Pollution Control—Full-time Program At Weirton Steel

By **RICHARD L. DUNN,**
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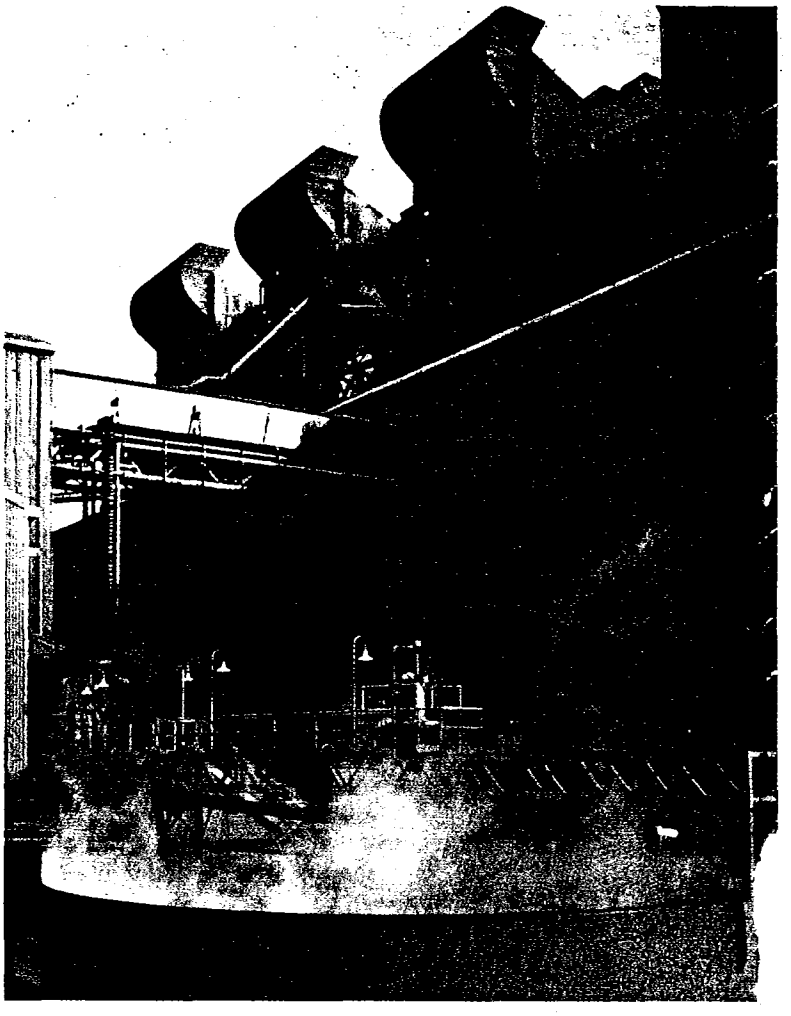

EVERY WORKING DAY, Houston Wood goes to a morning staff meeting. Weirton Steel's top management is all there or represented. A portion of the meeting is devoted to operating activities, and Wood gets a rundown on the plant's activities for the next 24 hours.

Wood needs this kind of information. He has to know what's going on at all times. And he has to evaluate each activity for its possible influence on Weirton Steel's pollution control efforts. Houston R. Wood is Supervisor of Environmental Control.

A steel-producing plant that uses 230 million gallons of water (enough to supply a city twice the size of Pittsburgh, Pa.) each day, and removes more than 25 tons of dust from exhaust gases every hour, makes pollution control a big job. Wood draws on over 12 years' experience in the field to accomplish it.

Weirton Steel, located in Weirton, W. Va., which nestles in the Ohio Valley between the Pennsylvania and Ohio borders, has been fighting pollution for decades. In 1953, one man began working full-time on the problem. Tom Millsop, then Weirton's president and mayor of the community, felt that the company had to do more than it was doing in the way of air pollution control simply for the good of the community. "With his direction, the company kind of got organized," Fred E. Tucker, Manager, Pollution Control and Services for National Steel, Weirton's parent corporation, explains.

