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Guest Editorial.....

Do Not Worry About the Small Industry

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CONSIDERABLE concern is being shown in certain quarters about the small industry, employing less than one thousand people. Too many are of the opinion that the USA is made up largely of giant industries, employing tens of thousands, and that these large industries are prospering at the expense of the small industrialist.

Census Figures

But as a matter of fact, a study of census figures indicates that the largest portion of the manufacturing of this country is being carried on by small industries.

In 1939, the Bureau of Census reported 184,230 industrial establishments, employing 7,836,567 people, or less than 43 people per industrial establishment. In New York State, in 1939, there were 34,506 industrial establishments employing 957,854 people, or less than 28 people per industry.

Latest census figures, for 1947, show that in that year we had 240,881 industrial establishments. They employed a total of 14,294,304, or an average of 59 employees per industry. Since a few industries grew phenomenally from 1939 to 1947, this average indicates the great majority of our industrial establishments are still quite small.

Also another important factor is not generally known, namely, that the small industry is frequently much more profitable than the large industry. As

concrete illustrations, in my own home town of Lafayette, Indiana, there is a small manufacturer of electric meters who not only met competition from big industry but has been able to give to Purdue University a gift of about one million dollars for an electrical building and equipment. This manufacturer came as a poor boy from Scotland and made his fortune in a small industry. Another citizen of Lafayette, Indiana, also of Scotch descent, developed three small successful industrial establishments in his home town, and when he died left to Purdue University several million dollars for research—all made in small industries.

I could cite many cases in different parts of the country where people with ingenuity, ideas, and the will to work (whether of Scotch descent or not) built up small profitable industries—assets to their localities and to the country as a whole. Some of these, like the Lincoln Manufacturing Company of Cleveland or the Bailey Meter Company of the same city, increased in size because of the demand for their product so that they are not now small industrial establishments.

Crying Need

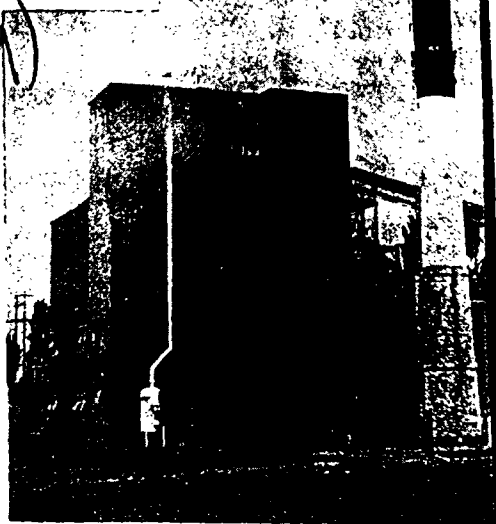
The fact remains, however, that in this country industries whether small or big, can be successful if they have people of imagination, inventiveness, judgment, and character. What all American business and industry needs now, large and small, is to be left alone and to be allowed to reap the benefits from their brains, genius, vision, and hard work.

MODERN DESIGN IN A SMALLER STATION -- MONTROSE, COLO.

Territory of The Western Colorado Power Company extending from Durango to Paonia, Colorado, has been largely served by hydro-electric stations until recently, although two steam plants have been operated. Early in 1951 the 5,000 kw semi-outdoor-indoor steam plant described herein went into service.

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Boiler, draft fans, dust collector, and other auxiliaries are installed out-of-doors.

GROWING loads and uncertainty of sufficient water flow for the hydro-electric power plants of The Western Colorado Power Co., a subsidiary of Utah Light and Power Co. dictated the erection of a recently completed 5000 kw steam electric station at Montrose in central western Colorado. Until 1951 Montrose, as well as the utility's area, received 42% of its electrical energy from the hydro plants of the system. Today the hydro units take all the energy loads possible and, utilizing storage facilities, a considerable part of the peaks. The steam plant load, of course, varies with the total demand—that is, the steam plants must take the remaining portion of the peaks besides a basic part of the energy load.

The turbine generator together with steel foundation, condenser, and auxiliaries were purchased as a unit. Generator is equipped with top mounted air cooler so that the condenser is hung longitudinally inside the steel foundation. This made a compact arrangement and saved building space. Also purchasing of the equipment in this manner saved considerable engineering and other expense.

