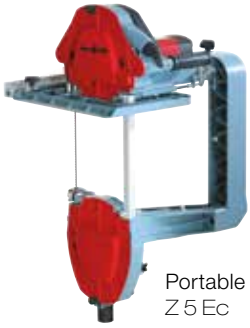
Portable Circular Carpentry Saw
MKS 130 Ec / MKS 185 Ec

Portable Circular Saw
K 85 / K 85 Ec

For ripping, use sawblades with few teeth.

2. Decorative end

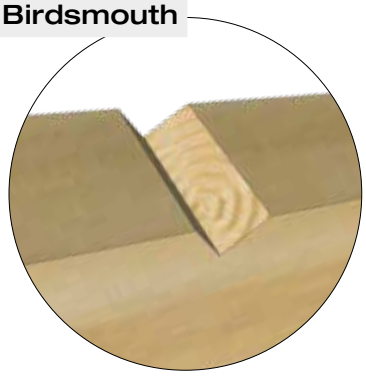


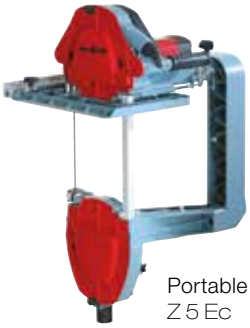


Portable Band Saw
Z 5 Ec

Carpenter's Beam Planer
ZH 320 Ec
(for visible profile)

3. Birdsmouth



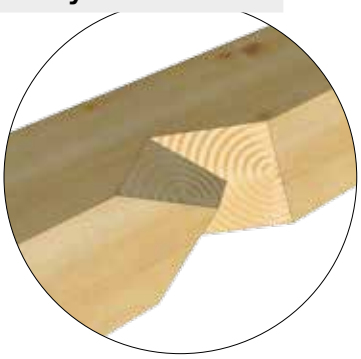


Portable Band Saw
Z 5 Ec

or

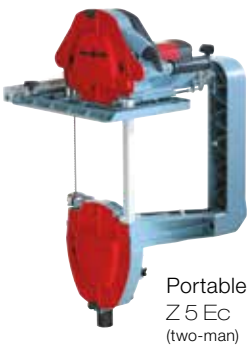
Skew Notch,
Lap-Joint &
Tenon Cutter
ZK 115 Ec

4. Valley rafter notch



Carpenter's Saw
ZSX Ec / 400 HM

or



Portable Band Saw
Z 5 Ec
(two-man)

5. Splayed scarf joint with square vertical abutments

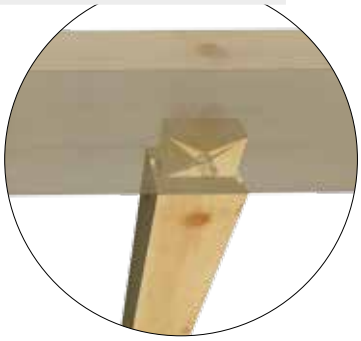
Cordless
Drill Driver
A18 M bl
+
Drilling Station
BST 460 S

or

Carpenter's Saw
ZSX Ec / 400 HM

Portable Band Saw
Z 5 Ec

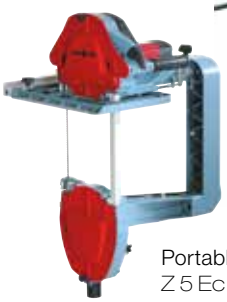
6. Mortise and tenon



Portable Circular Saw
K 85 / K 85 Ec

or

Tenoner
ZAF 250 Vario



Portable Band Saw
Z 5 Ec

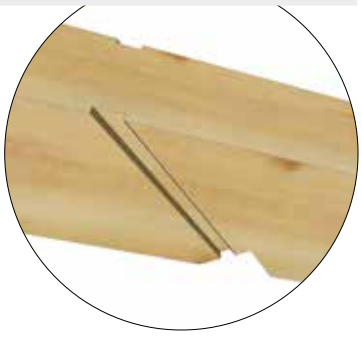
Chain Mortiser
LS 103 Ec

7. Compound miter

Portable Circular Saw
MKS 165 Ec

Carpenter's Saw
ZSX Ec / 400 HM

8. Recess for frieze block



Multi-Cutter
MF 26 cc / 400
(recess for frieze block)

