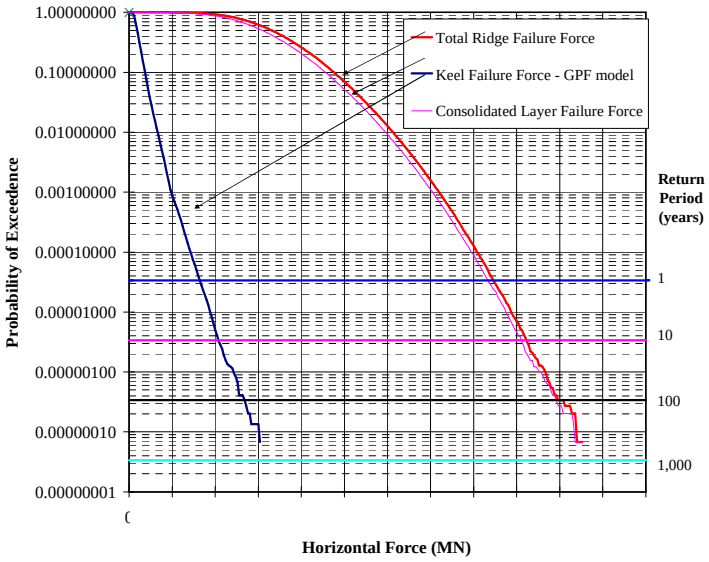
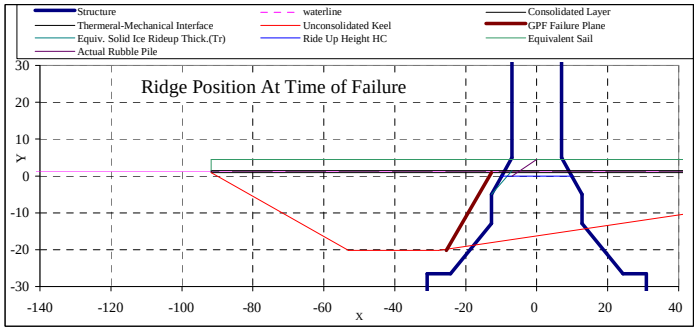
Prediction of Ice Forces on Sakhalin Structures

Client Exxon Mobile Corporation





The modeling framework developed for the Confederation Bridge was adapted for the prediction of ice forces on structures for offshore Sakhalin Island. Although the environment conditions are quite different, the two applications are similar in that they both have large ice movements and the ice passing the planned structure comes from a large geographical area.

The various environment distributions were developed based on local conditions. Extensive analyses of satellite images were performed to determine ice drift patterns. The limited amount of upward looking sonar data measuring keel draft and ridge profiles (measured using thermal drill) was analyzed to determine the various ridge input parameters.

Very careful consideration was given to correlations between various input parameters. For example, during a cold winter, the wind conditions can vary significantly from a warm winter.

The model framework is modular in nature, so it can easily accommodate the wide range of proposed structures. Various combinations of structural widths and shapes, with and without sloped sides or cones, were examined and compared.

The output from the simulation includes probability distributions for all input parameters, derived parameters and loads on the structure. All of the input parameters and calculated parameters are stored for each of the maximum loading cases. This allows the user to examine the ridge and environmental parameters causing the high loads.