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EVALUATION OF PROCESS PLANT EQUIPMENT TENDERS

Equipment tenders submitted by Original Equipment Manufacturers (OEMs) should be methodically evaluated. Tenders are first evaluated against process and technical mandatory parameters as specified in the Request for Quotation (RFQ). Bidders who do not meet design criteria are notified of discrepancies and given the opportunity to rectify them within a reasonable amount of time.

A point system -- which measures several pre-agreed technical, commercial, and financial parameters – is a reliable tool used to impartially measure and grade tenders. Equipment price, ease of installation, operating costs and other factors are considered in the selection process.

1. POINT RATED EVALUATION

A point-rated evaluation system is used to determine the relative merit of each proposal. Point-rated criteria identify value-added factors and provide a means to assess and compare the offers.

Key parameters like capacity, flow rates, brake power, power consumption, and fuel consumption are evaluated. Key parameters must be agreed upon by the evaluation team before the evaluation process starts.

The following formulae could be used to calculate the score:

- When the minimum value is the most attractive value, score = avg/value x 100
- When the maximum value is the most attractive value, score = value/avg x 100
  "avg" is the average value of all the OEM offers and "value" is that which has been provided by the OEM supply being evaluated.

For example, to evaluate an ID fan for a vertical roller mill break power. .

Description	Unit	Bidder A	Bidder B	Bidder C
Fan Brake Power	Kw	820	660	700

First the average power value is calculated and this value is equated to 100.

The average brake power value for the table above is 727 kW..

In this case the lowest motor power is the most attractive feature. Then use the following formula:$Score = \ Avg\ Power\ Value \div Power\ Value \ \times 100$

$$Score = 727 \ \div 820 \ \times \ 100 = 88.66$$

The score for all three bidders is listed below:

	Value	Score
Average Value	727	100.00
Bidder A	820	88.62
Bidder B	660	110.10
Bidder C	700	103.81

In this case, Bidder B has the highest score, 110.10, because it is providing the lowest operating power demand for the fan (we are looking for the most efficient fan for the vertical mill system)

This process is followed for each parameter to be evaluated. A weight is assigned to each parameter according to its importance, and each parameter score is multiplied by its weight. Weights for each feature are agreed upon before the evaluation process starts.

Below is an example of a Clinker Cooler evaluation:

			VALUES			SCORES		
PARAMETER	***Weight Factor***	**Average Value**	**Bidder A**	**Bidder B**	**Bidder C**	**Bidder A**	**Bidder B**	**Bidder C**
Area (m2)	10.00%	98.67	95	102	99	9.63	10.34	10.03
Specific Loading	15.00%	43.00	44.50	41.00	43.50	14.49	15.73	14.83
Air - Clinker ratio	10.00%	2.07	2.20	2.00	2.00	9.39	10.33	10.33
Installed Power of Cooling Fan (kW)	35.00%	1973.33	1880	2065	1975	36.74	33.45	34.97
Clinker exit temp (°C above ambient)	5.00%	66.67	70	65	65	4.76	5.13	5.13
ID Fan Installed Power (kW)	25.00%	740.00	830	670	720	22.29	27.61	25.69
Total	**100.00%**					**97.31**	**102.59**	**100.99**

After every parameter is analyzed and rated, all the values are added. In this case, the cooler provided by Bidder B has the highest technical score of 102.59.

2. PROJECT COST

The equipment tender price not the sole indicator of equipment cost. There are other factors to be considered in addition to the tender price: i.e., the life cycle of the equipment, installation cost, construction of supporting facilities and operation costs.

Equipment and installation costs should be calculated for each bidder and then equalized for comparison purposes. An economic analysis must be made of the entire life cycle of the plant, not just the initial equipment purchase price. In some cases less expensive equipment may in the long term end up costing more due to higher installation and operating costs.

The table below shows operating cost comparisons of power and fuel for a cement plant:

Power Consumption			
	Bidder A	**Bidder B**	**Bidder C**
Raw Mill (kWh/st of clinker)	30	28	37
Pyro-processing (kWh/st of clinker)	20	24	25
Coal Mill (kWh/st of clinker)	2	5	5
Finish Mill (kWh/st of clinker)	33	35	36
Misc. (kWh/st of clinker)	2	2	2
Total (kWh/st of clinker)	**87**	**94**	**105**
Power Cost ($/kWh)	0.1	0.1	0.1
Clinker Production (st/year)	1,500,000	1,500,000	1,500,000
Cost year	$ 13,050,000	$ 14,100,000	$ 15,750,000

Fuel Consumption			
	Bidder A	**Bidder B**	**Bidder C**
Specific heat consumption (mmBtu/st)	2.63	2.54	2.51
Power Cost ($/mmBtu)	2.4	2.4	2.4
Clinker Production	1,500,000	1,500,000	1,500,000
Cost year	$ 9,468,000	$ 9,144,000	$ 9,036,000

Power and fuel costs are added in the table below. A score is calculated using formula avg/value x 100., where “avg” is the average total operating cost/year.

	Average	**Bidder A**	**Bidder B**	**Bidder C**
Power Operating Cost	$ 14,300,000	$13,050,000	$ 14,100,000	$15,750,000
Fuel Operating Cost	$ 9,216,000	$ 9,468,000	$ 9,144,000	$ 9,036,000
Total Operating Cost/year	$ 23,516,000	$22,518,000	$ 23,244,000	$24,786,000
Score	100	104.43	101.17	94.88

3. BIDDER OVERALL EVALUATION

Point-rated criteria, project cost, and operating cost are incorporated into the overall evaluation. Weight is assigned to each parameter:

Parameter	***Weight Factor***	***Average Value***	**Bidder A Value**	**Bidder B Value**	**Bidder C Value**	**Bidder A Score**	**Bidder B Score**	**Bidder C Score**
Point Rated Criteria	*25%*	*100.00*	94.10	105.17	100.74	*23.52*	*26.29*	*25.18*
Total Project Cost	*50%*	*$451,686,667*	$437,725,000	$449,240,000	$468,095,000	*51.59*	*50.27*	*48.25*
Total Operating Cost	*25%*	*$23,516,000*	$22,518,000	$23,244,000	$24,786,000	*26.11*	*25.29*	*23.72*
Total weighted Points	*100%*					*101.23*	*101.86*	*97.15*

Bidder B has the highest score, 101.86, followed by Bidder A. Bidder C score, 97.15, is below average. This evaluation is not definitive, but serves as a tool for top management to make a final decision. There are other factors that, although not quantifiable, should be considered, like client-supplier relation, services near plant location, technology, commercial terms, etc.

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