



Polski Komitet Narodowy
Międzynarodowej Rady Ochrony Zabytków
ICOMOS



VILNIUS GEDIMINAS
TECHNICAL UNIVERSITY



Methodological approach to conservation



Erasmus+

Methodological Approach to Conservation: Physical Approach

SH

Sustainable Heritage

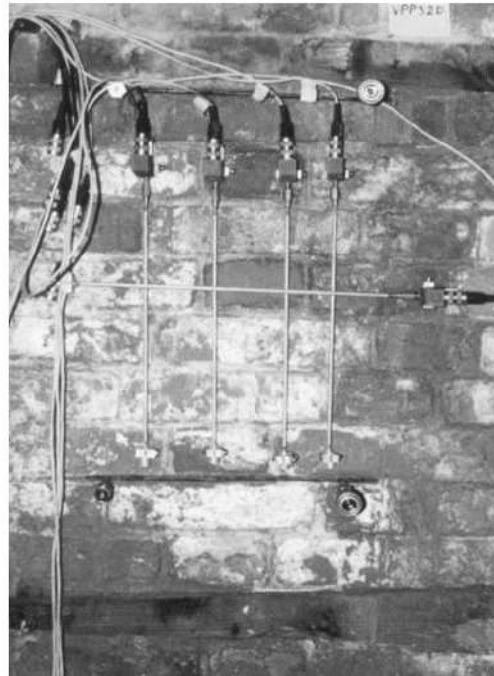
2 ECTS



Methodological Approach to Conservation: Physical Approach

1. Introduction to Methodological Approach
2. Geometrical Survey
3. Geometrical Survey: traditional method
4. Geometrical Survey: new tools
5. Material Survey.
6. Mechanical Survey.
7. Damage maps I: degradation problems
8. Degradation types.
9. Damage maps II: fissure and crack problems
10. Damage maps III: moisture problems
11. Damage tests on masonry constructions I
12. Damage tests on masonry constructions II
- 13. Survey, maps and tests on wooden construction**
14. Archaeology
15. Stratigraphy

