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ECONOMIES IN MATERIAL HANDLING

by

R D Flaxbart

NOVEMBER 1959

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R. D. Flaxbart

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ECONOMIES IN MATERIAL HANDLING

By devoting a minimum of time and imaginative effort to the study of the problems involved in material handling, each one of you might save your company thousands of dollars annually by improving its system for handling even the most common items. Since the field of material handling is virtually limitless in scope, we might well talk for the full day. As a matter of fact, extension divisions in many universities now offer concentrated courses in this field requiring a full week or even more of study. Let us then limit ourselves to an analysis of only those problems connected with the handling of the most common items in our stores, warehouses, and yards. We should certainly include some discussion of the methods which have been developed in recent years to receive, store, and finally deliver these items to the customer. Later, through a careful analysis of our past experiences in this area, we may be able to return to our respective jobs with some effective new ideas for handling these materials.

We are all so young and modern in our thinking that we would find it extremely difficult to visualize how really tedious life must have been when every plant-processed item had to be handled manually. Two ancient discoveries, more than any others, have made possible the modern mechanical handling of materials. Prehistoric man for untold centuries was forced to push stones and other cumbersome objects over the ground itself whenever he wanted to move them. Eventually he discovered that it was a great deal easier to roll these objects over a log or over a series of logs, and, when he did this for the first time to ease his labor, for all practical purposes our modern conveyor system came into being. Somewhere in the less remote prehistory of man, in the ancient land of Mesopotamia, he fashioned the wheel, certainly the most significant single invention in the development of our modern mechanical civilization. We might reflect for a moment on the possibility of life in our society if the wheel had never existed, and we would soon realize that the society itself could not exist without it. Through the use of the wheel we have developed the process of handling material from the beast of burden stage, through the horse and hand-drawn vehicle stage, to the gasoline and electrically driven vehicles and equipment of our present system. To aid our loading and handling of materials we have developed hydraulic systems, mechanized conveyor systems, and now we have fully radio-controlled trains which perform their functions without manual direction.

We might begin our discussion by asking quite seriously whether the problems of material handling really warrant consideration. In partial answer to the question we might look at some statistics on the subject furnished in the June issue of Factory Magazine. A survey conducted in 1955 by the magazine showed that 20-25% of industry's labor hours go into material handling, actually over 10% of all hourly workers spend all their time in handling work. A later survey in 1957 showed that 6% of all plant employees (including clerical, supervisory, and hourly) are engaged in handling work. In order to be as conservative as possible, we will not consider the 20-25% of labor hours spent in handling, but will consider instead the 10% of all hourly workers who spend all their time in handling. Since there are approximately 12-million hourly workers in manufacturing at the present time, roughly 1.2 million people are wholly engaged in handling work. In terms of the current average rates of pay this amounts to a payroll of almost 5.5 billion dollars annually. If we wish to be even more conservative, we might simply consider the lowest figure, the 6% of all plant employees who spend their time in handling work. Even this would mean that roughly 900,000 workers are engaged in this work and that a payroll budget of approximately 4 billion dollars a year is necessary to sustain them.

Obviously, research and development plants, such as we represent, are not obliged to handle the enormous volumes of material processed in a normal manufacturing plant, but we nonetheless have major handling problems. Actually the problems confronting us are a good deal more severe than they are for the manufacturing plant. In a production plant, after all, many of the operations are generally repetitive and thus lend themselves readily to some form of automation, whereas we generally handle unique items, or at least must process items singly. Our type of handling involves a great expenditure of time and diverse equipment, but, for these very reasons, we have greater opportunity to experiment with our system and develop imaginative new methods which effect sizeable savings. We should not be reluctant to look objectively at the problems confronting us and to call upon the assistance of the manufacturers of material handling equipment whenever we feel they might help with specific suggestions.

As a necessary preliminary step in improving your handling operations, I would suggest that you analyze in great detail the various functions in your system: How many of the operations are still performed by hand? How many by using two-wheeled hand carts? How many by pallets? How much moving is by wheeled truck? How long does it take to palletize the equipment? How long to stack it? All items in general have to be received, delivered to warehouse locations, unloaded, stored, reloaded and then delivered. You should determine exactly how much labor is being expended in each of these areas; you should fragmentize the whole process into small detail, so that you can decide ultimately which steps can be consolidated and which can be eliminated entirely.

Once you are able to determine with reasonable accuracy the number of man hours per year spent in your plant handling operations, you should multiply the figure by \$3.00 -- a rough approximation of hourly labor cost in our type of plants. The final figure will perhaps startle you, but it will be an effective way of impressing upon you the fact that buying equipment, admittedly very often expensive equipment, is still usually a good deal less expensive than paying for the cost of the labor which the piece of equipment replaces. For example, if by consolidating certain operations or by using an extra piece of equipment, you can reduce your work force by a single man, you will save your plant approximately \$6000 a year, and this saving will obviously quickly pay for virtually any item of equipment you need to buy.