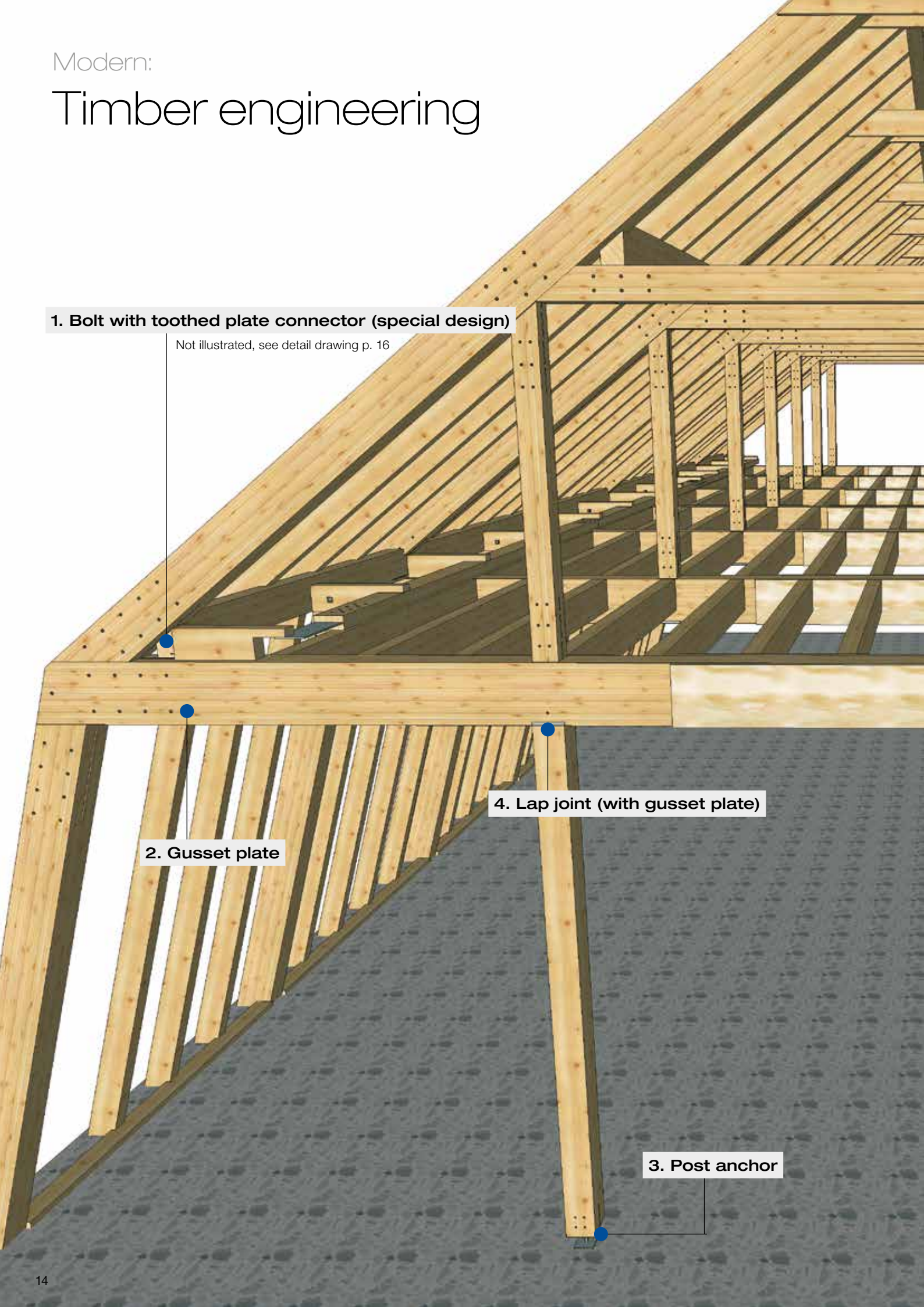
Cross-Cutting System
KSS 400
(cutting frieze block)

