

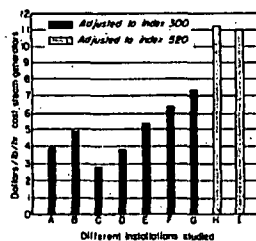
FIGHT POWER COSTS continued

much of the distribution systems, both steam and electrical, are 'charged' against the power plant or the process."

INVESTMENT COSTS

Robinson: "We cannot talk intelligently about low cost unless we have sound cost data. The old unit of \$/lb/hr of capacity installed has no meaning because you have to guess on the split wherever you have turbine rooms as well as boiler rooms. Here's what we did to get a comparison. We brought together the unit costs of a number of boiler-houses started up from Nov 1939 to March 1943, see chart, below, to guide us when we wanted to install a 200,000-lb-per-hr pulverized-coal-fired boiler at Belle. Column A shows accumulated investment in boiler house prior to the new boiler with book values adjusted to the then current construction index of 300. Column B covers the estimated cost of a new boiler, Column C, the combination of B and C, and Column E, F, and G unit costs for other similar commercial plants, all adjusted to the construction index of 300. The other two columns, H and I, are composite costs; H of these three plants and I of seven war plants built in the same period, and brought up to 1949-1950 costs by use of the construction index for that period—520.

Table IV tabulates estimated and actual unit costs for the Chattanooga and May plants built during 1949-1950. Here costs are adjusted to the then current construction index of 520. Column 1 gives actual cost of two 40,000-lb-per-hr boilers that went in at Chattanooga, Columns 2 and 3, the estimated and actual costs for a third boiler at this same plant, and Column 4, the average for all three. Columns 5 and 6 cover the May plant installation. Actual cost means final complete design and construction charges. These figures could be plotted directly on the chart, below.



COMPARISON of costs for 1949-1950 vs 1939-1943 shows benefit of planning

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You'll note the 1939-1943 plants adjusted to 1949-50 levels would cost \$11 or more per lb per hr whereas Chattanooga is down around \$8/lb/hr, and the May plant less than \$6.50/lb/hr. "These last two plants are small boiler jobs. The 1939-1943 plants had boilers of 150,000-lb-per-hr rating in almost every case. We feel our close adherence to the guides we mentioned above let us beat the accepted rule that unit costs for smaller boilers run higher than for larger ones."

Campbell: "To get better cost data than the above we set up a classification system where we segregate groups of related equipment. At present the classification covers only items within the boiler-house structure itself, Table III. But it gives sharp comparisons on the relative costs of the major item classes. For example, Plants D and H have the highest steam-generator cost but the lowest building. Both, as you'd expect, are in the South with much of the equipment outdoors. Piping in Plant F runs very low. The reason is simple. It's a small oil-burning plant with a relatively short distribution system.

"In Table III, steam generator means boiler, furnace, fuel-burning equipment with accessories attached or considered a part of these facilities, plus draft and dust-collecting equipment. Foundations, supports, drives, and other direct auxil-

aries are included unless specifically listed in other categories.

"Boilers prove the largest single item in this classification. So we do our best thing possible to hold their investment costs down. In the first place, we buy boilers offer the most immediate savings. Then we study summer and winter peaks so we can load all during the winter and yet have boiler off the line during the summer so each boiler can receive an annual inspection and overhaul.

"As steam demands increase we sought ways of removing boiler bottlenecks. In one case with unit-turbine cooperation we upped the capacity by 10% with only minor changes in a rule we never buy boiler capacity in excess of indicated loads. We want a boiler designed to receive superheaters, but they'll never go in until heated steam seems a definite economic advantage. The same thing holds for auxiliaries. We buy to meet existing conditions only, unless future increase in pressure or temperature are definite possibilities.

"Packaged boilers carry a steep price tag. They can be easily removed and used elsewhere as their original plant outgrows them.

