



# Leonardo – Project Straw Bale Building Training for European Professionals

- Overview of the structure:
- Unit 1 Introduction
  - Unit 2 Infill and prefabrication
  - Unit 3 Load Bearing constructions
  - Unit 4 Wrapping
  - Unit 5 Finishes
  - Unit 6 Building Physics
  - Unit 7 Concept of the House – design and Maintenance
  - Unit 8 Marketing and Communication
  - Unit 9 Building Practice
  - Unit 10 Teaching Methods

# Preface

## Introduction to the Handbook

# U1 – INTRODUCTION



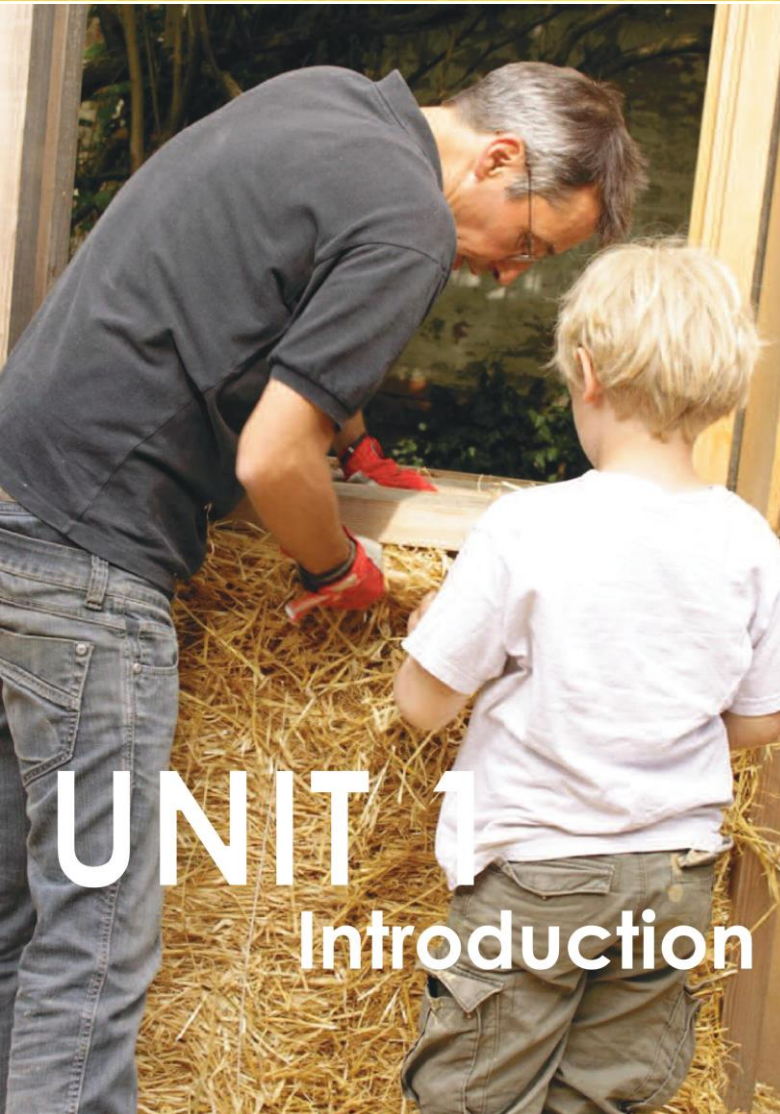
AU – DE – FR – SP – PO – SL – HUN – UK – NL – (BE)



Straw bale building Training  
for European Professionals



Lifelong  
Learning  
Programme



## UNIT 1 Introduction

UNIT 1 Introduction	Training	Page
U1 Learning Outcomes		5
U1 Session 1: General Introduction	1 day	7
U1 Info Sheet: History of Straw Bale Buildings (Overview)		9
U1 Info Sheet: Modern Straw Bale Buildings & Trends		10
U1 Session 2: Straw Talk	4 hours	12
U1 Info Sheet: Straw and Bale Properties (Overview)		13
U1 Info Sheet: Storage (Overview)		14
U1 Info Sheet: Straw Bale Production (Overview)		15
U1 Session 3: Testing and customizing straw bales	1 day	17
U3 Info Sheet: Safety regulations (Overview)		18
U3 Info Sheet: Tools (Overview)		19
U3 Info Sheet: Handling and Shaping the Bales (Overview)		20
U3 Info Sheet: twines and Knots (Overview)		15
U3 Info Sheet: Straw bale measuring (Overview)		23
Partner STEP (Straw Bale Training for European Professionals)		27
Credits & Imprint		28

# U1 – INTRODUCTION



Building a little cabin



Customizing straw

## Straw Talks –what is straw?

Good straw bales should be « DUDS »

