Engineering in Cold Regions

There are many differences between the practice of engineering in the more temperate climates of North America and the extreme north where there is relatively less development experience.

Lassing Dibben's engineers have the experience and specialised training necessary to assist clients dealing with these differences.

The Differences

There are two different aspects to engineering in cold regions that need to be considered. The problems of one are strictly related to the harshness of the climate and the nature of seasonal changes. This is the more obvious difference. However, the other substantial difference relates to the human factor.

Technical Issues and the Cold

The harshness of the weather manifests itself in a number of ways. There is the obvious extremely low temperature in the long winter months. This results in permafrost of great depths and an active layer that can be very shallow at high latitudes. Consequently, the precipitation is entirely retained near the surface, creating summer soil conditions unsuitable to support any load.

The type of foundation that is most familiar to the southern regions, the spread footing, is unsuitable for most northern areas. The summer thaw would render it useless. Therefore, the foundation of most structures in the permafrost has to be on piles embedded in the permanently frozen soils. There will also be a question of ensuring that steel, which is a good conductor of heat, doesn't start to melt the underlying permafrost. One or a combination of several measures may need to be employed to prevent this from happening. Some of these measures include thermosiphons, refrigeration, forced ventilation and insulation.

Also, the low temperature has an effect on the materials. Steel may be brittle, lubricating oils too stiff, polymers can crack if they are not selected with the climate in mind.

Logistics are also a major consideration in cold weather development. Limited transportation facilities and short shipping seasons need to be accounted for during all phases of project development.

The Human Factor

Cultural issues need to be addressed during project development. Sensitivity must be shown for cultural conditions that may have an impact on the location of buildings or facilities.

The engineer must evaluate the effect that the extreme cold can have on the human body if it is not protected properly by adequate clothing. Even with proper protection, the efficiency of a worker cannot reach nearly the efficiency of the same worker in a southern climatic situation.

The environmentally sensitive nature of the area makes it imperative that once a mine operation or industrial facility reaches the end of its useful life, the area involved must be helped to regenerate by proper rehabilitation measures. Nature needs much more time to do this on its own than is needed in warmer climates. Therefore, engineered rehabilitation is essential.

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