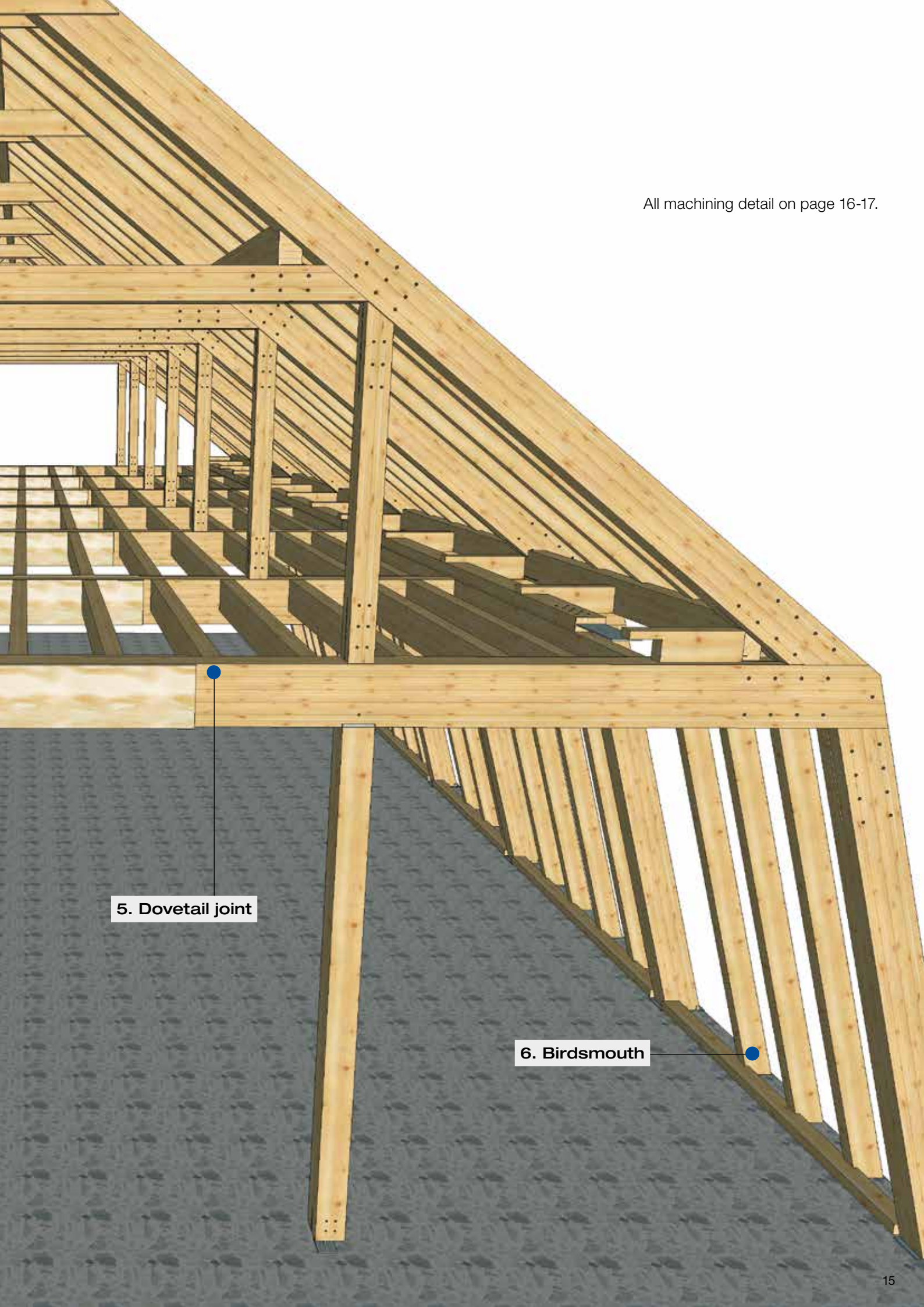
or

Cross-Cutting System
KSS 300
(cutting frieze block)

Modern:

Timber engineering



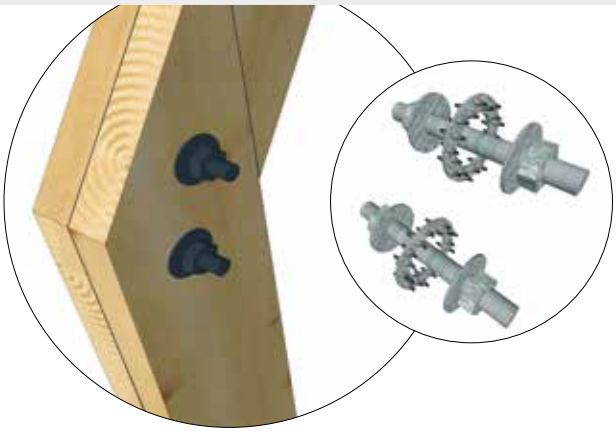


All machining detail on page 16-17.