D – Dense

min 80 kg/m<sup>3</sup>

U – Uniform

consistent density through the bale

D – Dry

less than 20% hum

S – Square

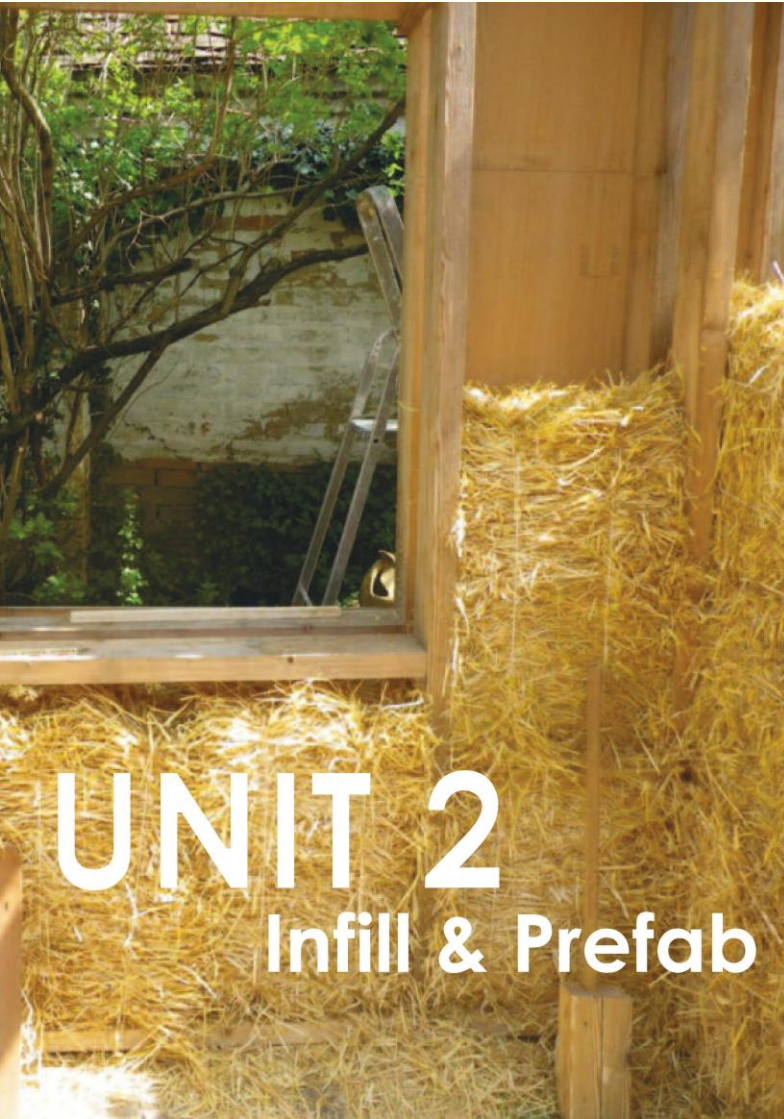
regular shaped

They should also not contain seeds (as few as possible)  
to discourage rodents/ insects.



© Pictures RFCP

# U2 – INFILL AND PREFAB



## UNIT 2 Infill & Prefab

### UNIT 2 INFILL & PREFAB

	Training	Page
U2 Learning Outcomes	3 days	5
U2 Session 1: Design and Planning	2 days	6
U2 Info Sheet: Design and Planning (Overview)		7
U2 Session 2: Construction Systems	2 days	9
U2 Info Sheet: Construction Systems (Overview)		10
U2 Info Sheet: Construction Samples (Overview)		11
U2 Session 3: Hybrid Constructions	1 day	13
U2 Info Sheet: CUT-Technique (Overview)		14
U2 Info Sheet: GREB-Technique (Overview)		15
U2 Session 4: Infill Constructions	2 days	17
U2 Info Sheet: Infill Constructions Austria (Overview)		18
U2 Info Sheet: Infill Constructions France (Overview)		19
U2 Session 5: Prefabrication and Modules	2 days	20
U2 Info Sheet: Prefabrication (Overview)		21
U2 Session 6: Building Details	1 day	22
U2 Info Sheet: Building Details (Overview)		23

## Straw Bale Hybrid CUT-System

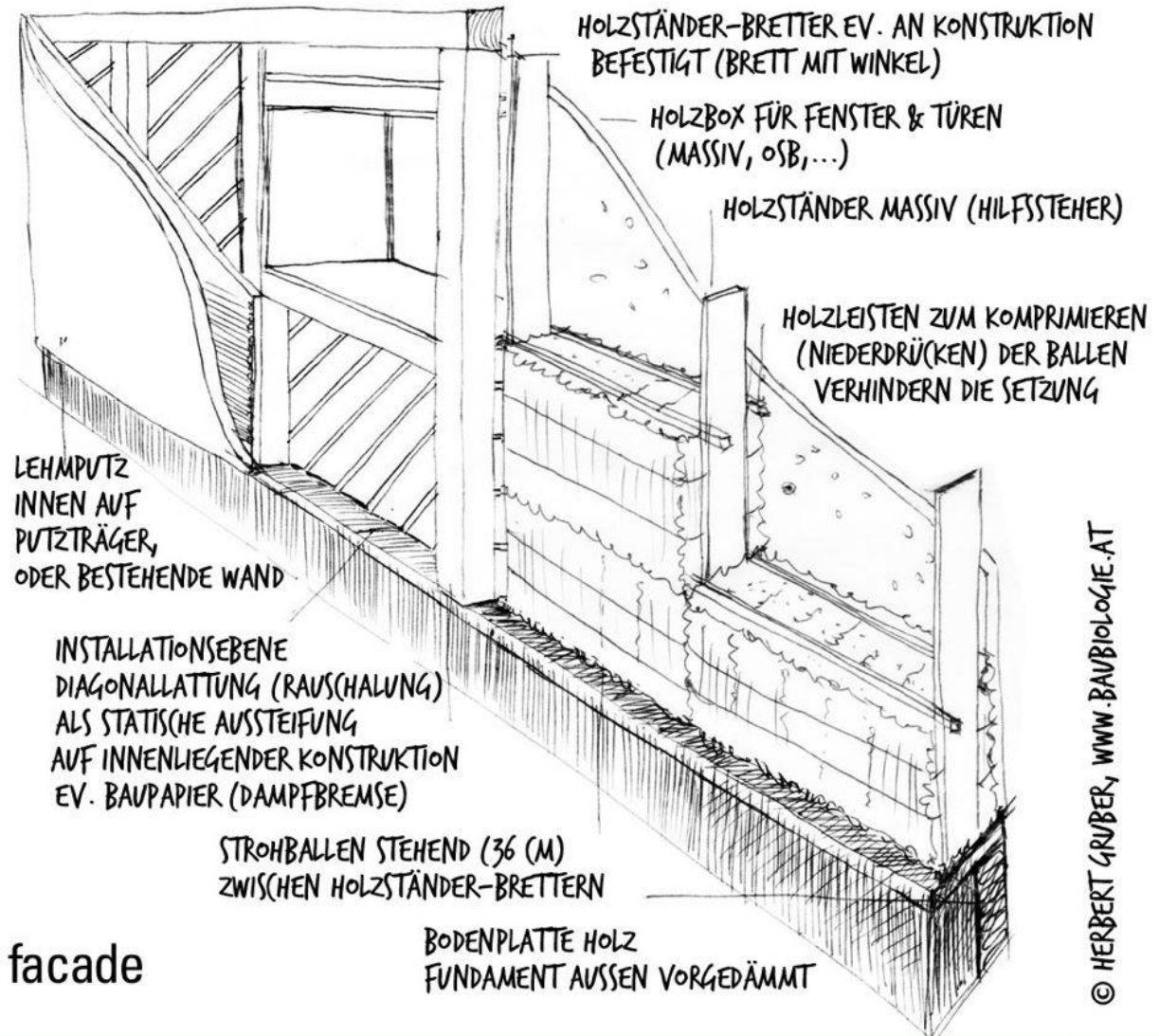
Tom Rijven

### advantages:

simple system,  
compression through  
lintels each sb-line,  
also ideal for  
thermal renovation

