Steam Generation

Fuel, labor and maintenance are the three big elements of steam cost. These are the key to sound steam-plant modernization. Fig. 1 (a typical plant) reminds us that fuel and wages have climbed to dizzy heights since 1930. Fig. 2 sums up Federal Power Commission statistics for all Class A and B private utilities. Note that maintenance costs, mills per kwhr, have almost doubled since 1941. Fuel costs, mills per kwhr, are up about 50%. Fig. 3 plots fixed charges for coal handling (as determined by Fairmont Coal Bureau) for plants of various sizes.

These curves show why automatic controls, fuel- and ash-handling equipment, and other labor-saving devices are such attractive investments today and suggest that they will be even more indispensable in years to come. Certainly fuel prices will keep on climbing —probably wages too.

Any comparison of the new and old must consider not only fuel, and other operating costs, but also maintenance. Usually the renovated steam plant will cost much less to maintain. Try to estimate how much less.

Go all out to deflate future maintenance costs. Pick equipment of proved reliability and accessibility and units that can be served mainly by scheduled periodic overhauls rather than by the "fire brigade" repair gang. And provide the tools and other facilities for rapid overhaul.

Table I shows the results of a professional steam modernization survey in a papermill power plant. The results are specific for only this plant, but the tabulating form used is a good guide for others. Many plants could make as good a showing with new steam units and better hookups.

A consulting engineer made this survey. It took a lot of time and cost real money. For example, all lines whose steam consumption affected the appraisal were fitted with orifices to measure flow. Here, as usual, cost of digging out the facts paid off in sound conclusions and genuine savings. Knowing totals is not enough; to make maximum steam savings you have to find out just where your operating dollars are wasted.

In this case the survey showed that 18% of the Btus in all the coal fired was running down the sewer in the turbine condenser cooling water. Eliminating condensing turbines, and switching from steam to motor drive throughout plant permitted jacking the electrical load and cutting heat losses.

Every plant is a special case, but most have a "steam tapeworm" somewhere in their systems. Study Table I to get

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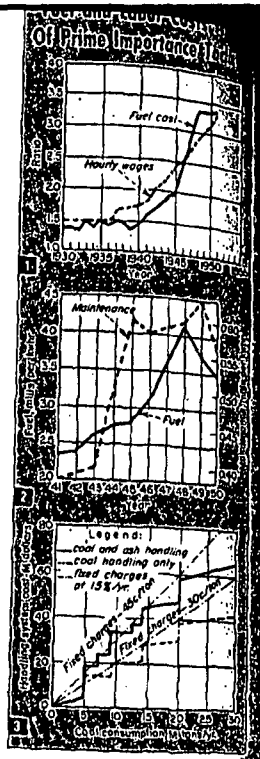

I: Steam Survey for a Paper Mill

Item	Btu per pound of paper made: Old operation	Btu per pound of paper made: New operation	Decrease in Btu needed	Equivalent lb of 600-psi 750-F steam per hr based on new operation
Paper drying	1290	1290	0	71,100
Heating process water	1260	1260	0	27,200
Heating boiler feedwater	815	427	388	9250
Turbine-steam, condensing water to sewer	2660	eliminated	2660	0
Corrugators	303	303	0	6550
Heat equivalent for mech & elec power	1160	885	275	19,150
Misc and exhausted to atmosphere	727	50	677	1020
Stove cookers	221	221	0	4760
Building heating and miscellaneous	402	402	0	8685
Boiler-room losses	3780	1287	2493	—
Total Btu supplied in coal per pound of paper	14,618	8125	6493	—
Steam per hour	—	—	—	147,770
Equivalent pounds of 13,600 Btu coal per pound of paper	1.073	.598	.477	—

II: Points to Consider Before Construction

- Storage areas
- Temporary buildings
- Parking space
- Temporary services
- Commissary
- Labor
- Construction equipment
- Construction staff
- Personnel manager
- Laws and regulations
- Construction manual

III: How a Schedule Speeds Construction

1. Material ordered in sequence for delivery when needed
2. Contractor knows when ordered material will arrive
3. Major equipment set on permanent foundation as delivered. This reduces storage and extra handling
4. Provision can be made for early or late unit deliveries
5. Time clearly defined to complete each phase of job
6. Testing, checking, adjusting time after the installation is included in schedule
7. Contractor can estimate the most efficient labor force needed for each phase of job