



Collaborative research project

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Development of wind energy technologies in Nepal on the basis of natural materials: Theoretical and experimental analysis of the materials aspects

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Funded through Danida, Royal Ministry of Foreign Affairs

Project, funded by Royal Danish Ministry of Foreign Affairs

Development of wind energy technologies in Nepal on the basis of natural materials



Nepali handmade blades for wind turbines



300W wind turbine with wooden blades

**Project duration: 3
years.**

**Funding: 4 800 000
DKK (about 700
000 €)**

PROJECT TEAM:

Denmark:

Leon Mishnaevsky Jr. – Project leader, Senior Scientist (Project Management, Micromechanics of Wood, Integration of Experimental and Theoretical Parts of the Project)

Hai Qing – Project Scientist (Computational Micromechanics) (after 1.11.2007)

Jakob Ilsted Bech – Specialist in Fatigue and Fracture Testing, Senior Development Engineer (Setup of Testing Mashines)

Povl Brødstedt – Specialist in Fatigue and Fracture Testing, Head of Programme (Advising and Support on Testing)

Nepal:

KAPEG group – Fatigue, fracture, other testing

Practical Action – (after 2008) Field testing

Advisor:

Peter Freere

How to choose wood for the turbines?
How to choose the coating?
Which wood ensures the highest lifetime?


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Our working assumption:

one can develop **techniques of quick estimation of wood quality and recommendations for the choice** of wood/coatings, using the analysis of interrelations between **microstructure** of wood and its fatigue properties.

MAIN PARTS OF THE PROJECT



- Setup of testing machines
- Fatigue/fracture/hardness testing of different sorts of timber
- Computational analysis of relationships between wood microstructure/ fatigue/ fracture/ hardness
- Analysis of the effects of coatings: experiments and modelling,
- Realization and testing of practical recommendations

Schema of Research (1)



Fatigue Testing, Fracture
Testing, Hardness (np)

Analysis of Microstructure
(np)

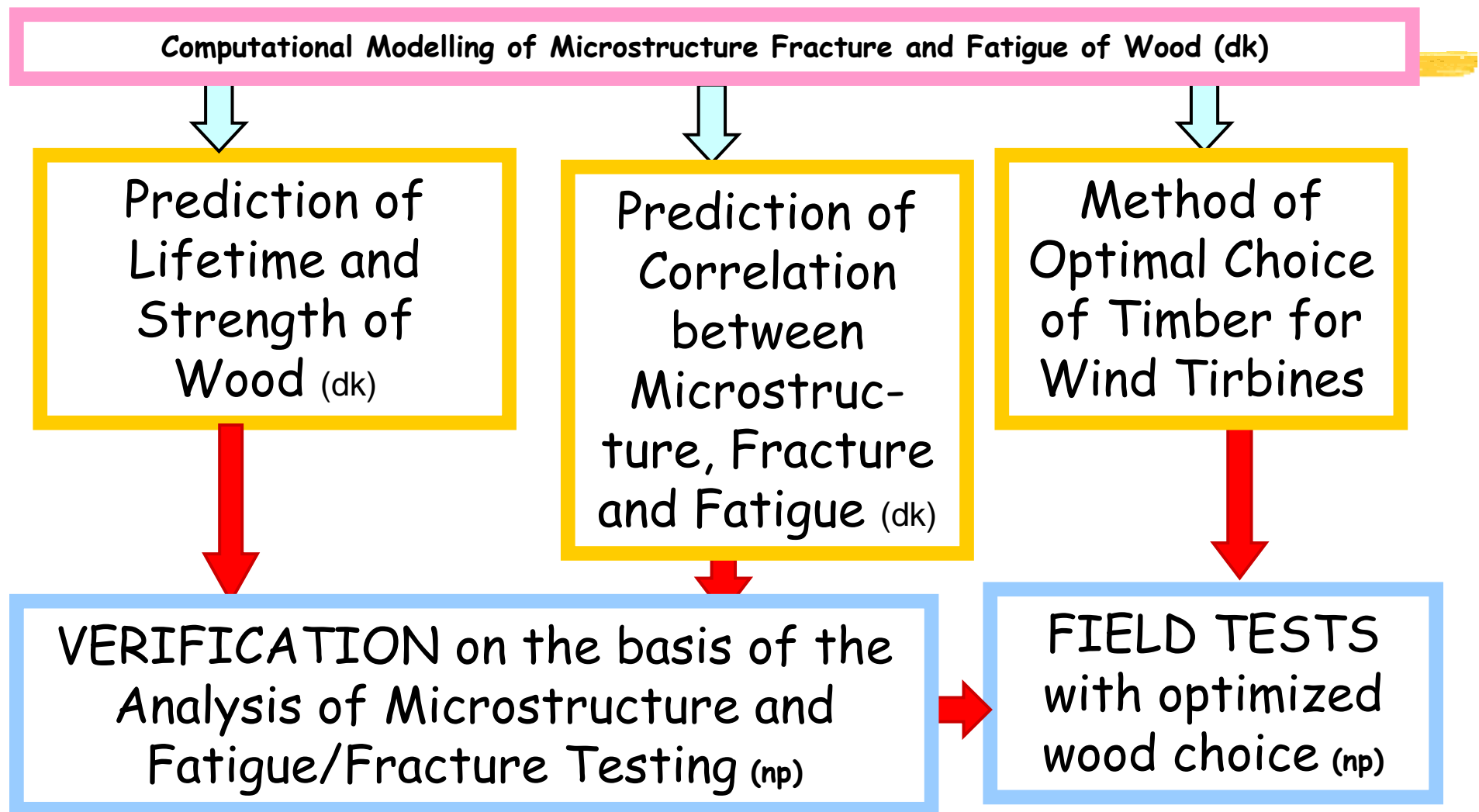
Computational Modelling of
Microstructure of Wood (dk)

Computational Modelling of
Fracture and Fatigue of Wood
(dk)

What is the
Correlation between
Microstructure,
Fracture and Fatigue?
(np, dk)

Prediction of Lifetime
and Strength of Wood
(dk)

Schema of Research (2)



SPECIAL TRAINING FOR KAPEG STAFF IN THE PROJECT



- Materials testing,
- Wood analysis/Microscopy,
- Computational modelling
of parts and materials
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