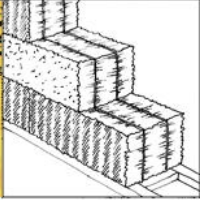
### disadvantages:

structural tests (72 tons)  
similar to loadbearing,  
ev. humidity problems  
through direct plastering on facade



© HERBERT GRUBER, WWW.BAUBIOLOGIE.AT





# UNIT 3

## Load bearing

### UNIT 3 LOAD BEARING

U3 Learning Outcomes

U3 Session 1: Design and Planning  
 U3 Info Sheet: Drawing Basics  
 U3 Info Sheet: Drawing for Exercises

U3 Session 2: Construction  
 U3 Info Sheet: Preparing Bales (Overview)  
 U3 Info Sheet: Notching Bales (Overview)

U3 Session 3: Tools  
 U3 Info Sheet: Tools on Building Site (Overview)

Partner STEP (Straw Bale Training for European Professionals)

Credits & Imprint

**Training Page**

5

5 hours 6

8

10

18 hours 13

14

15

2 hours 16

17

19

20

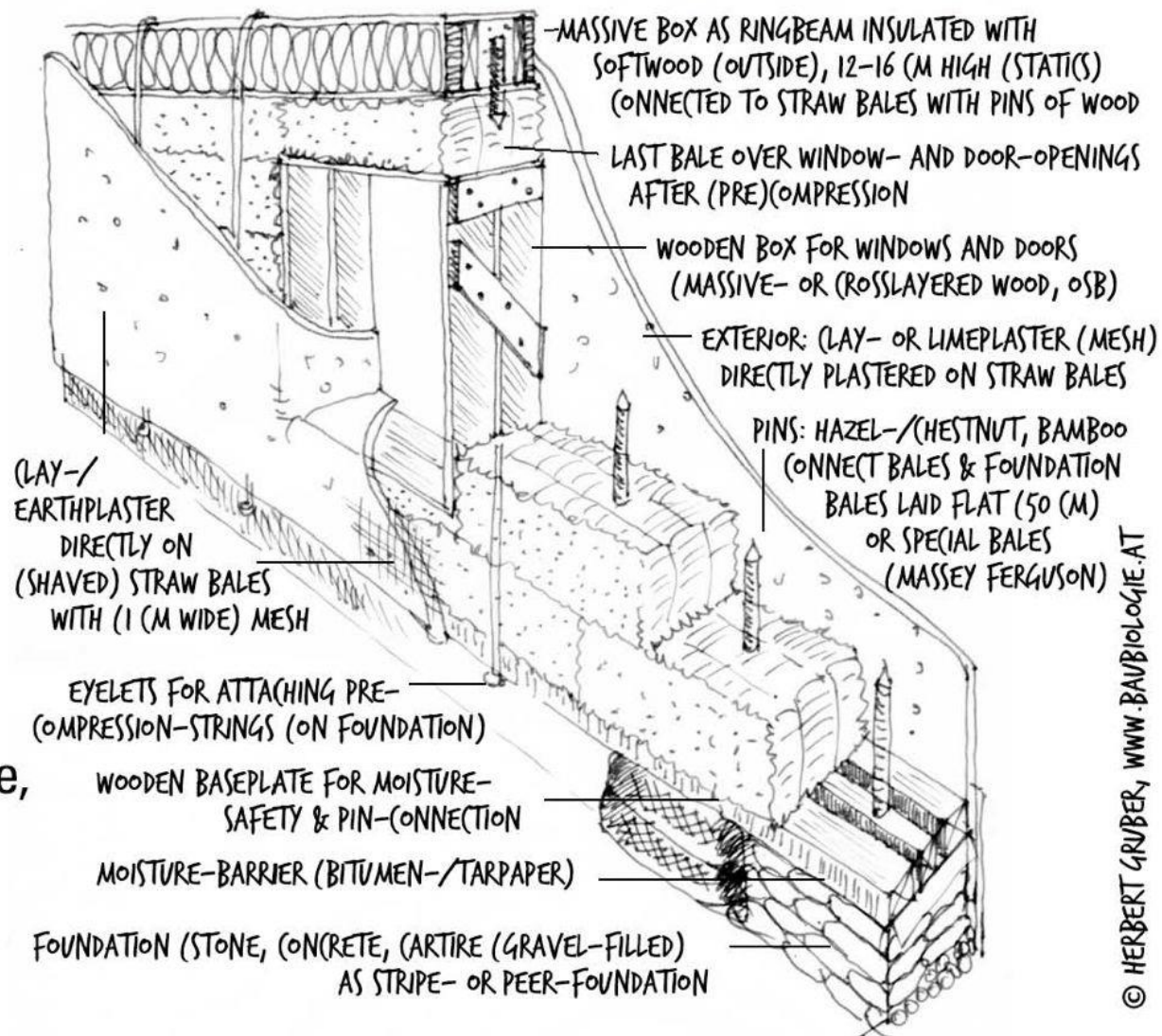
## load-bearing straw bale wall

### Advantages:

continuous, thermal bridge-free insulation, great shape flexibility

### Disadvantages:

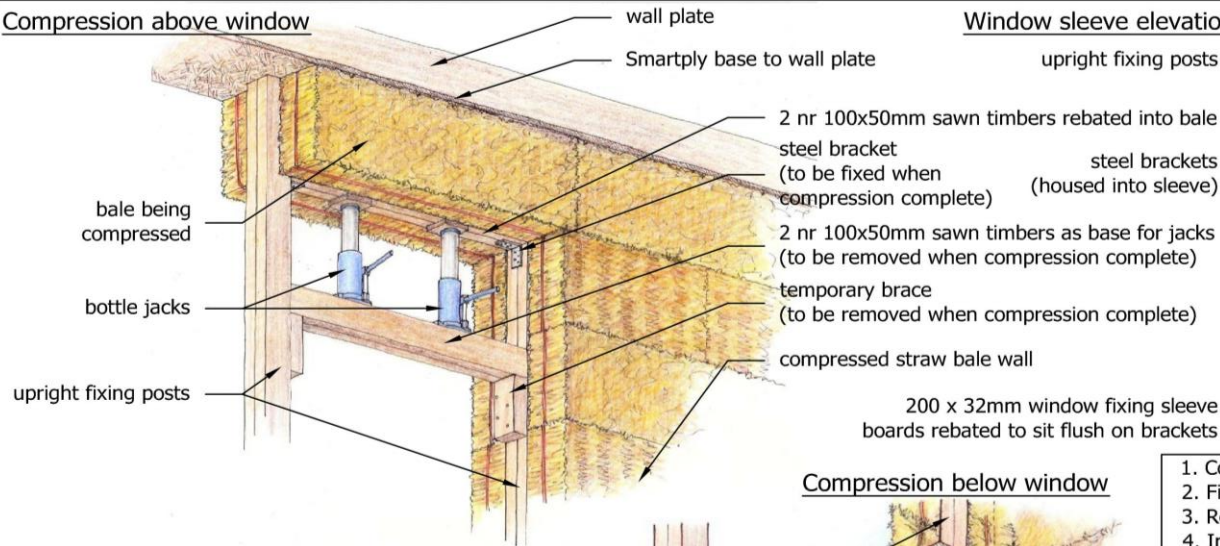
prefabrication & wooden facade not possible, possible humidity-problem through direct-plaster outside, smaller windows possible, missing installation area, statics: harder to proof