From that humble beginning, Weirton Steel's pollution abatement activities have grown until, today, Wood has a full-time staff working for him. His chemist, enviromental engineer, chemical analyst, and chemical supervisor help him locate, identify, and evaluate problem areas and plan for their control. The chemical supervisor also runs Weirton's own effluent sampling and analysis laboratory.

If there is anything going on within the company that has a bearing on environmental control, Wood knows about it. He attends the morning meetings to keep up with daily happenings because whatever is going on may affect Wood's activities. If the day's plans call for an oil change on the tandem mills, for example, Wood knows this could cause problems in the oil treatment system. With this prior knowledge, he can take action to prevent what might otherwise become an embarrassing incident for the company.

Wood's attendance at the morning meetings is a prime example of Weirton's pollution control philosophy at work. Weirton officials believe that the most important single factor in keeping pollution control problems at a minimum is constant communication. This communication must cover the entire width and depth of the company. For example, Wood on the division level maintains close, personal contact with Tucker on the corporate level.

"You have to have this communication with top management to know what's going on and what's going to happen," Tucker says, "because they're the only people who know what's going to happen." And, on the other hand, he emphasizes the necessity of having a good rapport with the people out in the plant. "A guy on night turn, if he's not concerned about pollution, can easily throw a drum of oil down the sewer and foul up the river for the next two days," Tucker

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DOLLARS BLOWING INTO THIN AIR?

"A penny saved is a penny earned." Old advice and still pertinent. But how closely is it heeded in a typical industrial plant? Take your compressed air system, for example. How many pennies—adding to dollars—are literally blown into the atmosphere every operating hour in your plant through compressed air leaks in tools and accessories?

Among the causes of leaks are:

1. Equipment that is not rugged enough and starts leaking a short time after it is put into service.
2. Abuse by irresponsible users. Mistreatment can be detrimental even to good design.
3. Insufficient concern about compressed air leaks which magnifies other problems.

To cope with the first cause, simply buy products of top quality. If you are not sure which manufacturers' products to buy, purchase similar items from several different manufacturers and run your own service tests in similar applications. Then establish your preference for equipment that gives the best performance.

Top quality products provide part of the answer to the second cause—abuse. The other part is to train users in the proper care and become more careful about proper handling of pneumatic equipment.

Ask the foreman of such departments to acquaint their men with the problems and ask their cooperation. Ask the accounting department to send monthly reports to each production department foreman of costs charged to his department for repair and replacement of pneumatic equipment. Thus, he will have comparative yardsticks of what is happening in successive periods. Costs going unreasonably out of line should spur him into action.

Finally, to remedy the neglect of leaking equipment, assign one or more individuals to periodically check equipment for leaks. Whenever possible, checking in each department should be done when it is not operating—with the compressed air lines under pressure—so that leaks can be more readily detected.

Even as you are reading this, those pennies may be disappearing into thin air. By doing nothing, losses will mount into dollars. So start plugging those leaks and keep those dollars from blowing away.