Modern metal/wood joints:

Machining detail.

1. Bolt with toothed plate connector (special design)

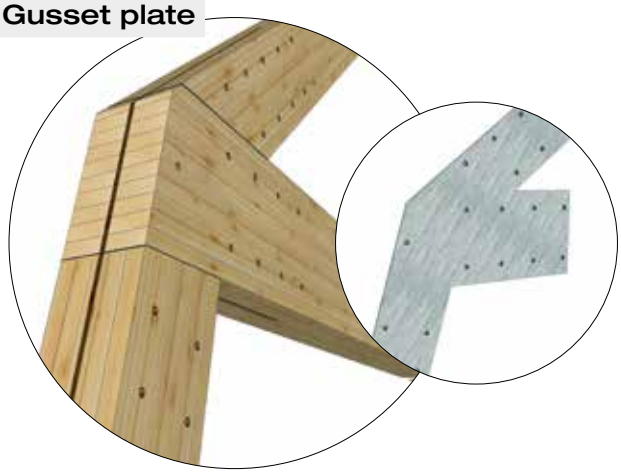


Carpentry Drilling Machine
ZB 100 ES

Carpentry Drilling Machine
ZB 400 E / ZB 600 E

Tenoner
ZAF 250 Vario

2. Gusset plate

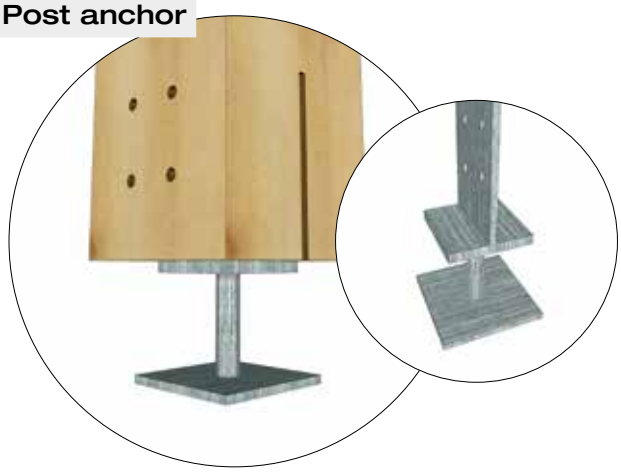


Slot Mortising
Attachment
SG 500
+
Chain Mortiser
LS 103 Ec

Cordless
Drill Driver
A18 M bl
+
Drilling Station
BST 460 S

Optional:
Copying insert
24,8 / 18 mm

3. Post anchor



Portable Circular Saw
MKS 130 Ec

Slot Mortising
Attachment
SG 230
+
Chain Mortiser
LS 103 Ec

Cordless
Drill Driver
A18 M bl
+
Drilling Station
BST 650 S

4. Lap joint (with gusset plate)

Multi-Cutter
MF 26 cc / 400

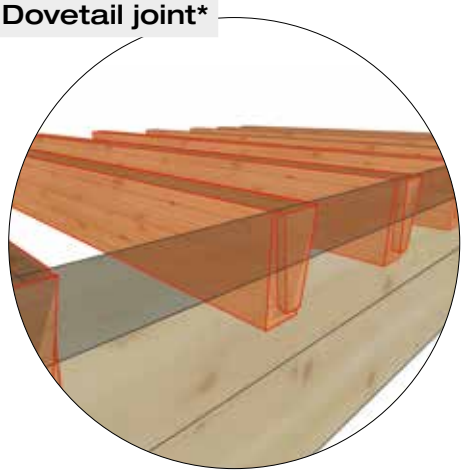
Optional:

Slot Mortising
Attachment
SG 400
+
Chain Mortiser
LS 103 Ec

Cordless
Drill Driver
A18 M bl
+
Drilling Station
BST 460 S

Skew Notch,
Lap-Joint &
Tenon Cutter
ZK 115 Ec

5. Dovetail joint*



Portable Circular Saw
MKS 145 Ec

Hand Router
LO 65 Ec

*Template for machining dovetail not available from MAFELL.