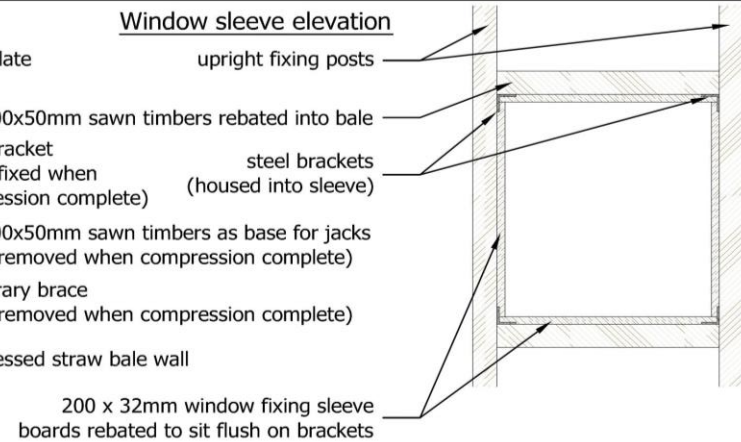
© HERBERT GRUBER, WWW.BAUBIOLOGIE.AT

# U3 – LOADBEARING

## Compression above window

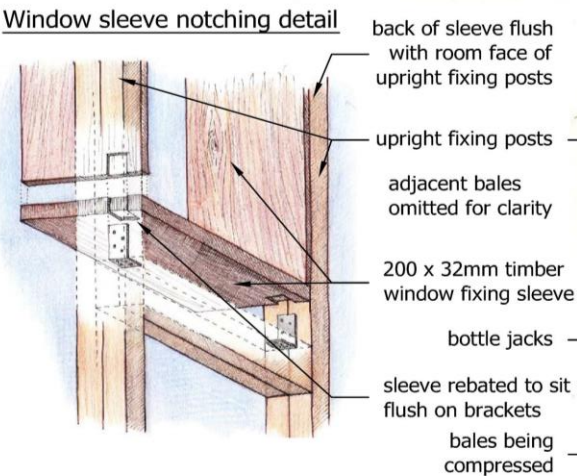


## Window sleeve elevation

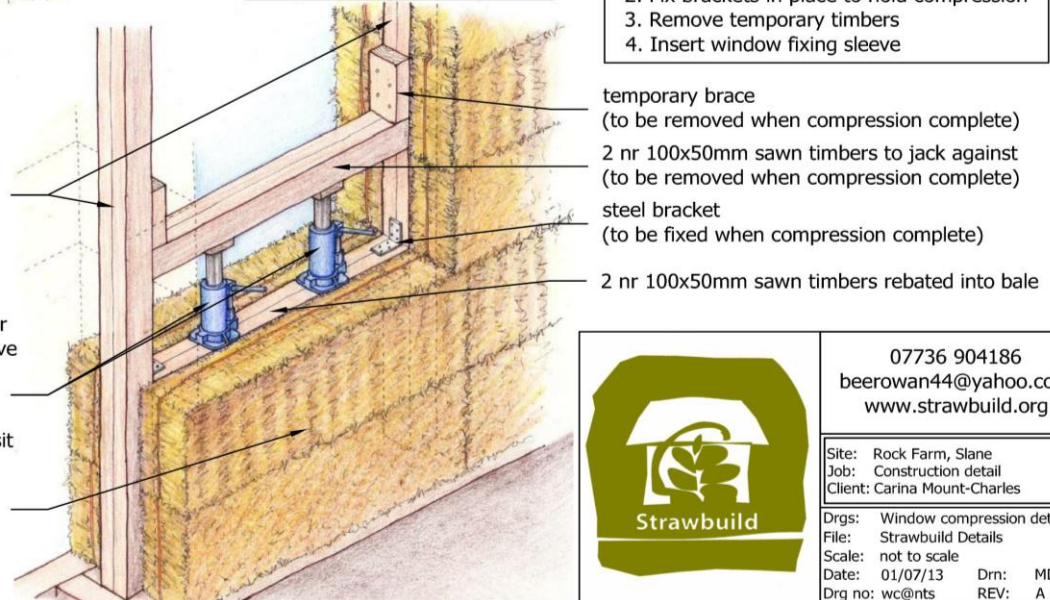


1. Compress bales above and below opening
2. Fix brackets in place to hold compression
3. Remove temporary timbers
4. Insert window fixing sleeve

## Window sleeve notching detail



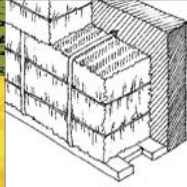
## Compression below window



07736 904186  
 beerowan44@yahoo.com  
 www.strawbuild.org

Site: Rock Farm, Slane  
 Job: Construction detail  
 Client: Carina Mount-Charles

Drgs: Window compression detail  
 File: Strawbuild Details  
 Scale: not to scale  
 Date: 01/07/13 Drr: MDH  
 Drg no: wc@nts REV: A



## UNIT 4 Wrapping

U4 Learning Outcomes

**Training Page**

5

U4 Session 1: Design and Planning

3 days

7

U4 Info Sheet: Basic concepts and different options

8

U4 Info Sheet: Characteristics of different options

9

U4 Info Sheet: Pros & Cons

10

U4 Session 2: Construction

5 days

12

U4 Info Sheet: Wrapping (Overview)

