pean plants generally are characterized by 10- to 40-ton Thomas converters or relatively small open hearth furnaces. United States plants generally do not use Thomas converters and have tended toward larger and larger batch size open hearths (though their much longer tap-to-tap time has meant comparatively low annual capacity). Changeover to OC converters in the United States would often require complete plant revision while in many European firms converters alone can be added to, or substituted for, Thomas furnaces.[5] Batch size is also interrelated with ingot size. Flat rolled products can be produced more efficiently from large ingots which are most economically produced from large batches while long products do not require such large ingots. A greater proportion of United States production is in flat products than is true of other parts of the world.

Adams and Dirlam oversimplify the investment decision on at least two counts: first, they focus on a single step in the integrated production chain, steel furnaces alone. In so doing they assume away many of the problems of technological interrelatedness suggested above. Second, they fail to note that the manager may be faced with a series of mutually exclusive opportunities for improving his plant, all of which provide his firm with positive present value.

The decision which Adams and Dirlam consider is that between a new OH plant and a new OC plant at a single point in time and *in vacuo*. Even firms which are expanding their output can do so by modifying an existing plant or by building a completely new facility. Only in the latter case can the potential of a new process be utilized most fully through production line balancing. Actually managers in this industry face a matrix of decision possibilities when they introduce new technology. Each of them must be analyzed.

Adams and Dirlam's analysis applies most closely to the simplest case, the I-E decision. While the comparison of the costs of the OC and OH plants in the I-E decision involves the comparison of annualized investment *plus* operating costs for both processes, the R-R

5. It is possible to find in Europe today plants originally constructed in the 1800's with Thomas and OC converters operating side by side, still utilizing original auxiliary equipment. One example is that of Dillinger Huttenwerke, Dillingen, Germany which has one melt shop of Thomas and LDAC converters utilizing the same auxiliary equipment. It also continues to operate its 80-ton open hearth furnaces because of their great flexibility in charge and output range. Even when its new OC plant is built in the immediate future, the open hearths will be retained, in part to assure processing of home scrap.