**INFORMS O.R. & Analytics Student Team Competition**

**Team 3234: Federal University of Santa Catarina**

**Summary of Judges Comments**

- The team proposes to split the problem into a master production problem (by transporting raw materials) and the detailed production sequencing. This is a very reasonable approach given the complexity of the overall problem.

- The team articulates that its goal is to maximize that demand can be satisfied (within the time limit), and secondarily to minimize excess production. Hence, also the transportation problem is designed with this in mind.

- The internal work orders are designed based on an interesting assumption: there is no benefit in aggregating customer orders, as smaller orders are more flexible. Therefore, the team proposes to create internal work orders by splitting customer orders. As a consequence, the master transportation problem also distributes customer orders over the sites.

- The team proposes to fit Normal distributions to fit the processing rates data. They apply hypothesis tests to confirm the validity.

- Internal work order complexity: this team relates the complexity of a work order to excess production, as caused by the different sizes having different split percentages and aggregate demands. The team computes a complexity score for each internal work order, but does not derive a conclusion. Nor does the complexity seem to play a role in the solution approach.

- The transportation problem aims to distribute the raw inventory over the sites. It is unclear to me how the variables D\_jk (quantity of color k demanded at site j) relate to 1) the initial inventory, 2) the transported amounts (X\_ijk), and 3) the number of empty bins used at the destination (Y\_jk).

- The production sequencing heuristics appear to be inspired by the elements that make up the order complexity. However, the descriptions of the heuristics are rather high-level -- it would have been better to make these more formal as they represent a crucial component of the approach.

- The section describing the simulation process is very brief. From this description I was unable to fully understand how the simulation is used. In particular, is the simulation used to change the sequencing decisions of the internal work orders, or is it only used to evaluate the performance (i.e., based on the sequencing decisions made by the heuristics)?

In summary, the team has shown to have a good understanding of the problem. The proposed solution has several interesting elements, although the description of the approach is rather brief which makes it difficult to assess the quality and/or reproduce the results.

On the positive side, the executive summary consists of problem definition, approach, and recommendation. On the negative side, the approach part has a report format instead and could be more concise and focused on the final chosen approach. I’m happy to see the use of a holistic approach for solving the problem. They had an active mentor, a professor with an optimization background, which should be factored in when comparing teams.

On the solution:

I’m not clear why it is beneficial to exclude rate parameters from transportation optimization model. You are technically deciding how much to move from site A to B without knowing whether or not it can be used there.

On the methodology:

A flow chart is given but it only consists of modeling modules and misses the data flow. It’s a plus to include the math formula, but the definition of variables at each constraint was redundant and needed one to go back and forth. The assumption/rational for modeling variable x (the quantity of RMI) as continuous and variable y (number of empty (at the beginning) drums) as integer should have been explained.