Methodological Approach to Conservation: Physical Approach



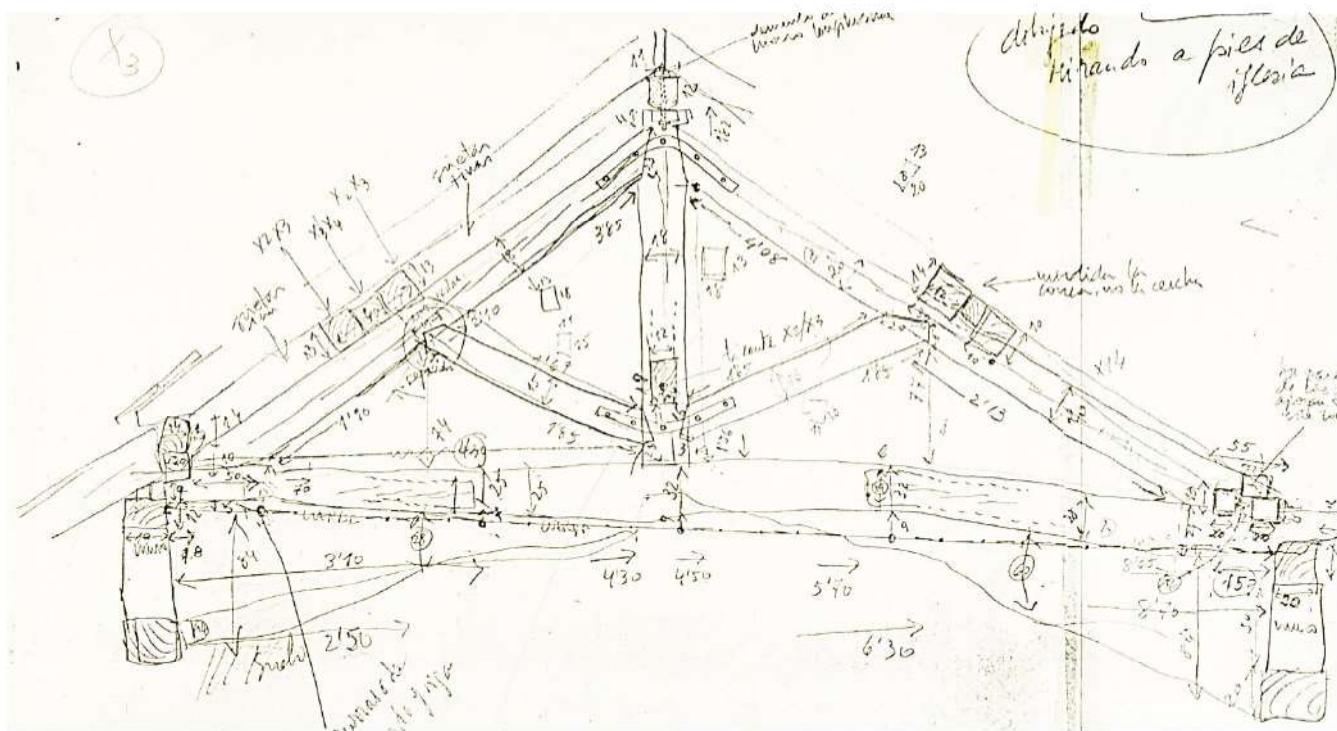
LESSON 13. SURVEY, MAPS AND TESTS ON WOODEN CONSTRUCTION

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

- A. Geometrical, material and mechanical survey**
- B. Damage maps**
- C. Damage tests**

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

A. Geometrical and material survey



Sketch of a wooden truss with measurements and constructive indications.

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

A. Geometrical and material survey

Example of a document
for the structural
diagnosis.

Committente:

**SOPRINTENDENZA PER I BENI ARCHITETTONICI E PER IL
PAESAGGIO, RAVENNA**

Oggetto:

**DIAGNOSTICA STRUTTURALE SULLA COPERTURA LIGNEA
DELLA BASILICA DI S.APOLLINARE IN CLASSE RAVENNA**

Titolo:

Beginning of data
collection for a detailed
analysis of each
element.

RELAZIONE TECNICA

Emesso:

dott. Paolo Mezzaro

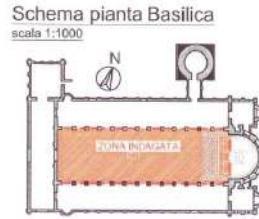
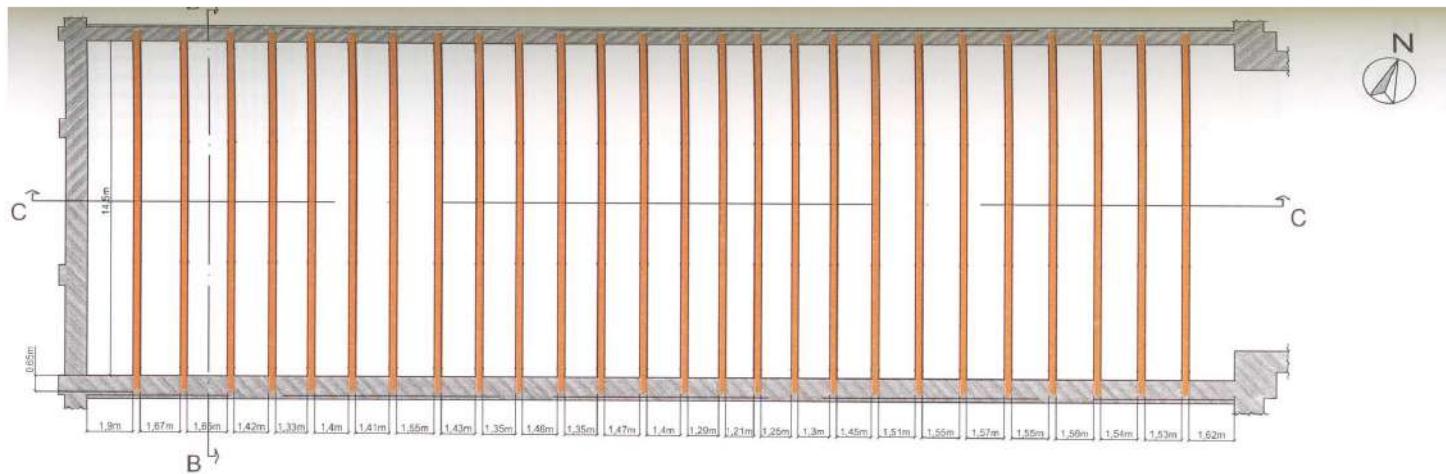
Approvato:

ing. Sergio Tralli

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

A. Geometrical and material survey

Roof survey with central nave sections.