We might consider briefly and generally the simple problem of handling items too frequently. In most manufacturing plants, items are handled a minimum of six times: upon receipt, unloading at a warehouse, storing, removal from storage, reloading prior to delivery, and, finally, delivery to the customer. Very often, of course, this is increased to eight or ten handlings. The use of any one of the hundreds of different types of commercially available pallets probably would reduce the frequency of this handling, particularly if the material is such that it can remain on pallets during storage. Using pallets, one fork truck can handle the same volume of material as a half dozen or more men, and at a fraction of the cost. Additional savings are of course possible wherever special pallets or racks can be used which permit tier stacking.

In our particular plant we have found that four-wheel trailers linked in a train arrangement and towed by a tractor facilitate the handling of materials. Whenever possible, incoming freight is loaded directly on the trailers and delivered to the warehouses with no additional handling. Furthermore, if the material is to be delivered within a short period of time to the customer, it is simply left loaded on the trailers and therefore reaches the customer after only two handlings. Soon after adopting this plan, our receiving organization was able to reassign three drivers and trucks to other jobs with a saving for the Corporation calculated at approximately \$20,000 per year. Besides this saving in our receiving organization, additional savings of a yet undetermined amount were made on our warehouse operation.

Perhaps a specific example of one study which we have presently under progress would help to illustrate some of my points. At present, in our stores organization, the stock keepers fill hundreds of orders from our warehouse stock. They load all the packages on small hand trucks, and each day delivery trucks report and pick up the materials for distribution in our technical area. The packages have been segregated according to the designated building and room designation, but they have to be loaded on the delivery trucks and then unloaded into

handcarts at the proper building for delivery to specific rooms. Obviously each item has to be handled a minimum of four times under this system. We are now investigating the feasibility of using light weight trailers which can be loaded directly from the bins by the stock keepers, towed to the proper building in train, and, after uncoupling, pushed to the designated room for unloading. Through this method, two handlings of each piece will be eliminated, and we estimate as of now that the number of labor hours eliminated will pay for the trailers in one or two years.

But labor is not the only factor in the high cost of handling materials. There is generally a great potential saving from making more efficient use of available storage space. I would like to cite another specific example here. Several years ago our plant engineers began an investigation of our warehouse space utilization. They found that in one warehouse area we were gainfully occupying 12,100 square feet of floor space out of a total square footage of 20,000 square feet. The balance of the space was used for aisles, all 12-1/2 feet wide. That width aisle was the minimum possible to enable us to stack materials 10 feet high using a standard 4000-pound battery-powered fork truck. When it came time to acquire another truck, we bought a new type reach fork, a type which several manufacturers were producing. Through the use of this truck, we were able to reduce the aisle width to 7 feet, thereby utilizing approximately 3420 square feet of additional warehouse space, at no cost save that of the truck, and we needed a new one anyway. At the approximate rate of \$9.00 per square foot for warehouse construction, the new piece of equipment actually saved us about \$34,000. Compare this with the cost of the reach fork, \$8000.

There are literally hundreds of ways in which we can apply new methods to our handling operations. Our biggest handicap is perhaps lack of imagination and ignorance of what equipment is now available to make handling easier. Though I may run the danger of sounding like a public relations man for Material Handling Institute, I would urge you to study carefully what products are now available from the manufacturers of handling equipment. Read and study their catalogues and listen carefully to their sales representatives. The industry publishes magazines and articles in trade journals -- surely we should read them; they have annual shows in various parts of the country -- certainly we should attend them.

On the other hand, we should not rely entirely on the equipment manufacturers for our ideas. After all, as an industry, the manufacture of handling equipment is still in virtual infancy. It is true that some of the staple pieces of moving equipment, such as conveyors and two-wheeled carts, have been around for a long time, but the bulk of the new useful equipment did not appear till after World War II. In contrast to the automobile manufacturers, who have

had years of engineering experience and have developed the bulk of their ideas in their own research department, the manufacturers of material handling equipment have obtained most of their new ideas from the field. Perhaps problems which you feel are unique to your system are not unique at all, and if the manufacturers of this equipment are made aware of them, they will perhaps develop a new device or attachment which will be widely useful. Consider for example the dozens of attachments which are now available for fork trucks which can turn, roll, shimmy or shake your materials. The operator can now walk behind or, stand or sit on, gasoline, diesel, LP gas or battery-powered fork trucks or pallet trucks with lift capacities of 100 to 100,000 pounds. Straddle carriers, formerly used almost exclusively in the lumber industry, are now used for thousands of different tasks.

In many handling systems, trackless trains have proved invaluable. When there are repetitive routes involved, a train, guided solely by radio waves transmitted through wires buried in the floor, offers the ultimate in automation because it eliminates the operator entirely. When someone wants the train at a particular point he simply pushes a button. Trucks can follow a predetermined or even variable path to a given destination. If they are not needed, they can be sent to a central parking area where they will automatically couple to a charging receptacle. Many of these inventions are the direct result of suggestions and ideas from the plant users of the equipment. There are also hundreds of small aids to making handling easier and quicker -- small rollers, track-type dollies, friction-type come-alongs, powered Johnson bars, and many, many others. They not only reduce handling costs but greatly reduce the drudgery usually associated with handling work. But after all our considerations of the above described equipment, I still feel that the greatest area for possible improvement lies in the reduction of the number of times individual items have to be handled. Reduce this factor through some of the means described above or through your own ideas, and thousands of dollars of savings will accrue to your company's account annually.