HIGHER TECHNICAL INSTITUTE

CIVIL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

AN INVESTICATION INTO THE MECHANICAL PROPERTIES OF IMPORTED SOFTWOODS

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BY: PROCOPIOU PETROS

& STYLIANOU STELLA

JUNE 2000

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TITLE : AN INVESTICATION INTO THE MECHANICAL PROPERTIES OF IMPORTED SOFTWOODS.

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Project report submitted to the department of CIVIL ENGINEER of the HIGHER TECHNICAL INSTITUTE Nicosia ,Cyprus. In partial fulfilment of the requirement for the DIPLOMA of TECHNICIAN ENGINEER of CIVIL ENGINEERING.

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PROCOPIOY P. - STYLIANOY S.

SUMMARY

The main objectives of the project " An investigation into the mechanical properties of imported softwood " are :

1. Chapter one deals with the investigation of the physical properties of wood in general and it emphasizes in the importance of density. This chapter describes the way some physical properties such as density, colloidal nature, colour, heat and electrical conductivity, influence the properties of wood. A graph that describes the relationship of density against stress is also shown in this chapter. The values from the graph were obtained by tests made on imported softwoods.
2. Chapter two deals with the investigation of the mechanical properties of imported softwoods. This chapter describes the procedure followed in the static bending test. It also describes the way some mechanical properties affect the strength of softwoods.
3. Chapter three is the mathematical part of the project. All the results, graphs and calculations taken from the static bending test are presented in this chapter.

INTRODUCTION

Wood is a very versatile raw material and is widely used in construction, especially in countries such as Canada, Sweden, Finland, Norway and Poland, where there is an abundance of good-quality timber. Timber can be used in a range of structural applications including marine works: construction of wharves, piers, cofferdams; heavy civil works: bridges, piles, shoring, pylons; domestic housing: roofs, floors, partitions; shuttering for pre cast and in situ concrete; false work for brick or stone construction.

Of all the construction materials only timber is naturally occurring. This makes it a very difficult material to characterize and partly accounts for the wide variation in the strength of timber, not only between different species but also between timber of the same species and even from the same log. Quite naturally, this led to uneconomical use of timber, which was costly for individual and the nation as a whole. However, this problem has now been largely overcome by specifying stress graded timber.

There is an enormous variety of timber species. They are divided into softwoods and hardwoods, a botanical distinction, not on the basis of mechanical strength. Softwoods are derived from trees with needle shape leaves and are usually evergreen (e.g. fir, larch, spruce, hemlock, pine) while hardwoods are derived from trees with broad leaves and are usually deciduous (e.g. ash, elm, oak, teak, iroko, ekki, greenheart).

The names given to divide the two species of timber, softwoods and hardwoods, suggest that the wood taken from conifer trees is softer than the one taken from deciduous trees. This is generally true in Europe, where spruces and pines yield timber that can be cut and nailed with ease, while oak and beech produce hard and heavy wood. However this distinction becomes blur considering the great range of tropical hardwood,

since many of the light hardwoods are softer than many European softwoods. Nevertheless, the terms softwoods and hardwoods have persisted and they are still used in the trade.

In Europe softwoods are generally preferred to hardwoods for most structural purposes, such as carcassing timbers, rafters and joints, because they are cheaper, easier to work, and are usually available in a wide range of widths and lengths. Many species of softwood are more or less interchangeable for general building work.

In Cyprus there are not many soft woods, but with the development of trade, softwoods are imported from other countries such as Czech Republic, Russia, Rumania, Finland, Sweden. Similarly to Europe softwoods are prefered than hardwoods in Cyprus and for this reason this project is involved only with the mechanical characteristics of imported softwoods.