13

U4 Info Sheet: Retrofitting (Overview)

14

U4 Info Sheet: Details (Overview)

15

U4 Session 3: Tools and Building Site

4 hours

16

U4 Info Sheet: Tools (Overview)

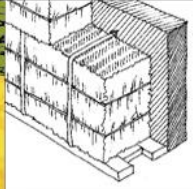
17

Partner STEP (Straw Bale Training for European Professionals) 21

Credits & Imprint

22

## U4 – WRAPPING



Workshop in  
Slovakia with  
4 different  
methods



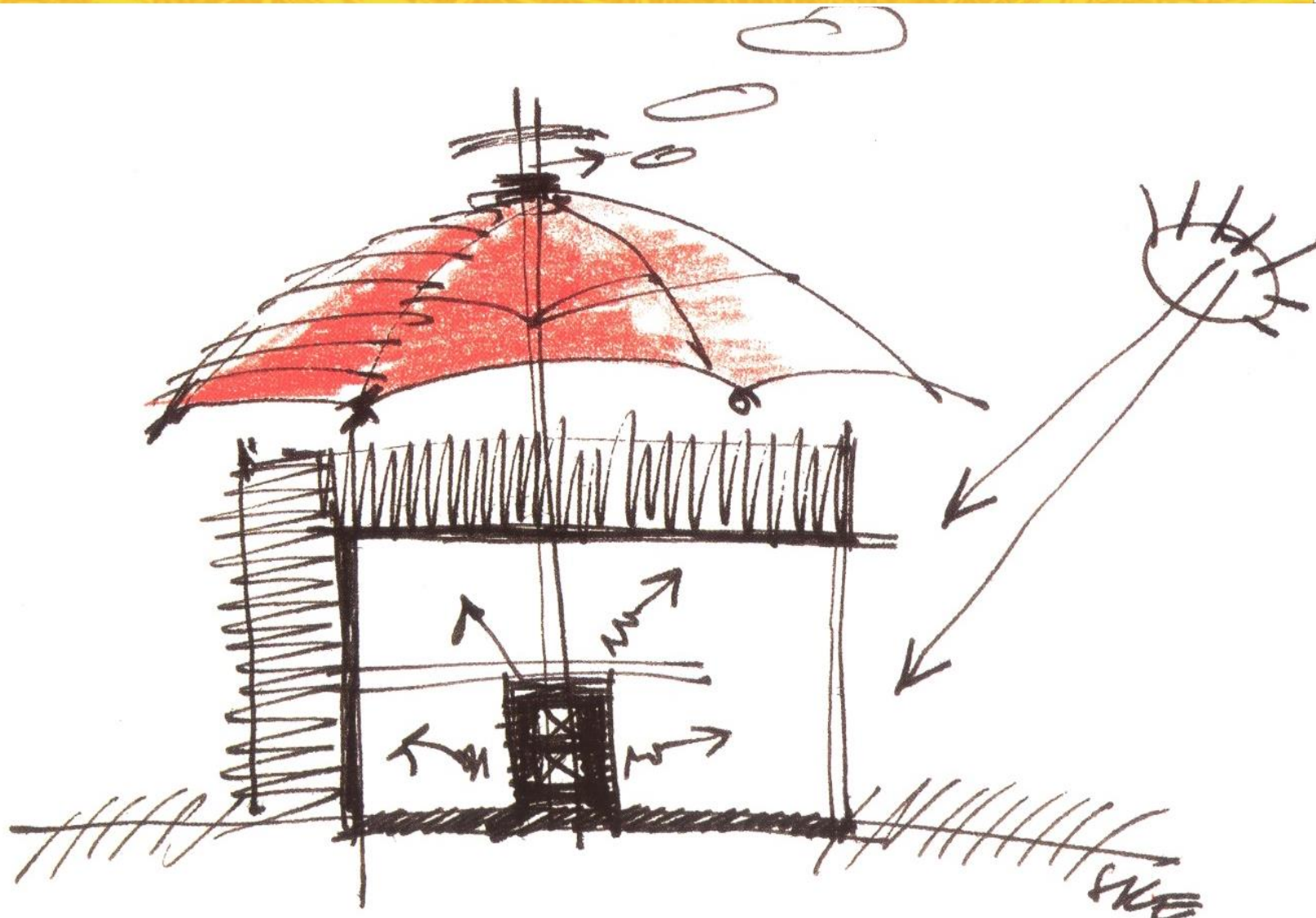
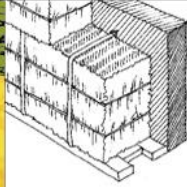
# U4 – WRAPPING

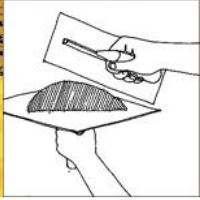


**Straw bale building Training  
for European Professionals**



# U4 – WRAPPING

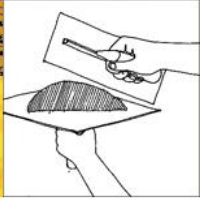




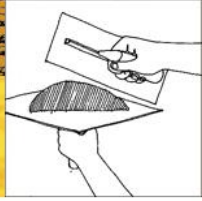
## UNIT 5 Finishes

UNIT 5 Finishes	Training	Page
U5 Learning Outcomes		5
U5 Session 1: Direct Plastered	1 day	7
U5 Info Sheet: Examples of Lime and Clay Finishes		8
U5 Info Sheet: Different functions of renders and plasters		9
U5 Info Sheet: Methods of applying plaster/render		10
U5 Session 2: Direct plaster practice: wall prep.	1 day	13
U5 Info Sheet: Examples of render related to building services		14
U5 Info Sheet: junctions between different materials		16
U5 Session 3: Direct plaster: clay mix preparation	1 day	19
U5 Info Sheet: Origin of clay soil and testing		20
U5 Info Sheet: Practice to prepare samples		21
U5 Session 4: Direct plaster: clay base coats	1 day	23
U5 Info Sheet: Direct plaster practice: clay base coat		24
U5 Session 5: Direct plaster: clay top finish	1 day	27
U5 Info Sheet: Lime renderings proportion and coloring		28
U5 Session 6: Direct plaster: lime base coats	1 day	30
U5 Info Sheet: Lime plaster: building examples		31

