

## Introduction

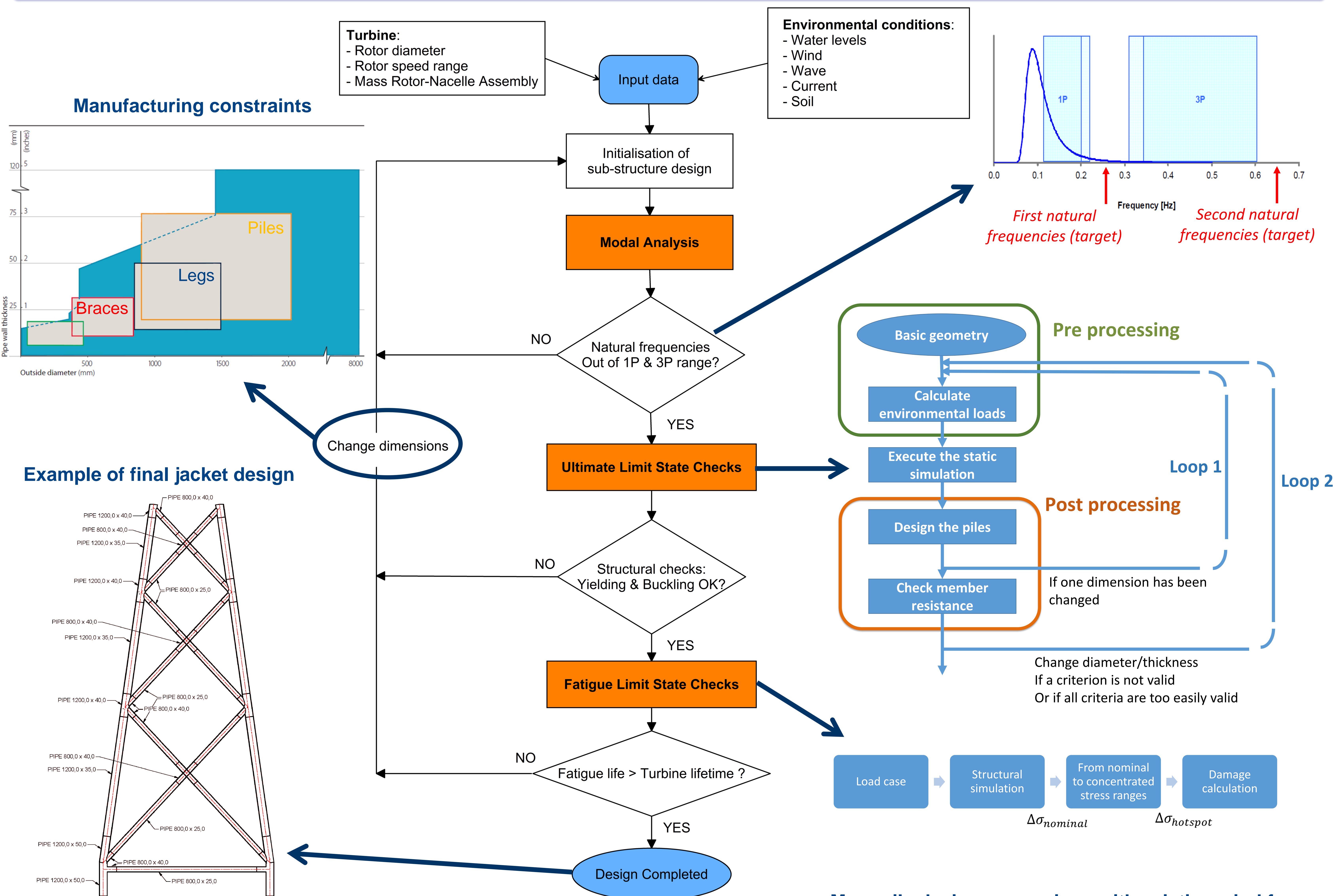
In the early phase of an offshore wind farm development, a preliminary design of sub-structure based on simple data is a great asset for foundations designers. During this stage, it can be interesting to be able to compare different types of foundation: monopile or jacket structure and to evaluate the influence of the structure choice on final mass. In this context, INNOSEA has developed a **preliminary design tool for offshore wind sub-structures** named **PREDIN**.

The methodology is based on a **simple set of data**: soil conditions, water levels, meteocean conditions on site and wind turbine data, and it is based on **analytical formulations for the computation of loads and the evaluation of structural integrity**. Three main steps are performed in order to determine the foundation dimensions: a **modal analysis, Ultimate Limit State checks and Fatigue Limit State checks**. The design steps are crossed one by one. The design is iterative: if one criterion is not respected or too easily respected, a dimension has to be changed and the program comes back to the first step.

## Objectives

INNOSEA's interest was to be able to estimate the overall dimension and mass of an offshore wind sub-structure (monopile or jacket) during an early preliminary design work. The resulting design should be in accordance **with manufacturing issues in terms of pipe dimensions** and installation matters. The objective was to develop a highly autonomous tool which is able to run every step of the design procedure without any manual intervention.

## General design methodology



## Conclusions

This study has shown potential capabilities of PREDIN methodology to evaluate a preliminary design of monopiles and jackets in a very short time. The tool is easily runnable with a limited number of input data. Thanks to the very restricted simulation time, PREDIN can provide a range of designs by varying key parameters.

The resulting designs for both monopile and jacket are coherent since dimensions (diameters, thicknesses, lengths, masses...) are close to existing structures installed on wind farms.

## References

- W. d. Vries, UpWind WP4: Offshore Foundations and Support Structures, Final report WP4.2, Support Structure Concept for Deep Water Sites, 2011
- TATA Steel, Steel Jacket Foundation Offshore Wind Turbine, Datasheet, 2013

## Monopile design comparison with existing wind farms