Pulverized coal firing is employed for the 70,000 lb per hr steam generator, and steam is generated at 625 psig 830 F (at super-heater outlet). The 5,000 kw 4160 volt .8 pf turbine generator takes steam at 600 lb 825 F and exhausts to condenser at 1½ in. Hg absolute. If required, the turbine-generator can deliver 6250 kw at unity power

factor. Three bleed extraction point provide steam for a low pressure heater (10 lb), deaerating heater (46 lb), and a high pressure heater (163 lb).

Variable Loads

The boiler is of two-drum water walled construction. Even with the boiler on the line alone, the demand on the steam plant varies with consumer requirements. Consequently the amount of load on the steam plant is not actually under the control of the operator. Because of this fact, the operating crews were given special opportunities to become able to anticipate changes. As long as the automatic combustion and feedwater controls are functioning, the changes in load do not cause great concern; nevertheless operators pay special attention at all times to the load on the plant. Boiler efficiency is designed to run around 86.6% at full load.

In the design of this station, special effort was made to provide the best of equipment, as well as alarms and safeguards, to assure continuous service. Also, because of the conditions, every effort is being made to minimize the possibility of shutdown. Inspections are made frequently; regular maintenance and good housekeeping are musts.

To assure adequate head for the circulating water and service water pumps a small diversion type dam was built to form an inlet-bay in the Uncom-

phagre River, which supplies water for the turbine's condenser and various other pieces of equipment. Water for emergency evaporator feed, cooling, and drinking is obtained from the city's water mains, a set of checks and bleeders preventing back flow from the plant system into the city water lines. A railroad spur, built to bring in construction materials and equipment, has been retained to bring in fuel and supplies.

Two types of fuel are available for firing the boiler—light fuel oil and run of mine bituminous coal. The former was provided for drying out operations and for re-starting the boiler after a prolonged shut-down.

Coal (12,800 Btu with ash softening temperature of 2300 F and delivered by rail) can be side or hopper dumped to an unloading pit. A course grizzly is located at this point and a belt conveyor delivers the unloaded coal to a roll crusher that reduces it to ¾" or less. Other conveyors deliver the crushed coal to open yard storage or to the bunkers above the firing aisle.

From the bunkers the coal is fed by gravity through automatic regulators to two pulverizers that serve the boiler's two burners, each burner having its own pulverizer. Pulverizers, driven by 60 hp electric motors, have integrally built fans that deliver the fuel to the burners. Burners are not cross-connected.

Furnace volume totals 4500 cu ft and boiler has 7580 sq ft of heating



Following the company's policy of modern public relations, the school children shown here in the firing aisle learn how steam and power are produced.

surface exclusive of the superheater. Walls and floor are water cooled. In addition to the two main drums, two sidewall headers, and a hopper bottom header have been provided. Special tempering type equipment controls the superheat temperature at 830 F over a wide range of operation.

Forced draft is supplied by a 23,250 cfm fan that has a double inlet, outlet damper, and inlet vanes. It is driven at a constant 1170 rpm speed by a totally enclosed 50 hp motor. Control of the air flow is automatic and an air piston operates the inlet vanes to the fan. The induced draft fan is rated 37,000 cfm at 345 F. It also has a double inlet, outlet damper, and inlet vanes and is driven at 1170 rpm—by a totally enclosed 100 hp motor.

Automatic Control

Full automatic combustion control, over a range of 20,000 to 70,000 lb per hr, has been provided for pulverized coal firing; but combustion controls have not been installed for oil firing, which, at present at least, is only employed intermittently.

A tubular type air heater heats the combustion air from the forced draft fan to 530 F at full load, 9700 sq ft of heat exchange surface (made up of 2½ in. tubes) being provided. Temperature of the flue gases, which is around 650 F as the gases leave the boiler, is reduced to about 305 F before going to the ID fan. In cold weather,

especially at light loads, the flue gas temperature will drop below the dew point. To overcome that difficulty, a manually operated arrangement has been provided to recirculate the hot air.