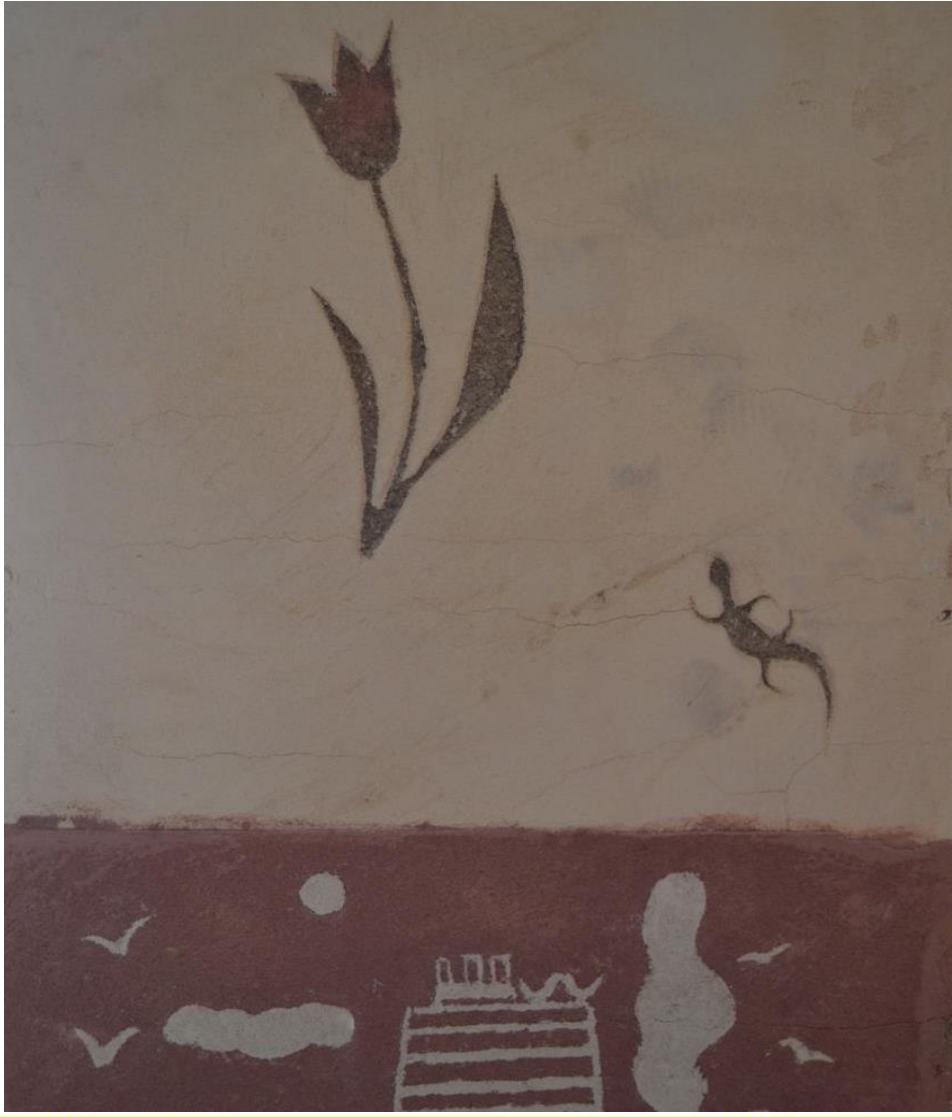




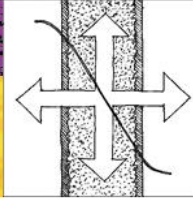
Clay and Lime finishes in the Dome in Slovakia



# U5 – FINISHES



## U6 – BUILDING PHYSICS AND SUSTAINABILITY

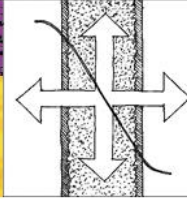


# UNIT 6

## Building Physics & Sustainability

UNIT 6 Building Physics & Sustainability	Training	Page
U6 Learning Outcomes		5
U6 Session 1: Introduction	1 hour	6
U6 Info Sheet: Introduction (Overview)		7
U6 Session 2: Heat Transfer	4 hours	8
U6 Info Sheet: Heat Transfer (Overview)		9
U6 Session 3: Flammability & Fire Resistance	4 hours	10
U6 Info Sheet: Flammability & Fire Resistance (Overview)		11
U6 Session 4: Acoustics	2-3 hours	12
U6 Info Sheet: Acoustics (Overview)		13
U6 Session 5: Humidity Transfer	3-4 hours	14
U6 Info Sheet: Humidity Transfer (Overview)		15
U6 Session 6: Heat & Comfort / Indoor Climate	4 hours	16
U6 Info Sheet: Heat & Comfort / Indoor Climate (Overview)		17
U6 Session 7: Energy Performance & Programs	4 hours	18
U6 Info Sheet: Energy Performance & Programs (Overview)		19

# U6 – BUILDING PHYSICS AND SUSTAINABILITY



## INSIDE

diffusion/breathability  
or vapour barrier (4:1)

$\mu = 20-300$

sD-value  $\leq 1\text{m}$

no vapour break!

### airproof

single: plaster

double: plaster + OSB/membrane

### diagonal bracing

shear/wind forces:  
structural board, plaster

### thermal mass

heavy materials  
in walls & floor  
phaseshift (day/night)  
clay/earth (indoor climate)