6. Birdsmouth

Skew Notch,
Lap-Joint &
Tenon Cutter
ZK 115 Ec

or

Portable Band Saw
Z 5 Ec

Machining examples:

ZAF 250 Vario

Tenon (straight, horizontal)

Tenon variant (extra thin)

Tenon (shouldered)

Corner half lap joint

Tenon (with mitered shoulders)

Steel beam joint

Tenon variant (straight)

Triangular notch in rafter for ridgeboard

Tenon (vertical, angled)

Ridge half lap joint

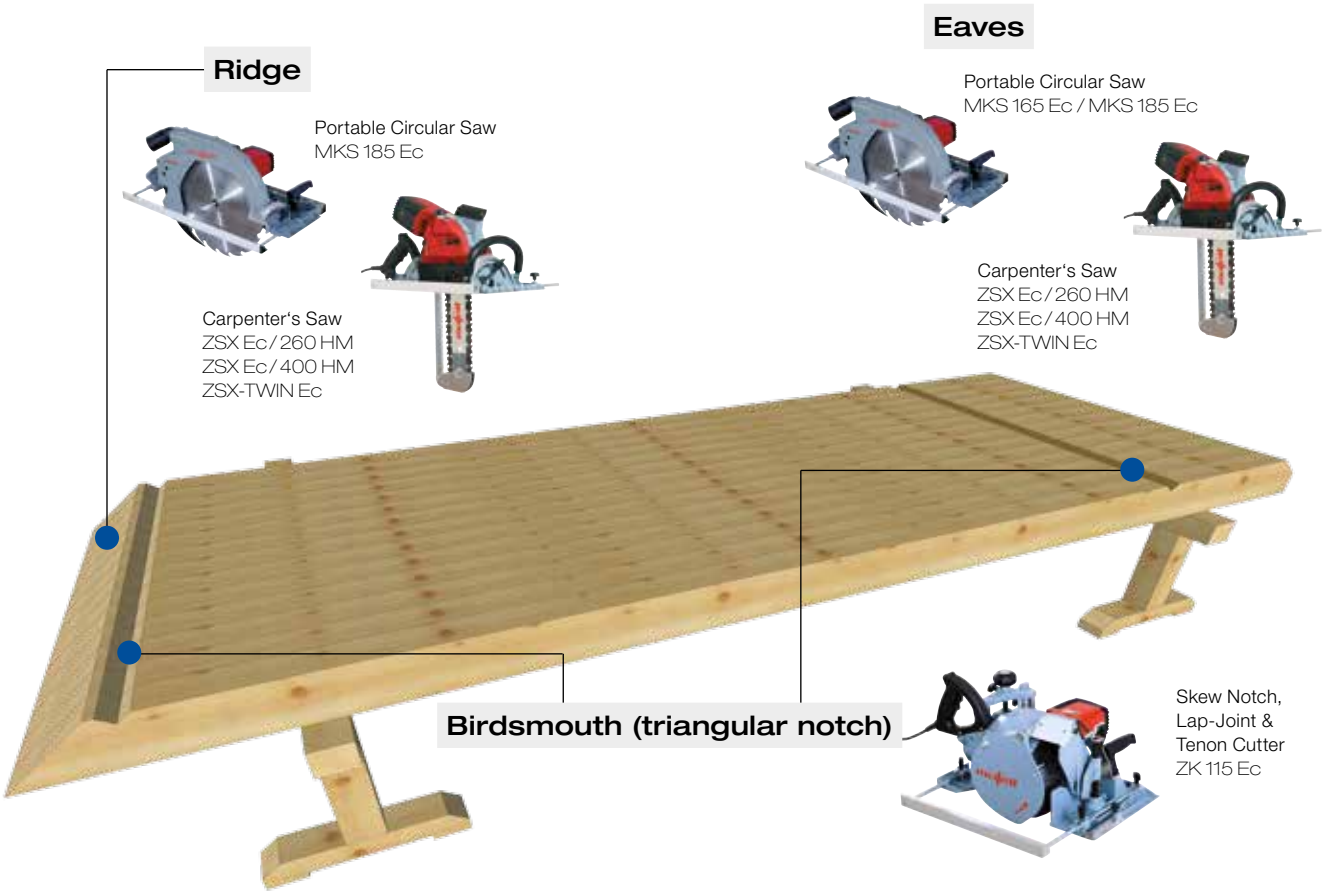
Rafters:

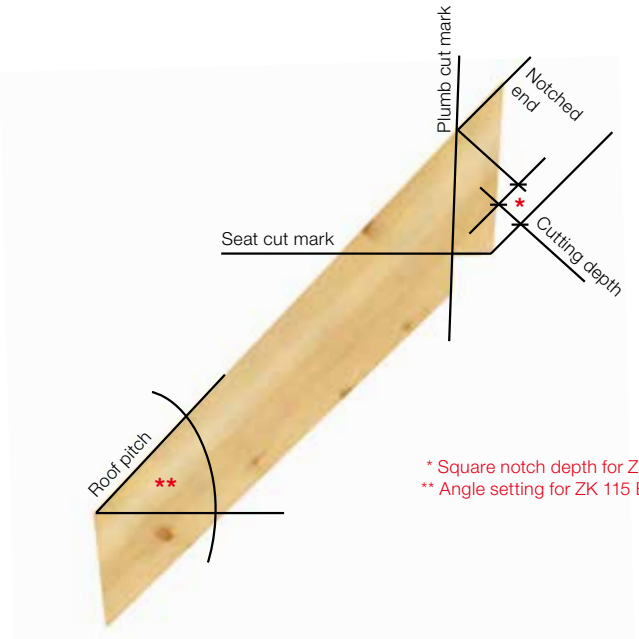
Series production

Introduction

Rafters can be series-produced, e.g. for an entire roof face, quickly and for exact fitting.

After marking the pattern rafter, lay out all the rafters so that they are square, and then clamp and machine them with the appropriate tools.