Source of the raw boiler water supply is also the river, incoming water being passed through a traveling screen to remove sticks and organic matter. Like other natural water, the dissolved solids content is too great to permit using this water as regular boiler feed make-up. It could be used directly as make-up for the evaporator that was installed to provide boiler feed, but maintenance on the evaporator is less if the raw water is softened. Therefore a zeolite softener has been installed to reduce the hardness of the evaporator feed. A sand and gravel filter precedes the softener to reduce the organic load on the zeolite beds.

Steam from the turbine is condensed in a tube and shell condenser, which has 5000 sq ft of surface made up of 7½" OD 18 BWG tubes, 20 ft long. When supplied with 5320 gpm 65 F cooling water, condenser is guaranteed to maintain less than 1½ in. Hg vacuum. A single vertical circulating water pump supplies cooling water for the condenser, generator air cooler, and generator lube oil cooler. Duplicate pairs of air jet ejectors remove the non-condensable gases.

Condensate is pumped from the station's hot well through the cooling tubes of the steam jet air ejectors where

it picks up 5 to 10 degrees F of heat. Next the condensate goes to a low pressure heater where its temperature is raised another 50 to 70 degrees. From the low pressure heater, the condensate goes to a contact type deaerating feedwater heater. The deaerator acts as a control for surges in the feedwater system. If its level goes below a set point, a valve opens to admit condensate from a condensate storage tank, to the condenser. With this arrangement the added condensate is partially deaerated in the condenser, and because of the sub-atmospheric pressure, no special pump is required. With high water in the deaerator, a spill valve (just after the steam jet air ejectors) opens to allow condensate to go to storage.

Recirculation Line

Because the condensate is relatively pure, proper operation of the deaerator will reduce the oxygen to .005 ppm. Nevertheless, a recirculation line has been run from the boiler drum to the deaerator. If about 1% of the steam flow is fed from the boiler to the deaerator, the pH will be raised from about 6.2 to 7.6. This gain helps to protect the boiler feedwater lines and pumps. Also sodium sulphite has been added to the boiler water to eliminate any oxygen that gets by the deaerating process.

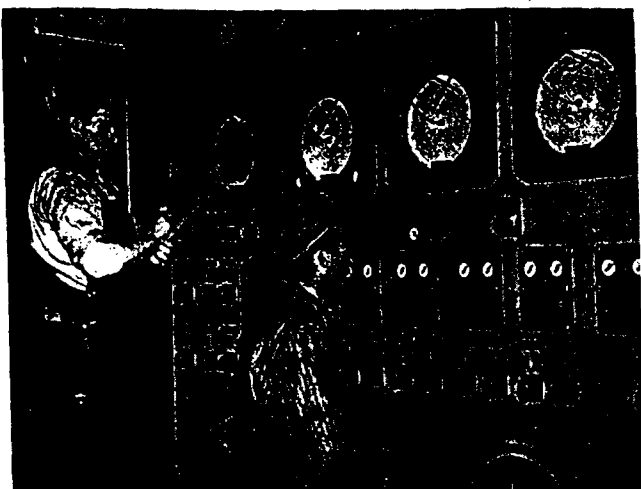
Dual boiler feed pumps, driven by 3550 rpm motors, have been provided. These take suction from the deaerator and raise the feedwater pressure to 700 psig. Either pump has capacity for full load operation, so one is always in standby. The pumps can be started without warm up. Water from the service header has been piped to the pump bearings and stuffing box glands to keep them cool.

The evaporator was installed to make up for leaks and losses. Because of the temperatures involved, this unit was incorporated in the boiler feed system immediately after the feed pumps. Product of the evaporator is steam and its heat is reclaimed in an evaporator condenser. The latter is a shell and tube type heat exchanger with the feedwater in the tubes and the evaporator steam in the space.

Bleed steam from the high pressure extraction point of the turbine heats the feedwater to its final temperature of 350 F at full load. This heater is a shell and tube type with the boiler feed inside the tubes.

Automatic soot blowers are provided and soot is blown at least once a day. At present one retractable blower and 5 wall units are installed.

Fly ash is removed by a dust collector installed at boiler outlet, gas entering the collector at the rate of 37,000 cfm. Guaranteed efficiency is 90%—based



Special effort was made to supply the latest in automatic controls, alarms, and other safeguards.