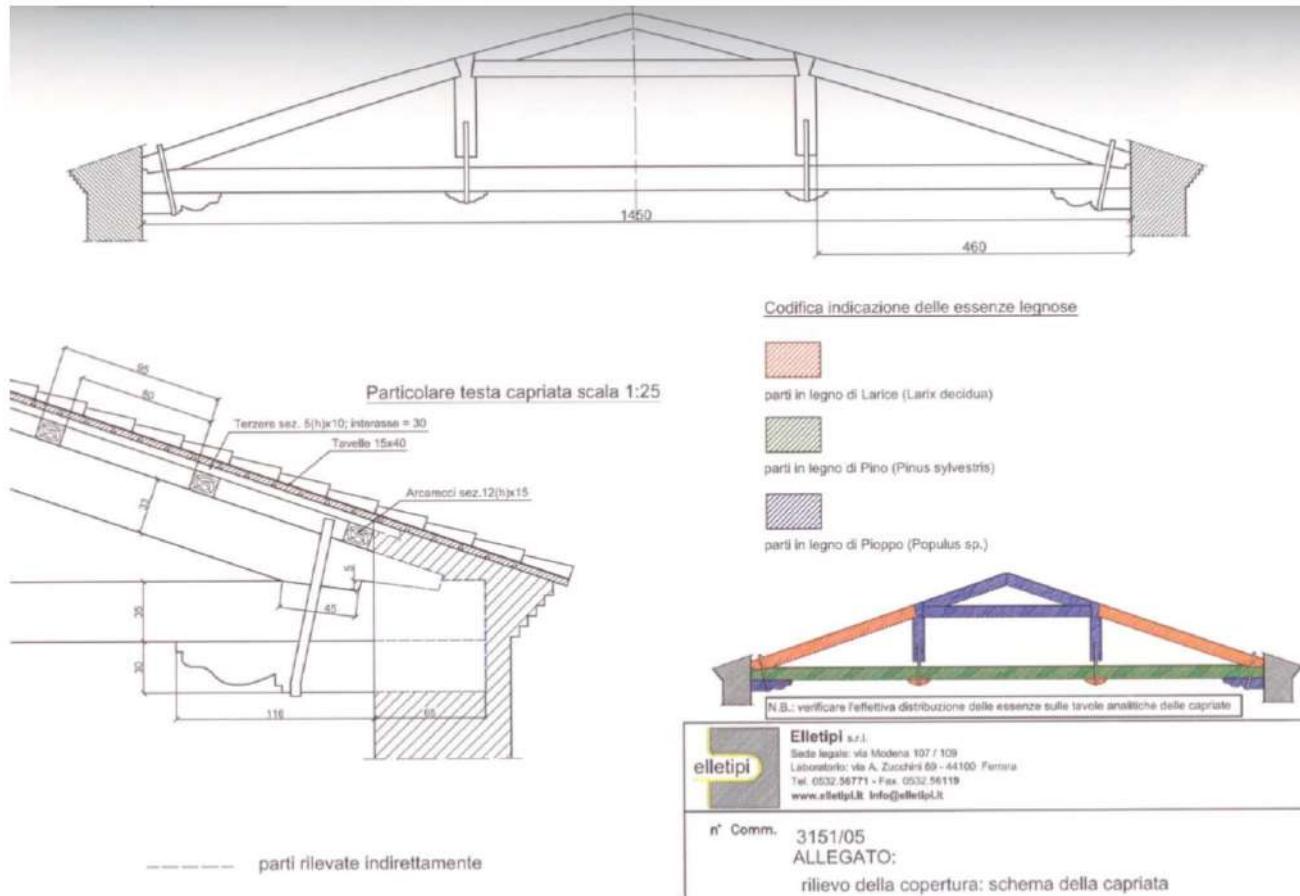
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n° Comm. 3151/05
ALLEGATO:
rilievo della copertura - sezioni navata centrale

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

A. Constructive detail and material characterization

It is represented the constructive solutions of the support points of the truss. The following drawing details the type of wood used in each element.



SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

B. MAPS OF DAMAGE

Analitical diagnosis data card including: list of damages, location and codification of test performed on the truss and typological recognition of wood species

L'individuazione zone di degrado sulla capriata e restituzione rilievo sezioni degli elementi indagati

A: attacco biotico di entità grave
B: attacco biotico di entità media
C: attacco biotico di entità contenuta
D: rottura del dente di taglio sulla catena con scorrimento relativo degli elementi
E: lesione in corrispondenza del dente di taglio localizzata su catena e/o punte:
F: presenza di fessurazioni da ritiro (verificare posizione, profondità ed ampiezza nella tabella descrittiva)

localizzazione e codifica prove resistografiche sulla capriata

19 Lato Sud
18
17
13
14
15-16
44 Lato Nord
40
43
41
42

perforazione a 45°
perforazione a 90°

localizzazione della capriata indagata

1 3 5 7 9 11 13 15 17 19 21 23 25
2 4 6 8 10 12 14 16 18 20 22 24

riconoscimento tipologico delle essenze legnose

parti in legno di Larice (Larix decidua)
parti in legno di Pino (Pinus sylvestris)

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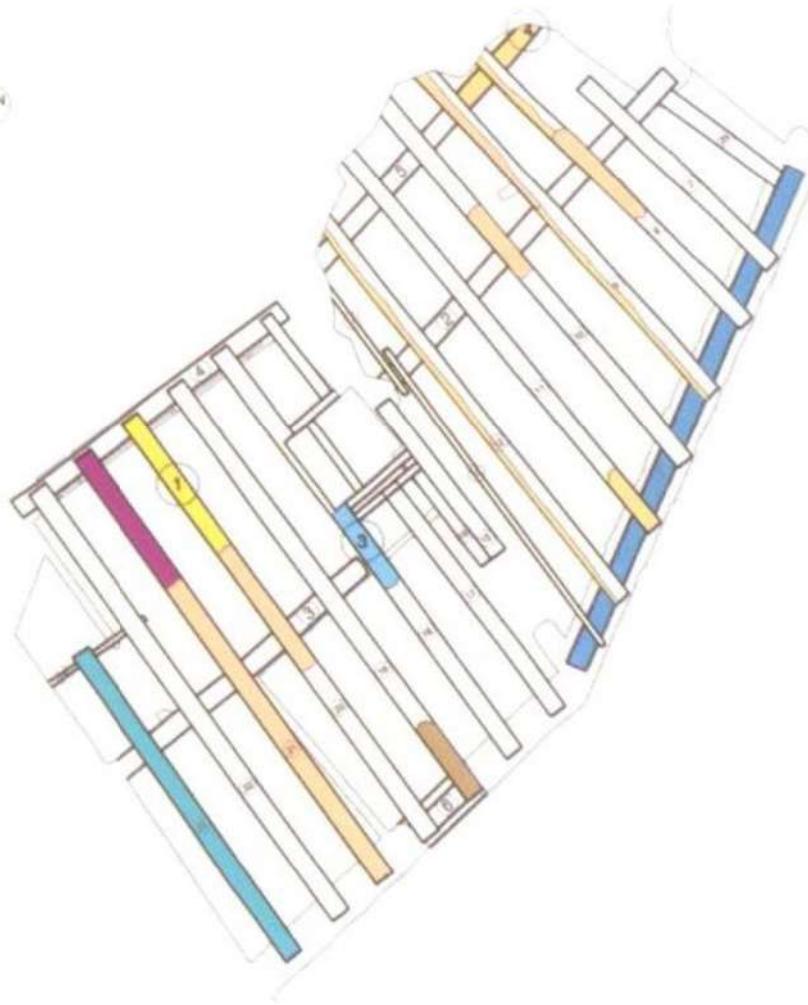
n° Comm. 3151/05
scheda diagnostica analitica capriata n.3

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

B. MAPS OF DAMAGE

Damages types identification

- Xylophagous insects
 - Xylophagous insects
 - Xylophagous insects
 - Cork-like wood and moisture stains
 - Cork-like wood
-
- Quartered wood
 - Rotting
 - Moisture stains
 - Xylophagous insects and rotting
 - Cork-like and rotting
-
- Quartered wood and rotting
 - Quartered wood and xylophages
 - Fungus
 - Birds' nests
 - Breakage



SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

C. DAMAGE TESTS



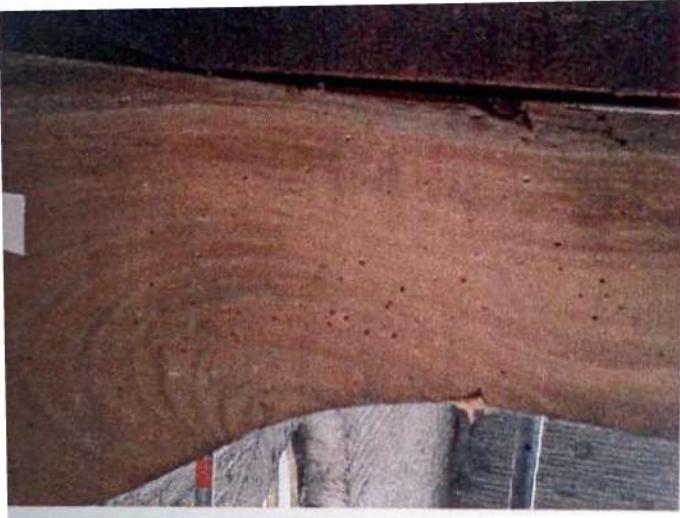
Analysis of specific damages

Suffering of the cutting tooth (left)

Breakage with relative sliding of the elements (right).

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

C. DAMAGE TESTS



Analysis of specific damages

Attack of anabids xylophagous (left)

Attack of cerambicides xylophagous (right).

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

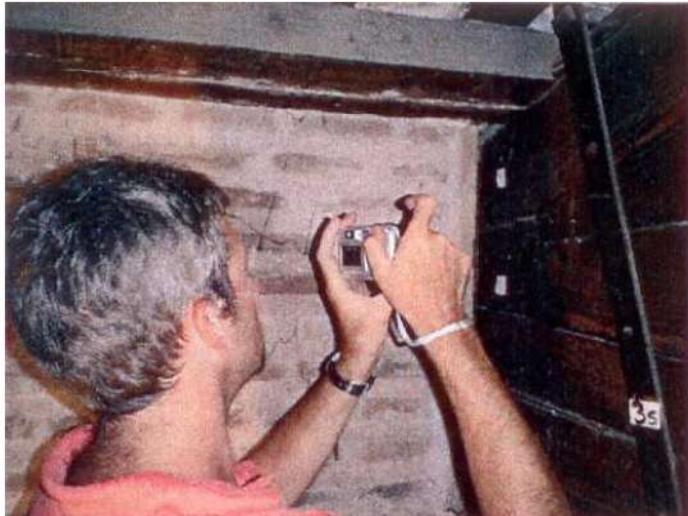
C. DAMAGE TESTS



Vertical deviation between bracket and tie-beam (left) and longitudinal fissures due to tie-beam shrinkage (right).

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

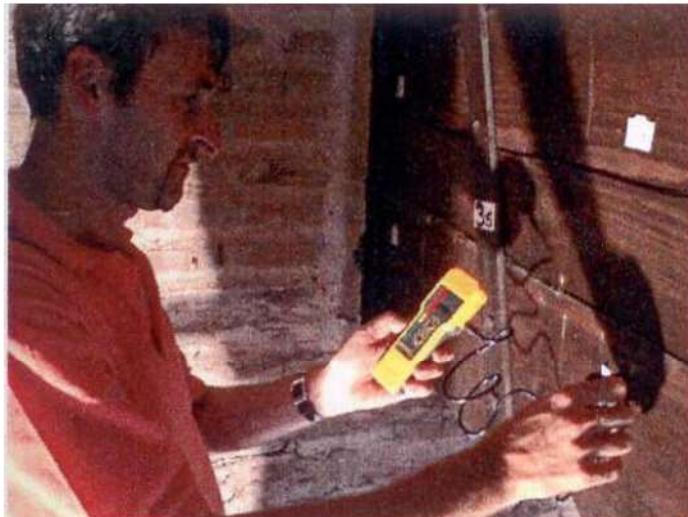
C. DAMAGE TESTS



Visual, photographic and geometrical survey.

