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## GOLDRATT'S GAME

This activity is a variation of the game Goldratt described in his "novel", the Goal (North River Press, 1992, pp. 104-112.). This variation was described to us by Graham Rand at an IFORS conference in Latvia. It can be used to illustrate many concepts in production management. We use it to reinforce the notation that reduction of variation in processes is more efficient and economical than increasing inventory, or work-in-progress in this case.

The game simulates a production line with 5 work stations. The product must pass through each of the 5 work stations in order from 1 to 5. We use pennies to simulate the process. The potential amount of work completed at each station in a given time period is a uniform distribution of 1, 2, 3, 4, 5, and 6. This random potential work is determined each period by the tossing of a die. Hence the average potential amount of work at each station and thus through the system is 3.5 units per period. If the game is played for 20 periods for example, one might expect an average of 70 completed units. However, the actual work completed at each station is limited by the WIP. The game is played by starting each station with a WIP of 4. At a signal all stations roll their dice to determine their potential work. The actual work forwarded to the next station is of course the minimum of the number on the die and the number of items in the WIP. We use pennies to represent the item being produced (No actual work is done at each station as the pennies move along). The first station's WIP is always replenished to the 4 level. As the game is played, WIPs begin to vary and eventually in some cases limit the amount of work done. We set up as many lines as we have students available. By the end of 20 periods no line will be near the expected level of 70 finished units. When asked to suggest adjustments that might allow us to reach the target of 70 units on average, many students will suggest increasing the WIP. We re-run the game starting with WIP's of eight rather than four and production does tend to increase but still often below the 70 level. Further discussion usually results in a suggestion that better results could be obtained by reducing the variation in the work. The game is played one more time flipping coins to determine potential production levels with heads resulting in 4 units and tails 3 units. The average work done is still 3.5 units. Going back to WIP's of four, this run is the most successful.

From: <http://web.lemoyne.edu/~wright/goldratt.htm>

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