### installation layer

plaster, on Heraklith or  
woodfibreboard, boards

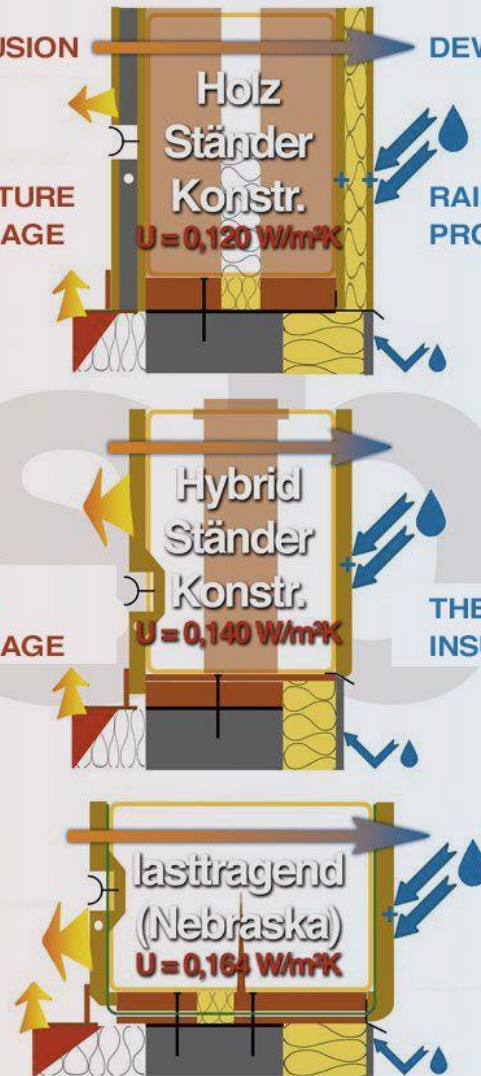
### splashwater area

baseplate, wood, tiles

DIFFUSION

MOISTURE  
STORAGE

HEAT  
STORAGE



DEWPOINT

RAIN  
PROTECTION

THERMAL  
INSULATION

## OUTSIDE

diffusion/breathability  
diffusionopen!

$\mu = 1-20$

dewpoint (condensation)  
no vapour barrier!

### windproof

single: (lime)plaster

double: + DWD/windpaper

### diagonal bracing

shear/wind forces:  
structural board, plaster

### thermal insulation

lambda (material)

U-value (building part)

low energy house:  $< 0,25\text{ W/m}^2\text{K}$

passive house:  $< 0,10\text{ W/m}^2\text{K}$

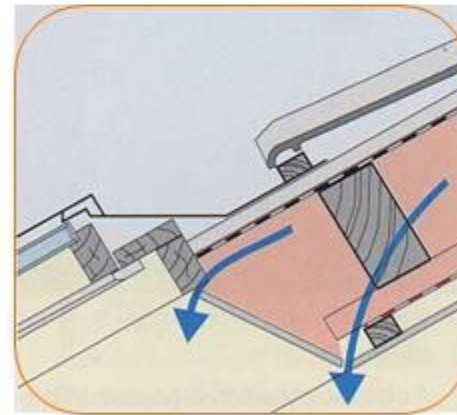
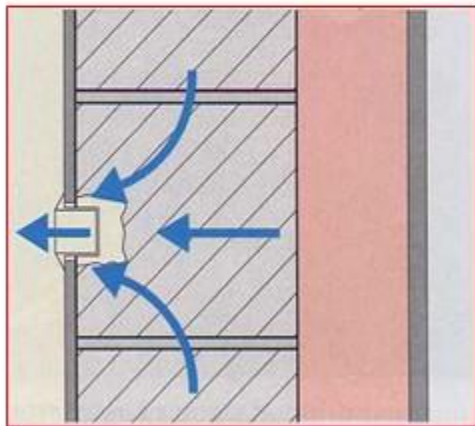
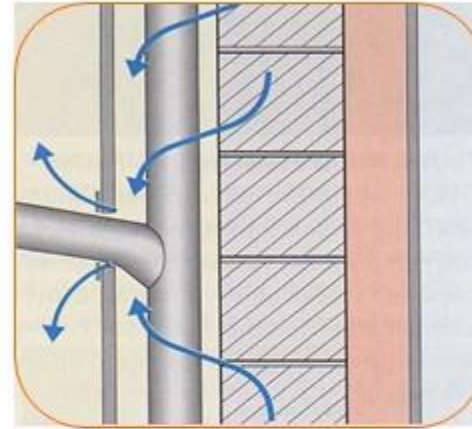
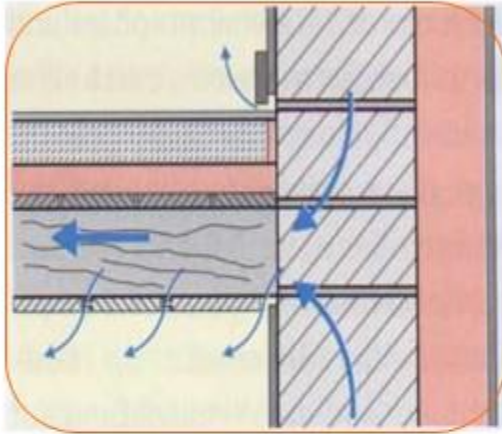
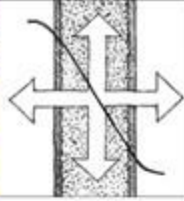
### facade (water repellent)

limeplaster + (silicate) paint  
woodfibreboard (protect) + plaster

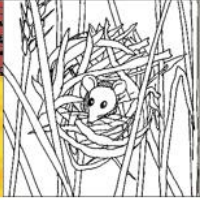
### splashwater area

30-40 cm above ground, gravel

© ASBN, [www.baubiologie.at](http://www.baubiologie.at) (U-Wert: [u-wert.net](http://u-wert.net))