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

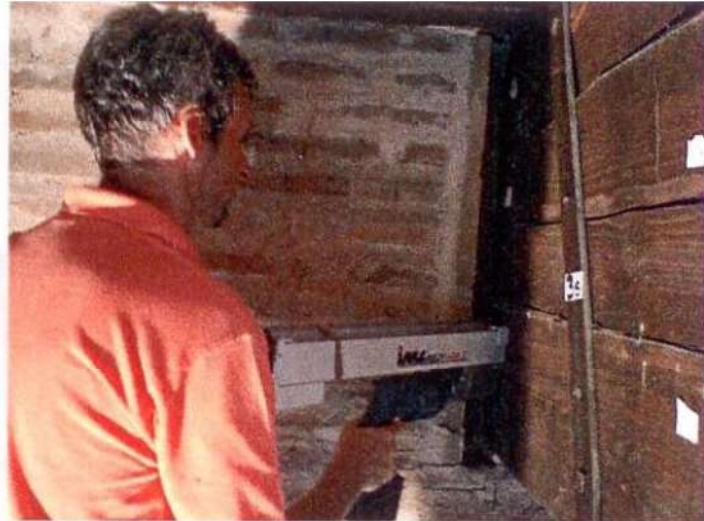
C. DAMAGE TESTS



Moisture survey (left) and example of the coding assigned to the truss head with indication of the execution points (right).

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

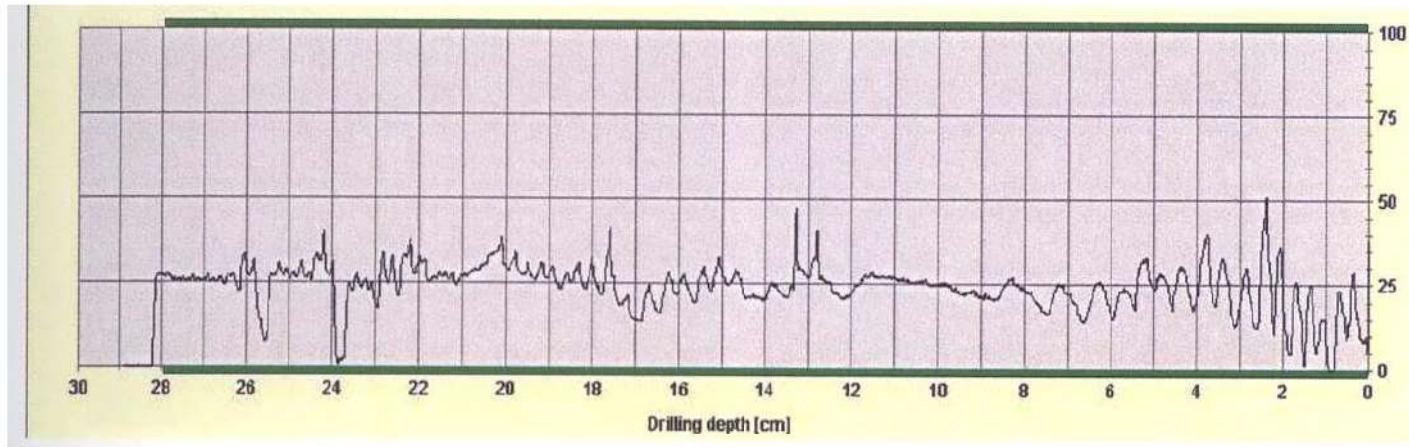
C. DAMAGE TESTS



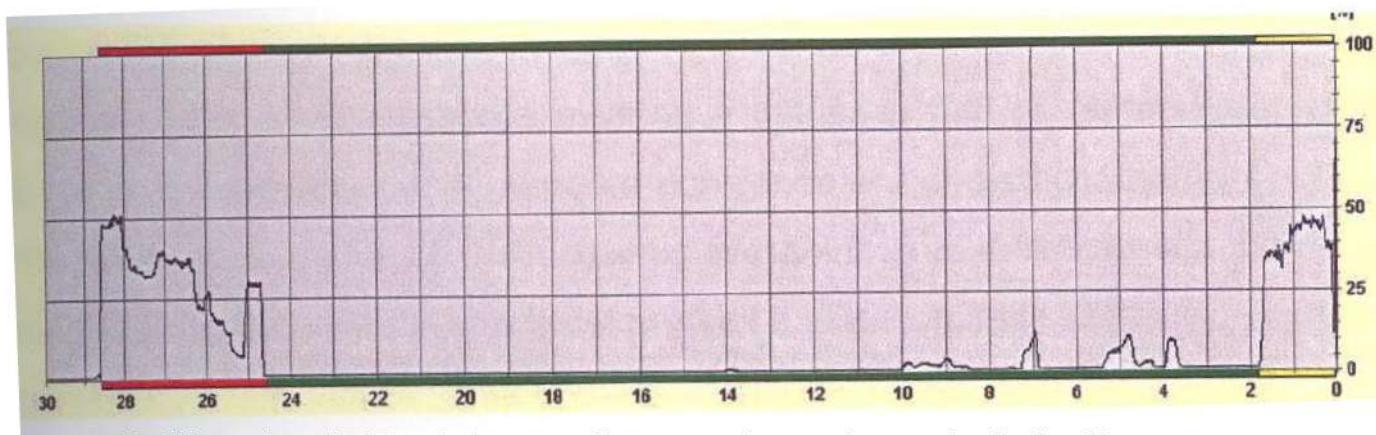
Perforations with resistograph in span (left) and in correspondence of the support (right).