"Fuels are always a prime consideration. In addition to the usual (Continued on page 206)

III. Percent Breakdown of Major Elements in Power Plant

Plant	No. boilers, capacity of each	Fuel	Steam generator	Fuel handling	Draft and ash handling	Feedwater	Piping	Electrical control
A	2, 40,000	Coal	34	11	6	9	18	7
B	1, 150,000	Coal	31	7	2	9	16	8
C	2, 50,000	Coal	33	7	5	9	14	3
D	2, 45,000	Coal	41	14	11	6	12	6
E	1, 80,000	Oil	37	8	—	10	24	3
F	1, 8,000	Oil	27	8	—	19	7	8
G	2, 60,000	Gas	40	—	—	19	16	7
H	4, 100,000	Gas	47	—	—	13	19	7

IV. Low Economical Power Investment, Dollars/Lb/Hr

	Chattanooga				May	
	1-40,000		1-40,000		1-40,000	
	Actual	Estimated	Actual	Estimated	Actual	Estimated
Steam generator	2.75	2.74	2.58	2.67	2.18	2.18
Fuel handling	1.19	.39	.35	.39	.64	.64
Draft and ash handling	.53	.43	.30	.49	.36	.36
Feedwater	.79	.14	.12	.37	.47	.47
Piping	1.63	1.78	2.14	1.56	.88	.88
Electric	.36	.99	.24	.12	.19	.19
Instrument and control	.24	.39	.37	.38	.17	.17
Building	1.60	.99	.73	1.32	1.40	1.40
Miscellaneous	—	—	—	—	—	—
Total cost	—	—	—	—	—	—
Distribution	—	—	—	—	—	—
Total	9.08	7.11	6.98	8.08	6.66	6.66

ENGINEERING AND MANAGEMENT SECTION

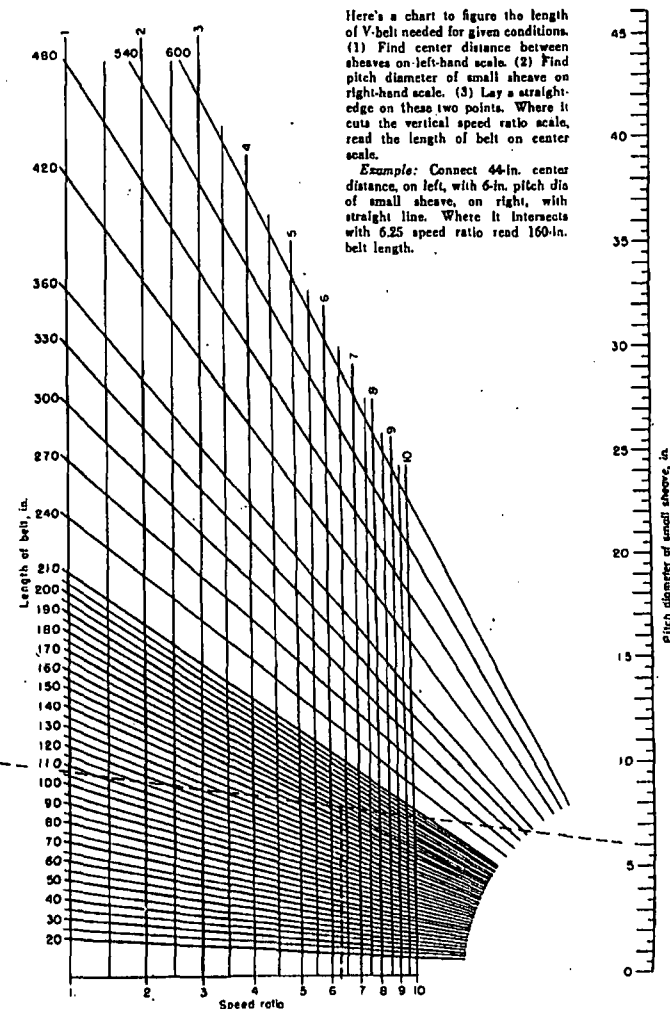
POWER'S DATA SHEET

No. 249

Approximate Length of V-Belts

Here's a chart to figure the length of V-belt needed for given conditions. (1) Find center distance between sheaves on left-hand scale. (2) Find pitch diameter of small sheave on right-hand scale. (3) Lay a straight-edge on these two points. Where it cuts the vertical speed ratio scale, read the length of belt on center scale.

Example: Connect 44-in. center distance, on left, with 6-in. pitch dia of small sheave, on right, with straight line. Where it intersects with 6.25 speed ratio read 160-in. belt length.



Courtesy, Allis-Chalmers Manufacturing Co

ENGINEERING AND MANAGEMENT SECTION

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