Covered belt conveyor delivers coal from the nearby crusher building to bunker above the firing aisle.



Unusual compactness is one of the outstanding features of the station's turbine generator installation.



More space was saved by hanging the condenser longitudinally inside of the turbine's steel foundation.

on having 30% of entering dust below 10 microns in size. Space has been provided for future installation of an electrostatic precipitator.

Slag and ash from the boiler and

flyash from the dust collector are removed by a vacuum conveying system and sluiced to waste.

Steam for building heat comes usually from the desuperheated steam

line, or, in case the steam plant is down, from an auxiliary oil-fired boiler.

Provisions have been made for the installation of a second turbine generator and boiler.

LIST OF PRINCIPAL EQUIPMENT

Turbine-generator—General Electric Co.
Steam generator—Riley Stoker Corp.
Condenser—Ingersoll-Rand
Air ejector—Ingersoll-Rand
Condensate pump—Ingersoll-Rand
Low pressure heater—Lummus Co.
Flow control valve—Bailey Meter Co.
Air heater—Riley Stoker Corp.
Soot blowers—Vulcan Soot Blower Co.
Water gages—Diamond Power Specialty Co.
Safety valves—Consolidated-Manning Maxwell & Moore
Pulverizers—Riley Stoker Co. (Attrita No. 4)
motors—Allis-Chalmers Co.
couplings—Centric Clutch Co. (Rawson)
feeders—Riley Stoker Co.
magnetic separator—Cutler Hammer Co.
var. speed transmission—Reeves Pulley Company
Oil burners—The Engineering Co. (Enco)
Forced draft fan—Buffalo Forge Co.
motor—Allis-Chalmers Co.
Induced draft fan—Buffalo Forge Co.
motor—Allis-Chalmers Co.
coupling—Fast Coupling Dept.,
Koppers Co., Inc.
Boiler feed pumps—Worthington Pump and Mach. Corp.

motors—Allis-Chalmers Co.
Deaerating heater—Worthington Pump & Mach. Corp.
HP heater—Lummus Co.
Evaporator condenser—Lummus Co.
Combustion control & metering equipment—
Bailey Meter Co.
Control switches—Westinghouse Electric Corp.
Feedwater control—Bailey Meter Co.
Evaporator—Struthers-Wells
Preheater with vent. condenser—Hoppes
Mfg. Co.
Dust collector—Western Precipitation Corp.
Crane—M, M & M (Shaw-Box) 15 tons
Water softener—Cochrane Corp. (zeolite)
Ash handling—United Conveyor Corp.
Stack—Lang Co. (steel)
Coal handling—Fairfield Engineering
vibrating feeders—Syntron Co.
magnetic pulley—Dings Magnetic Sep.
Company
coal crusher—American Pulverizer Co.
Traveling screen—Link-Belt Co. (12,000 gpm
@ 1.5 fps)
Station service transformer—Westinghouse
Electric Corp.
Circ. water pump—Worthington Pump &
Mach. Corp.

motor—Westinghouse Electric Corp.
Transformers, lightning arrestors, capacitors—
General Electric Co.
Alarm switch low level in boiler drum—
F. H. Schaub Engrg. Co.
Air compressors—Gardner Denver Co.
filter—Dollinger Corporation
water valve—Mercoid Corporation
Screen & ash wash pumps—U. S. Pumps, Inc.
Service water pump—Worthington Pump &
Mach. Corp.
(centrifugal)
Storage battery—Gould Storage Battery Corp.
Aux. heating boiler—Cleaver-Brooks Co.
(80 hp)
boiler feedpump—Aurora Pump Co.
Battery charging m.g. set—Electric Products
Company
Coal handling control panel—General Electric
Company
Car puller—Stephens-Adamson Co.
Coal level indicator in bunker—Fairfield
Engrg. Co.
Condensate transfer pump—Gould's Pumps,
Inc.
Fuel oil pump—Geo. D. Roper Corp.
Roof vent fans—American Blower Co.
Insulated siding—H. H. Robertson Co.
Piping contractors—Stearns-Rogers