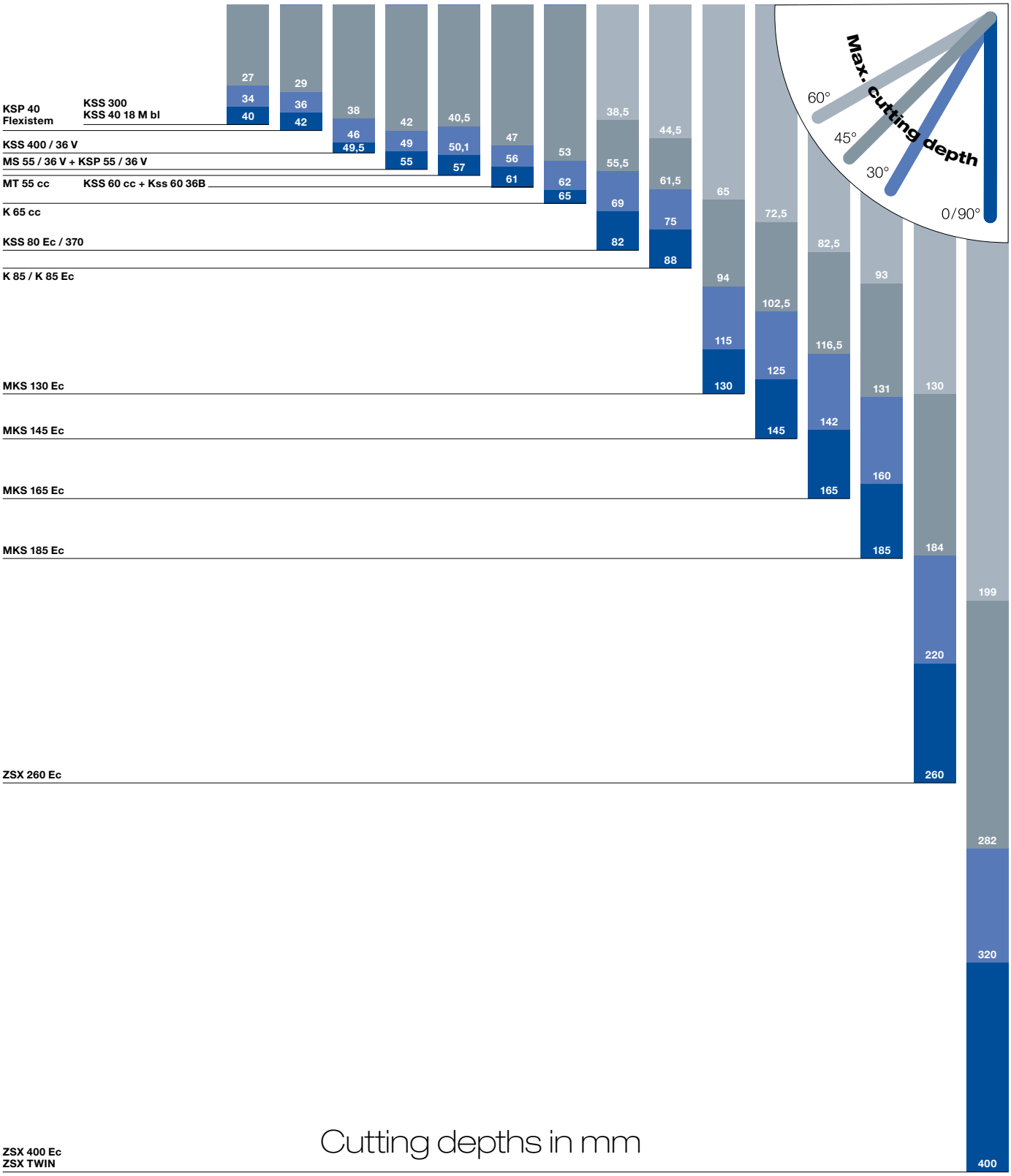




* Square notch depth for ZK 115 Ec
** Angle setting for ZK 115 Ec

The MAFELL cutting depth range.

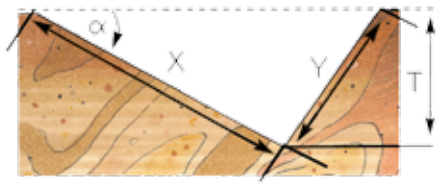
Nobody else in the trade offers a wider variety of cutting depths than MAFELL. We start with a light portable circular saw with 40 mm of cutting capacity and finish our range up and offer you an incredible cutting depth of more than 200 mm! If you need more – you get more! Our range of chain saws offer you 400 mm of clean and precise cutting. Which machine is now the best for you? Here is a little help for you:



MAFELL cutting depth table

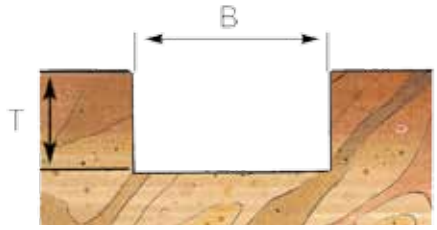
For machining with the ZK 115 Ec and various cutter heads

A: Skew notch



Ref. No.					**203657**
Cutter head					**150 x 115 mm**
„α“ (°)	0°	15°	30°	45°	60°
Depth ¨T˝ (mm)	27	29.7	57.5	77,9	75
Width ¨B˝ (mm)		115			
¨X˝ (mm)		115	115	110	86,5
¨Y˝ (mm)		30.8	66.4	110	150

B: Lap joint



Ref. No.	**203659**	**091417**	**091415**
Lap joint cutter head (mm)	**236 x 50**	**190 x 81**	**150 x 60**
„α“ (°)	0	0	0
Depth ¨T˝ (mm)	70	47	27
Width ¨B˝ (mm)	50	81	60

Any questions on the content of the training course?
In case you have any unresolved questions on issues covered by the course, please do not hesitate to contact me.

Oliver Hähnle
Product Trainer
Phone +49 7423/812-203
Fax +49 7423/812-218
oliver.haehnle@mafell.de

Dietrich's

Renderings produced with Dietrich‘s professional 3D CAD/CAM software.
Further information is available at **www.dietrichs.com**

Notes

Here at MAFELL, we often adopt a new approach in our quest to develop better machines. We take a fresh look and reconsider the crucial aspects of the tool concerned. And we always give due consideration to the future needs of the woodworking trades.

Time and again, together with outstanding material and build quality, our strategy spawns astounding solutions. We thus continuously enhance functionality and user-friendliness, for example. We strive to ensure that, while you are working, you no longer need to give the tool a second thought. Simply because MAFELL has already done the thinking for you. You focus on your job – and as far as everything else is concerned:

Follow your instinct.

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Fax +49 7423 812-102 · E-Mail export@mafell.de · **www.mafell.com**

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