E. B. Skubik

E. B. Skubik, Senior Editor



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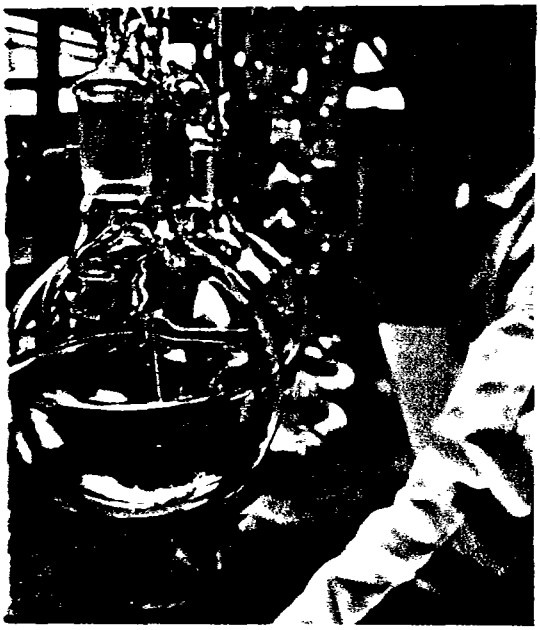
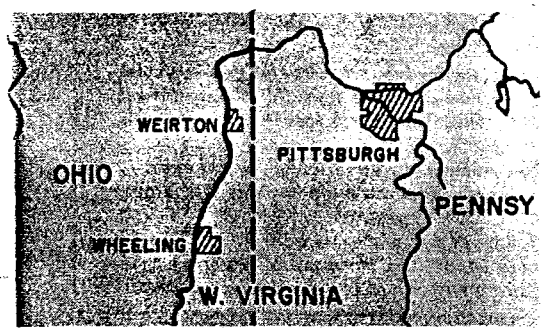
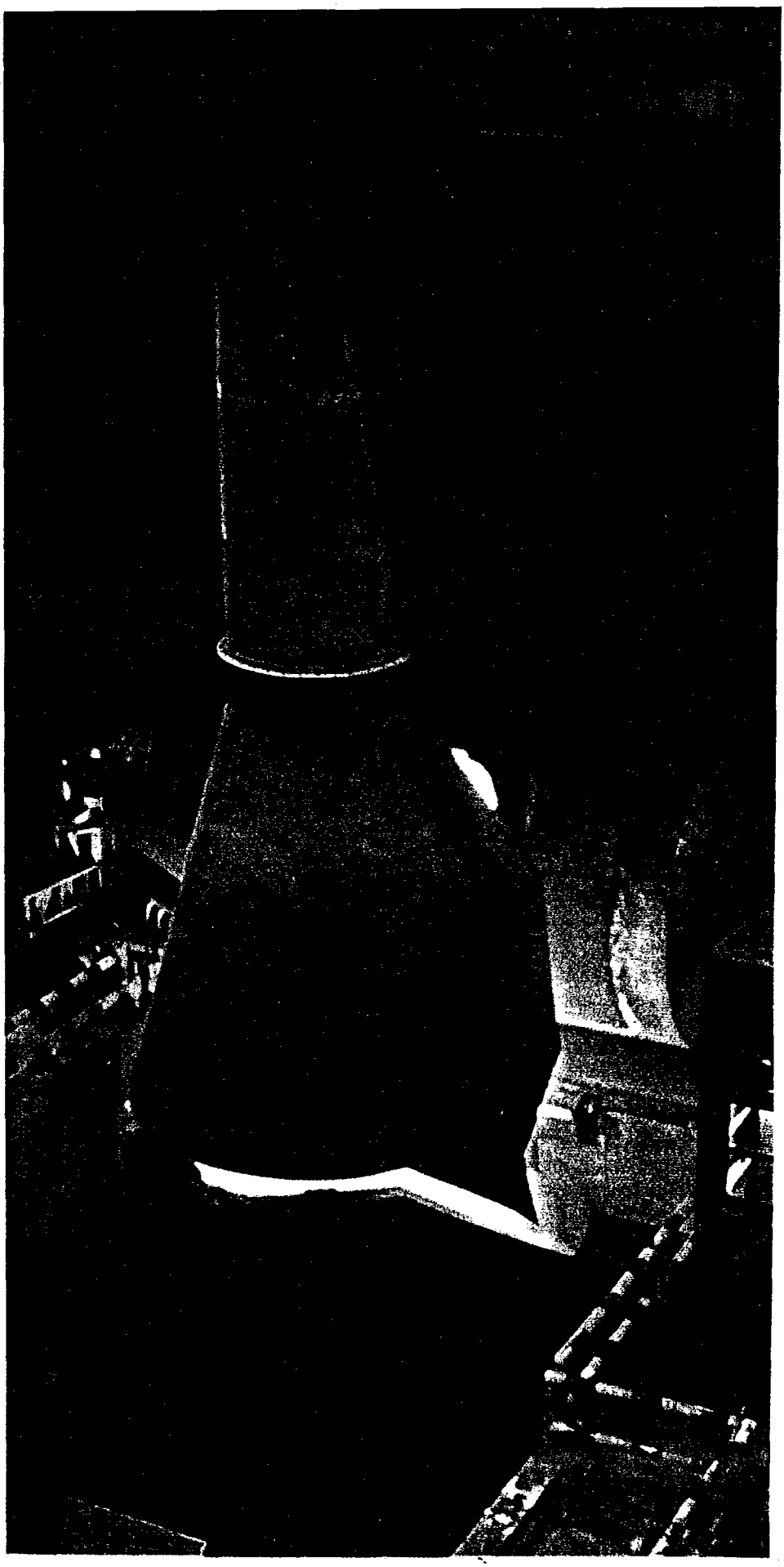