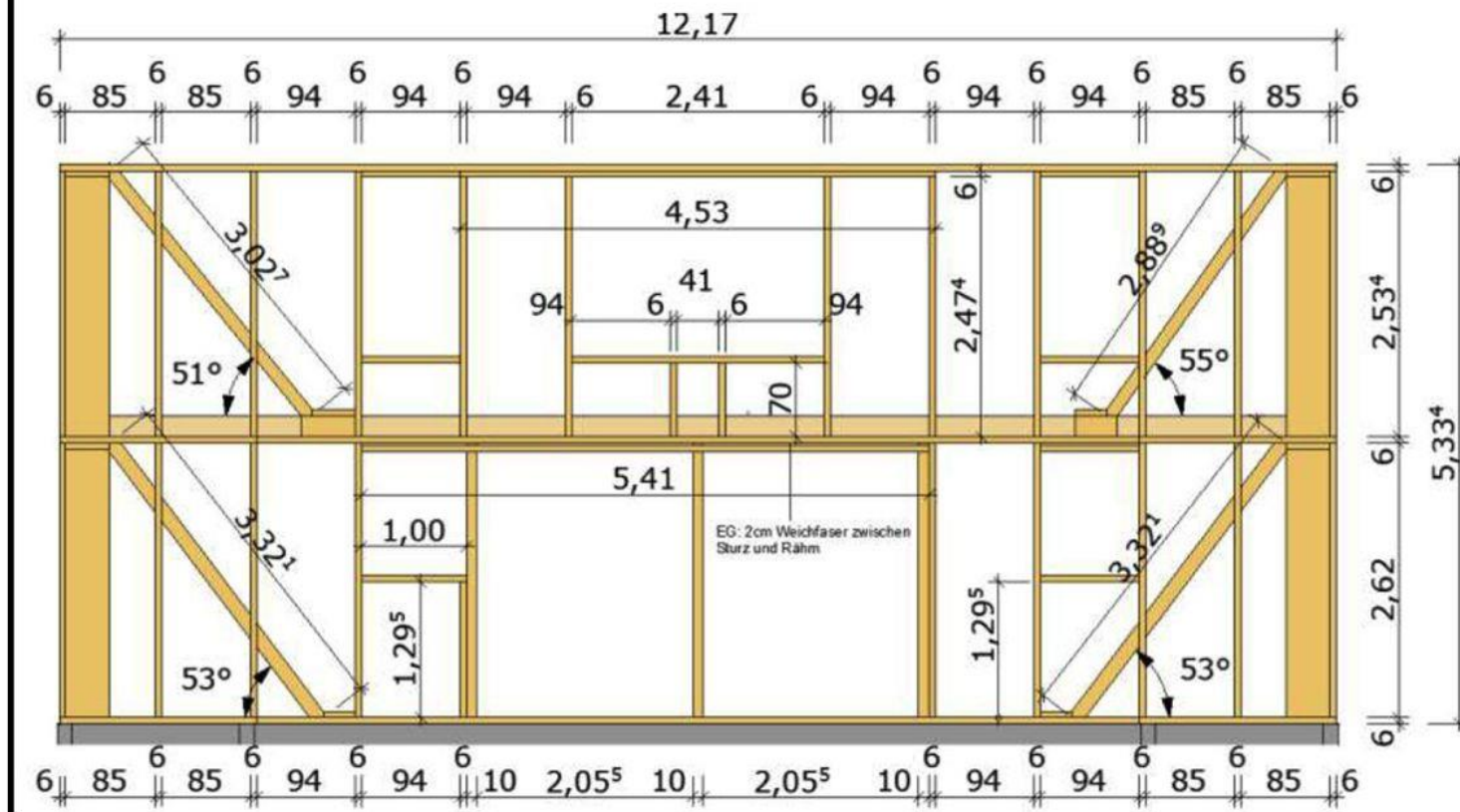


Air  
tightness  
In the  
building

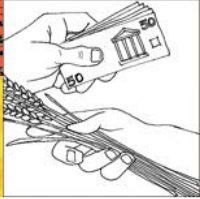


## production drawing wall I Fertigungszeichnung Wand

**architecture**  
**Architektur**  
source | quelle: arch. dirk scharmer



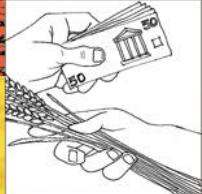
# U8 – MARKETING AND COMMUNICATION



## UNIT 8 Marketing & Communication

UNIT 8 Marketing & Communication	Training	Page
U8 Learning Outcomes		5
U8 Session 1: the Market	3 hours	7
U8 Info Sheet: the Market (Overview)		8
U8 Session 2: Marketing Strategy	3 hours	11
U8 Info Sheet: Marketing Strategy (Overview)		13
U8 Session 3: Branding	2 hours	14
U8 Info Sheet: branding (Overview)		15
U8 Session 4: Cost, Pricing & Contracts	6 hours	16
U8 Info Sheet: Cost, Pricing & Contracts (Overview)		17
U8 Session 5: Verbal Communication	4 hours	18
U8 Info Sheet: Tools (Overview)		19
U8 Session 6: Language Training	4 hours	21
Partner STEP (Straw Bale Training for European Professionals)		21
Credits & Imprint		22

# U8 – MARKETING AND COMMUNICATION



Handwerkskammer zu Leipzig

## ÖKO UND NOCH ETWAS

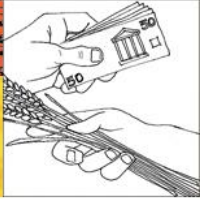
Handbuch zum Marketing ökologischer Produkte



### Straw bale building Training for European Professionals



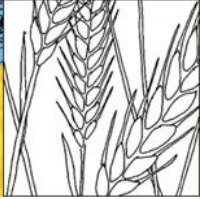




# Do Good & SPEAK ABOUT

- » Web (Website, Facebook, YouTube)
- » Print (Brochures, Books, Folder,...)
- » Workshops on your and on their site
- » Events (share your experience)
- » Friends and Friends of Friends  
(Viral Marketing like FB or YouTube)

# U1 – INTRODUCTION



Straw Leonardo 3 Austria

[www.straw-leonardo.eu](http://www.straw-leonardo.eu)



**Straw bale building Training  
for European Professionals**



Lifelong  
Learning  
Programme

# U1 – INTRODUCTION



„Batipol“ French training center close to Limoux



Straw bale building Training for European Professionals



# U1 – INTRODUCTION



Training center in Verden - Germany in a former tank hall – Fachkraft Stroh – training with 200 hours  
5 story Straw Bale Building (NZNB) realized in prefabrication with big bales in 2015

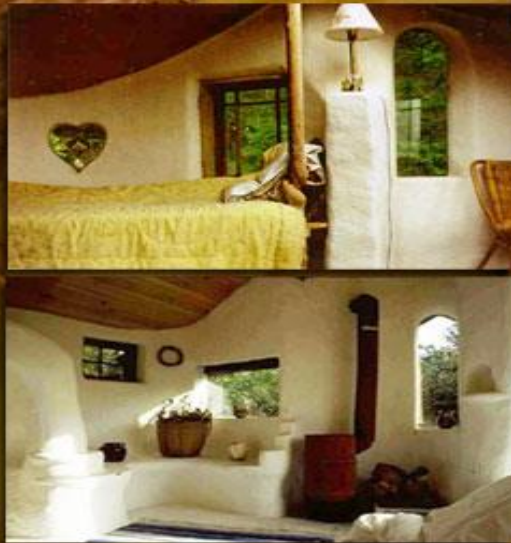
# U1 – INTRODUCTION



Training center Slovakia in Rhuby Sur from Artur – in an old renovated school

organic architecture  
2

ORGANIC  
OrganicCut



Training center in Ravelsbach  
Austria of ASBN

The possibility to build organic, free forms  
like in flying concrete with straw & earth  
(cob) as sculptural and plaster material

Let's open all  
windows and  
doors for SBB  
in Europe!!

Thank you!!

