Proposal Topic for a Master thesis:

“In-plant milk run”

Background:
In material flow system, parts are supplied to the workstations from the warehouse or from several supermarkets. The supplying process can be accomplished using tugger trains or forklifts. The tugger trains provide the chance to supply several workstations in one trip of the train. This is called “in-plant milk run” which will decrease the transportation costs. This is different from the usual milk run applied outside the company and concentrating on the movement of trucks among several companies. The demand for parts by workstations is sometimes dynamic. Sometimes the capacity of tugger trains is not enough to satisfy the demand. Sometimes the capacity is more than enough according to the demand pattern. The parts should be transported just in time. Many methods have been proposed in the literature to plan the feeding process.

Research objective:
Analyze the milk run system and determine how to plan it. A comparison between milk run and forklift can enrich the research

Keywords: tugger (tow) trains, transportation costs, material flow, bins, kanban, JIT

Research tasks

1. Present a case study in a company using milk run system
   - Determining the needed data such as the physical layout, bins capacities, workstation demand for parts, etc.
2. Define some performance measures to focus on such as workstation starvation and inventory costs
3. Investigate the problems and complexities on the ground. These problems usually affect the smooth application and planning of milk run system such as:
   - Very dynamic demand for parts
   - Sometimes, there are variable train’s capacities
   - The accuracy of the forecasting of the workstation demand for parts
   - Wrong delivery
4. Propose some modifications to optimize the system focusing on three major areas
   a. Tugger train routing
   b. Train scheduling
   c. Train loading or kanban system
5. Propose some ideas to face the problems inherent in the system such as errors in delivery
6. Compare the milk run to the traditional forklift system. (simulation may be used)

Methodology
1. The modifications in the proposed system can depend on
   - Concepts
   - Simple equations
   - Simulation
   - Others

2. A check list can be used to know the frequency of problems that face the working environment and affect the efficiency of the system

3. Some ideas can be presented for future research

**Student profile:**

The student must have some basic knowledge about kanban system, simulation, and JIT. Based on the available times, the meetings between the master student and the supervisor can sometimes be in the weekend. The thesis can be written in English or German

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