Above left: Water used for cooling and stack cleaning in Weirton Steel's basic oxygen process mill is held in clarifier tanks to allow solids to settle to the bottom. Of the 50 million gallons of water the mill uses daily, 45 million gallons are recirculated within the plant.

Above: Chemists conduct 24-hour surveillance on Weirton's wastewater by analyzing the samples in their own laboratory.

Right: Weirton's Kish system collects particle-laden air during the transfer of hot metal from railcars to ladles and feeds it to a baghouse outside building.



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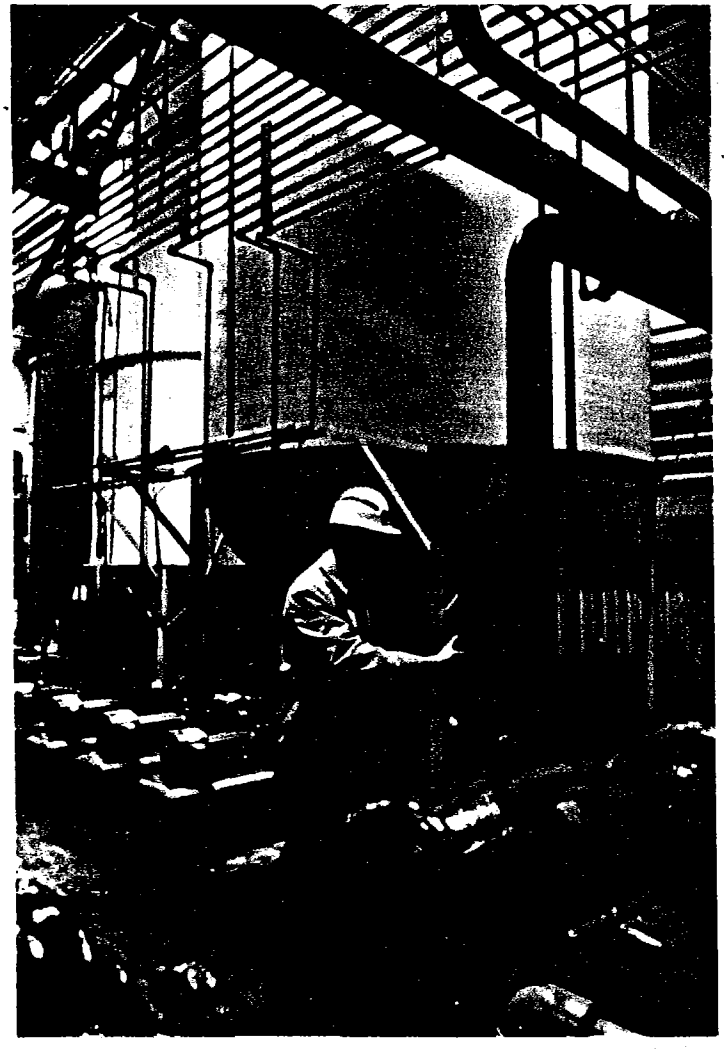

The oil recovery and water purification system at Weirton's hot strip mill enables the company to recover and re-use much of the mill's oil wastes.

Capsule of Pollution Control Activities

Air and stream pollution control touches virtually all operations in the steelmaking process at Weirton. A summary of Weirton's major pollution abatement systems gives an indication of the vastness of the program.

Dust from the BOP steelmaking and hot metal charging operations is controlled by two venturi scrubbers that have the capacity to remove 180 tons of effluent per day.

Electrostatic precipitators are capable of cleaning 7,500 tons of air per day from two open hearth furnaces.

Phenol emissions from 294 coke ovens are controlled by one of the most advanced phenol recovery plants in the industry. Besides the 3,500 lb of phenol recovered each day, the plant also recovers tar, oil, and ammonia. The ovens use about 22 million gallons of water and 80.8 million cu ft of air per day.