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

C. DAMAGE TESTS



Drilling depth-Resistance diagram for a «healthy» shelf.



Drilling depth-Resistance diagram for a degraded shelf.

C. DAMAGE TESTS

Penetrometer tests on wood
(PP.MM. Laboratory, Politecnico di Milano)



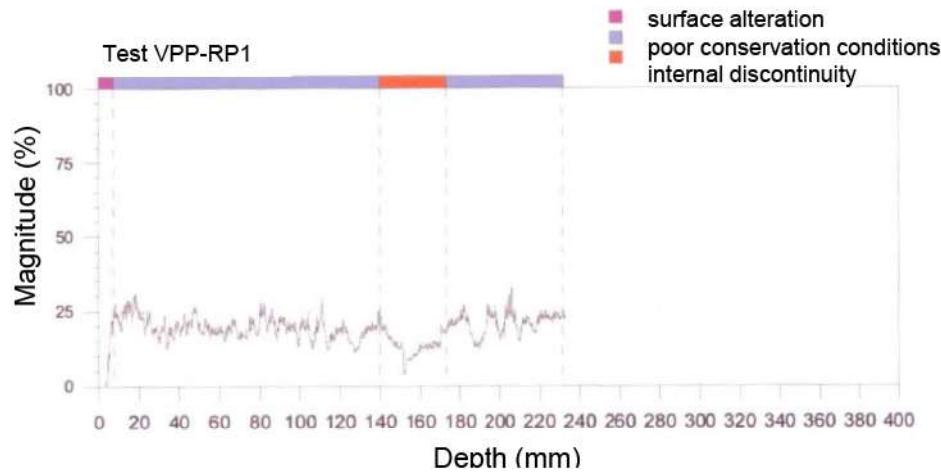
Reading the humidity inside the beam.



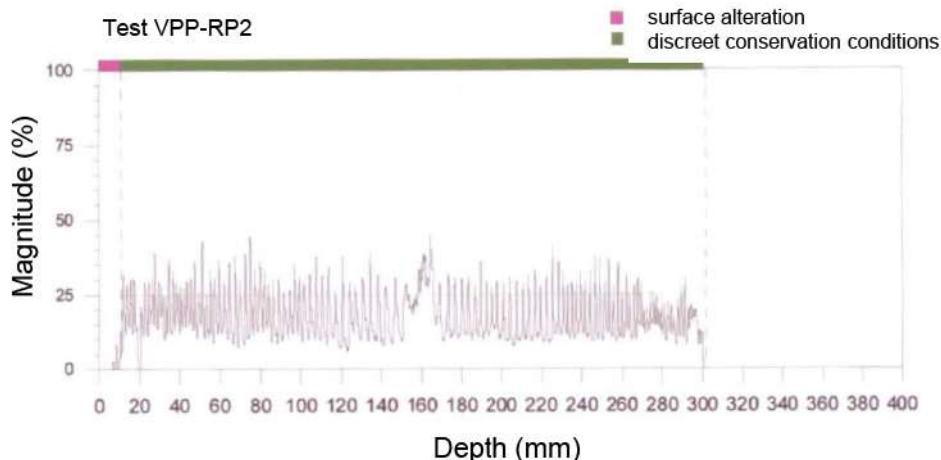
Performing the penetrometer test.

SURVEY, DAMAGE MAPS AND TESTS ON WOODEN CONSTRUCTION

C. DAMAGE TESTS



Densiometric profile obtained from the VPP-RP1 test



Densiometric profile obtained from the VPP-RP1 test



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