COMPARISON OF TWO ARCHITECTURES OF PRODUCTION SYSTEMS

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- Both system architectures contain **nxm** machines
- In both systems, each part is completed by the operations of **n** machines, located in n stages
- Each of the **nxm** machines has equal production time
- The difference between the two architectures is in the material transfer system

On the left lower corner: **m** serial lines architecture, commonly utilized by **Toyota** in Japan.

The advantage: The material transport system is very simple and inexpensive.

The drawback: If two machines in two different lines are down, the throughput **loss** is **2/m** of the normal rate.

On the right upper corner: A typical RMS system architecture commonly utilized by **General Motors** in North America.

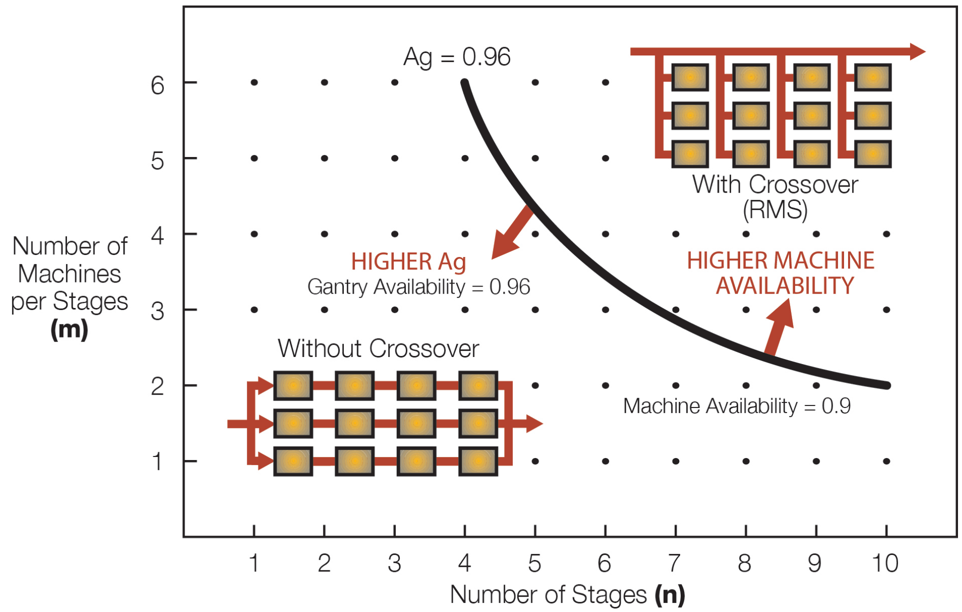
Because of the added crossover material transport system, the part can move from each machine in a stage to any of the machines in the next stage.

The drawback: The material transport system is expensive.

The advantage: If two machines in two different lines are down, the throughput **loss** is only **1/m** of the normal rate.

NOTE: Typical systems in industry may have 20 or more stages, and 4 to 6 machines in each stage
Therefore, the probability that two machines will be down at the same time may be high.

RMS configurations (with crossovers) are advantageous in systems with large number of stages and many machines in each stage.



A solution, obtained by Boolean algebra, for machine availability of 90% is shown above. [Source: 11-Year RMS Summary, 2007.] If machine availability is higher, then the black borderline is going up, and the region for the "Toyota" system becomes larger. Machine availability is higher when failed machines are repaired quicker, as is the norm in Japan. The speed of repairing machines depends also on the attitude and concern of workers to have a profitable company.