The company's four blast furnaces are equipped with a complex dust control system which includes dust catchers, gas washers, precipitators, and venturi scrubbers. The 22 million gpd of wastewater is cleaned by two large clarifiers.

Rotoclones, cyclones, and a chemically treated wet water system remove 10 tons of dust per hour from the two sinter plants' exhausts.

The strip steel tandem mills are equipped with an oil recovery and water purification system which provides reclamation of used oil.

A system for acid mist elimination, oil recovery, and recirculation and containment of chemical waste provides effluent control for the sheet mill and tin mill. (The tin mill uses 10 million gallons of water per day.)

The coal preparation plant employs a recirculating and cleansing system to eliminate any undesirable black water discharges. The operation recovers 2,000 tons of sludge every month.

Weirton spends $1,500 per day to dispose of 70,000 to 100,000 gallons of waste pickle liquor. The company is exploring deep well disposal and acid recovery as a means of reducing this cost.

POLLUTION CONTROL IS FULL-TIME PROGRAM

points out. Weirton's personnel strive to prevent this type of occurrence.

Wood's responsibilities as Supervisor, Environmental Control, include all air and water pollution control, industrial hygiene, and solids disposal. Although he is often involved with costs and cost estimates, his primary function is to act as an independent control official within the company advising management on all matters dealing with his responsibilities. He doesn't decide what equipment to buy or how much to spend, but he does make recommendations on what device should be used. The engineering division selects and buys all equipment with the advice of the environmental group.

This link with other management areas allows Wood to be objective, and the relationship works to Weirton's advantage.

Weirton is within a recently designated interstate air quality control region, but Wood is already trying to set levels for plant effluents that will meet or exceed the new criteria when they are established. Wood has studied several regions and States where air pollution criteria are now in effect. "We've tried, in our own minds," he reasons, "to decide what the criteria will be here. Then we're trying to use those numbers we think they'll come up with on our particular installations."

Such advance planning is not new at Weirton. Tucker states that "Weirton has always tried to anticipate where the problem areas were—the most serious problem areas—and it has always tried to do something about them before they become a problem for public concern." Wood now has a project underway using matching federal funds to try to anticipate what the problem areas are going to be in four to five years and what Weirton can do about them.

These problem areas concern low-flow, highly concentrated wastes that might lend themselves to treatment in the city's water treatment plant. The city has a primary treatment plant which, in all likelihood, will have to be upgraded to a secondary or tertiary plant in the next several years. So, using the federal funds, Weirton Steel is studying the possibility of building an addition to the city's treatment plant which would treat a number of the company's wastes and at the same time upgrade the city's facilities. The company considers this a significant program and is very optimistic about it.

For advance planning of pollution control to be meaningful, the company must have information not

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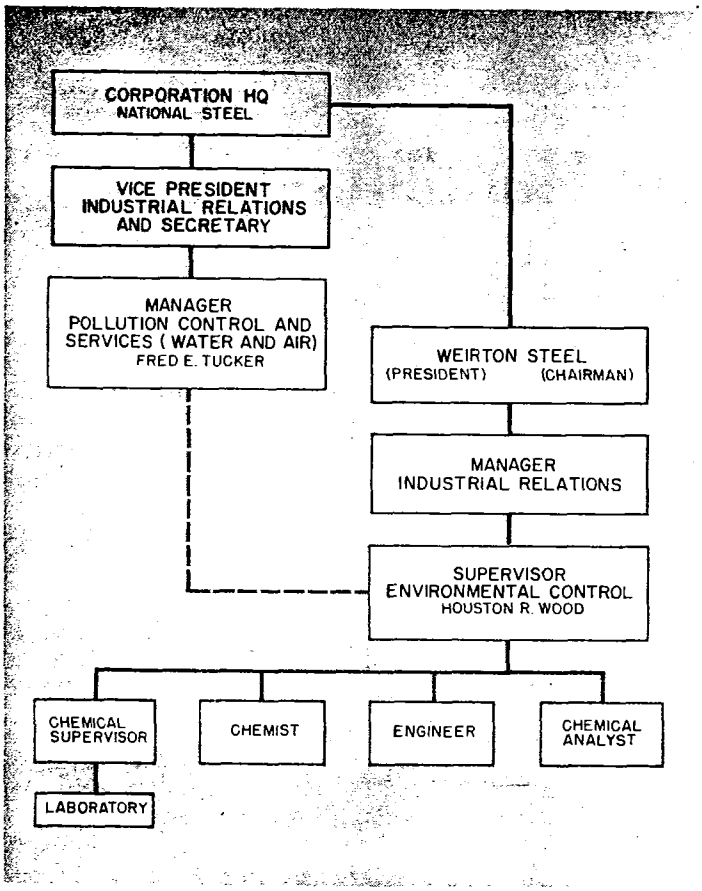

