Title: Industrial Planning with Models

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In the bygone era of pre-war days, models were looked upon as a hobby, or as playthings—Hollywood camera props—which were used to film such things as airplane crashes, train wrecks, or terrible fires. After the war began, models were used to solve some of the problems of training our fighting men to recognize planes, ships, and other fighting equipment both of our enemies and of our allies.

As our rapidly expanding industrial plant was being built, it became clear that a faster, easier, and more efficient method of plant layout was needed. Industrial engineers turned to models to eliminate the slower, more laborious two-dimensional method formerly used to lay out production facilities. The two-dimensional system consisted of first determining the machine tools necessary to do a certain job; then, on paper, charting the flow of materials through the plant and drawing the machine tools, aisles, ways, and working space to scale in their proper location. The three-dimensional system consists of first determining the required machine tools, formulating a rough material flow system, and then placing the machine tool models in their proper positions. The final refinements in spacing and material flow can be determined merely by looking at the rough three-dimensional layout.

Last quarter, the students in "Chief" Younger’s plant layout laboratory decided, with Professor Younger's consent and assistance, to use the three-dimensional system to lay out the factory which was being developed as a laboratory project. The plant which we were to develop was required to produce and assemble bench type drill presses at the rate of 100,000 complete drill presses per year.

Our first problem was to determine, by estimating the production time of each part of the drill press, the type of machine needed and the number of machines needed to produce one part per minute. The selection of machines was made with the aid of the machinery file which is being

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MODELS
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collected at the Davis library. After we had spent several weeks in the library, inspected the Jeffrey Mfg. Co. in Columbus, and listened to several lectures on machine tools and their application by Professor Rickly of the Industrial Engineering Department, we had compiled sufficient data to give us the number of machines of each type to produce the drill presses and to give the cost of manufacture of the product as well as the total time to fabricate and assemble the various parts.

Our next step was to cut out the numerous small wooden blocks which were to represent the various machine tools. Because we had neither the time nor the patience to construct scale models of each machine we cut the blocks to overall scale dimension of the machines. Identification of the machines was accomplished by coloring them in accordance with the following color code:

<table>
<thead>
<tr>
<th>Color</th>
<th>Machine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Drill Press or Boring Mill</td>
</tr>
<tr>
<td>Blue</td>
<td>Milling Machine</td>
</tr>
<tr>
<td>Red</td>
<td>Broaching Machine</td>
</tr>
<tr>
<td>Gray</td>
<td>Lathes and Automatic Bar Machines</td>
</tr>
<tr>
<td>Black</td>
<td>Assembly and Inspection Benches</td>
</tr>
</tbody>
</table>

Operators were represented by small white sticks. The conveyorized assembly line was shown by strips of wood, high enough above the base to give the proper scale height for efficient working space. To give the whole thing an air of realism we made small models of the drill presses and located them on the conveyor line in their proper stages of assembly.

To the person who did not know the significance of the completed layout it appeared to be an attempt to simulate a multi-colored cemetery, but to us it was a very clear representation of a modern manufacturing plant. The advantages of this type of layout should not be underestimated; we found that even with our extreme inexperience in this field, we were still able to visualize the best material routing scheme in the shortest time and the fullest utilization of the available floor space possible by manipulating the models to their most advantageous position.

Because the most important factors in production are good material routing and full utilization of the available floor space the three-dimensional layout system is the system to be used wherever possible, and, needless to say, the possibilities are unlimited. Models are being used not only in plant layout work but also in layouts of airports, railway terminals, and innumerable facilities of other kinds.
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