Francis turbine cost

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Francis Turbine Cost. The relationship between the costs of Kaplan type turbines C F and a flow rate Q in m 3 /s indicated three different bands. For flow rates between 0.5m 3 /s -2.5m 3 /s the cost of a turbine can be expressed as below: C F1 = 142000 × (Q × H 0.5) 0.07 (£, 2008), or . C F1 = 122000 × (kW/H 0.5) 0.07 (£, 2008).

Costs for hydro plants with Francis pump-turbine units. The available data comprises five plotting positions for plants equipped with Kaplan, Kaplan-Rohr and Bulb units (Figure 5). The range for determination of costs on E& M equipment starts from a lower cost of US$20M for an installed power of 70MW up to US$70M for installed power of 380MW.

With about 60% of the global hydropower capacity in the world, Francis turbines are the most widely used type of hydro turbine. GE has continuously invested in R& D to increase turbine efficiency and developed specific product enhancements to improve machine performance.

Francis turbine Features: Compact structure, easy to install. Reliable operation, easy to control. high efficiency range, usually from 85%-93%, good output. it can be used at different ranges of water flow, even flow changing too much with high efficiency.

Francis turbine is a mixed flow turbine. In a Francis turbine, the water enters radially to the runner blades while exits axially. It is a combination of a reaction turbine and an impulse turbine. Francis turbines are most commonly used in large or medium hydropower plants to produce electricity.

Having analysed the data for different types of turbines received from the manufacturers, the following formulae were derived. Kaplan Turbine Cost The relationship between the costs of Kaplan type turbines CK and a flow rate Q in m3/s indicated two different bands. For flow rates between 0.5m3/s ? 5.0m3/s the cost of a turbine can be expressed as below: CK = 15000 × (Q × H) 0.68 (£, 2008),

For higher flow rates, between 5.0m3/s - 30m3/s, the cost of a Kaplan turbine can be estimated using the following formula: CK = 46000 × (Q × H) 0.35(£, 2008)

When working on a project, hydro consultants need to carry out a cost estimation analysis for each specific case. This can be a time-consuming task when carrying out feasibility studies and final reports. Therefore, a detailed analysis of costs continually needs to be carried out. The author has developed a simplified methodology based on current information from E&M equipment contractors or suppliers.

Useful diagrams which allow a close cost estimation of E&M equipment in powerhouses which feature Pelton, Francis, Kaplan, Kaplan-Rohr (for low heads up to 15m), Bulb or Francis pump turbine units have

been developed based on the compilation of statistical data for over 81 hydro power projects. The data was obtained from existing publications, journals, call for tenders, award of tenders, websites and suppliers of E&M equipment. The data also contains projected costs from some projects - found on existing reports or national authority references.

The data, which is presented on Table 1, corresponds to 81 hydro power projects in 32 countries. The data comprises approximately 28 hydro power projects in America (90% Latin America), 9 in Europe, 35 in Asia and 9 in Africa. From these, 33 are from 2007 and 16 from 2008. The remaining 40 corresponds to the period between 2002 and 2006.

The hydro plants have net heads ranging from 9m to 800m and power capacities from 0.5MW up to the 800MW per unit. Taking into account the cost inflation over the past few years, the costs of E&M equipment for the period 2002-2008 have been revised and updated. These include different factors such as price of metals, project region, index of prices, exchange rates, escalation of prices and cost confidence.