only on its own requirements, but also on possible legislation. This is Tucker's assignment. "It's my responsibility to anticipate what's coming next and develop long-range planning for corporate air and water quality control," he says. Again, communication is the key factor. Tucker has the company's library route to him any information it receives concerning pollution control. He also placed his name on many mailing lists, including those of the government. In addition, he belongs to several organizations and committees involved with pollution control work, including the Iron and Steel Institute Committee on Natural Resources and the U. S. Chamber of Commerce Committee on Natural Resources.

Wood and Tucker both maintain a good relationship with State officials. Phrases like "We work with the State to establish what needs to be done. . . . We negotiate continually with the State . . . We're in constant communication . . ." come up often when they are talking about new company plans or new regulations.

Weirton has no "formula" for pollution control problem-solving. Each problem is treated individually, and seldom is a new problem attacked with an old approach. When the problem is identified, planning is begun to correct it. In some cases, the engineering staff may design it; in others, they'll get the supplier of the equipment to engineer it; and in still others, they'll hire a consulting firm. Or, as with their palm oil recovery, they'll have a contract service treat or haul the problem away. Weirton's men enjoy this freedom from set procedure and welcome the opportunity to try new methods.

Weirton's belief in the continuing need for effective pollution control is manifested in its cooperative training program. Wood normally has two students working for him under this program but has had as many as six. He extends Weirton's pollution control education program by using summer students, encouraging personnel to attend courses and seminars, and participating in the company's management-training program and speakers bureau.

Weirton's most aggressive environmental control project to date has been the construction of its new "Mill of the Future" designed for basic oxygen process (BOP) steelmaking, vacuum degassing and large-scale continuous casting. Of the four main interdependent systems in this 26-story, 8-acre mill, three could be classified as pollution control systems. The gas scrubber system cleans the gases evolved during the steelmaking process and ventilates the furnace shop. The waste heat boiler system captures waste heat for plant use and regulates steam through the various circuits. The total waste treatment and recirculation system provides the 50 million gallons per day required by the mill. Eighty-six per cent of the cooling water is recirculated for use in the furnace shop, vacuum degasser, and continuous casting unit.

Weirton Steel believes that proper control of pollution and wise management of water is a demonstration of responsible corporate citizenship. Houston Wood and Fred Tucker help make this philosophy a reality.

Senator Jennings Randolph, chairman of the Senate Special Subcommittee on Air and Water Pollution, brought Weirton's diligence to public attention when he reported to the U. S. Senate, "If all industrial management officials were as progressive and civic-minded as are those of Weirton Steel, and if all State and local officials were as conscious of their responsibilities in the field of pollution control as are those now serving in West Virginia, the Congress would perhaps not need to act on federal standards for air and water quality." **End**

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Planning for Materials Handling—Key to Company Expansion

By **ROBERT O. PROCHASKA,** Materials Handling & Packaging Consultant, P & W Engineers, Inc., Chicago, Ill.

THE STIMULUS GIVEN plant expansion may come from many sources—management, directors, or customers. But no matter who is involved, one individual is certain to have a major role in company expansion plans—the plant engineer.

Planning for materials handling will be a key part of this expansion and, like all other aspects of plant planning, it has become increasingly complex. Manufacturing has reached a high degree of sophistication as its production techniques become faster and more complicated. These advances, and constantly rising costs, demand constant review.

While some of the points covered in this article are general, many apply specifically to materials handling, one of the many provinces of the plant engineer. They emphasize that this phase of planning must receive attention on a level equal to production. In layout planning, the plant engineer will be working with architects and many department heads, sifting suggestions, examining ideas, exploring proposals.

He may also be working in close coordination with consulting engineers. Consultants can provide assistance in analysis of handling procedures, equipment selection, and in the design of a complete handling system. If such help is needed, it should be retained early in the planning.

An initial plan for the task is most important and includes:

1. Establishment of objectives. This is usually the prerogative of management. Does it, for example, seek to increase production by 50 or 100 per cent in the next five years?
2. Determination of present capabilities.
3. Evaluation of present capabilities in relation to

Fig. 1. Basic flow chart should be included in preliminary planning to aid in layout.

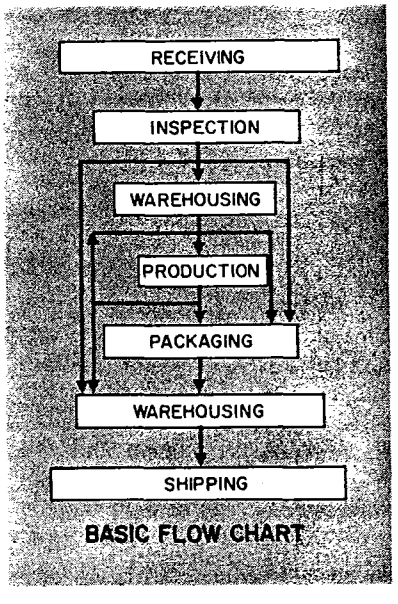
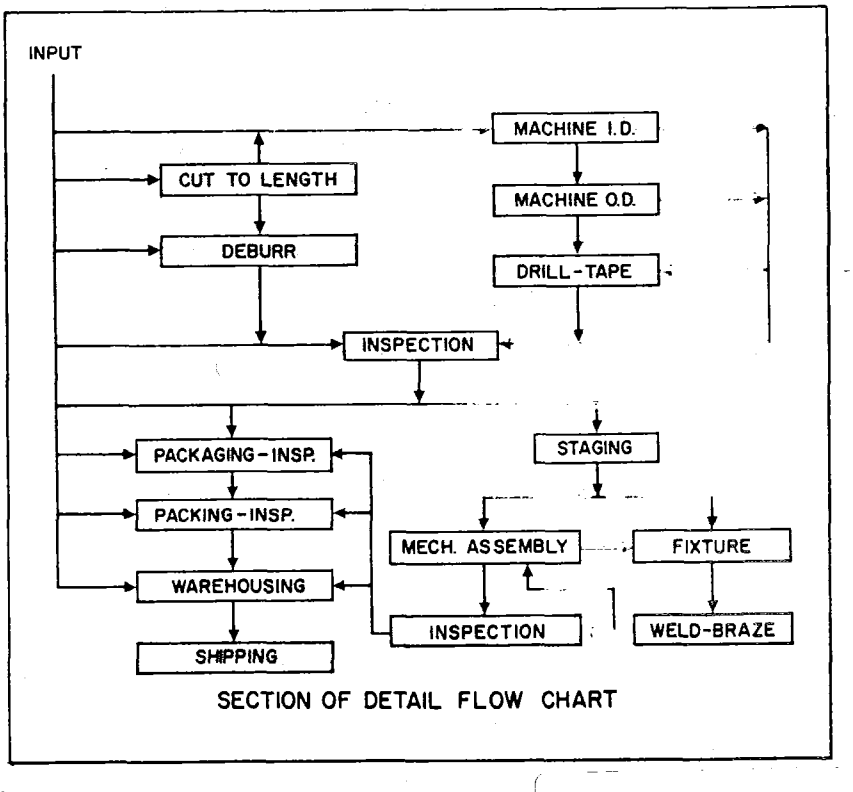


Fig. 2. A detailed flow chart eliminates backtracking of parts. Machines should be arranged for straight-line flow to move parts directly from receiving to shipping area.



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