MATHEMATICAL MODELS FOR JOB SCHEDULING AND ASSEMBLY OF MANUFACTURING SYSTEMS. ***Patrick Curran*** *and Darren A. Narayan, Department of Mathematics and Statistics, pmc6047@rit.edu, dansma@rit.edu*

A k-ranking of a graph is a labeling of the vertices with integers such that for any pair of vertices with the same label contains a vertex with a larger label. A k-ranking is minimal if reducing any label larger than 1 violates the described ranking property. The rank number of G is the smallest k such that G has a minimal k-ranking.

Early studies involving the rank number of a graph were sparked by its numerous applications including designs for very large scale integration (VLSI) layouts and Cholesky factorizations associated with parallel processing. An interesting relation involves the rank number of a path and the solution to the Towers of Hanoi problem. For a set of disks listed in increasing size, instructions for which disk to move next can be found by reading the labels in a minimum ranking of a path. A label of i in the ranking would indicate to move the i-th smallest disk from one stack to another.

A recent result by Kratochvíl and Tuza showed that the rank number of an oriented tree is bounded by one plus the rank number of its longest directed path. We prove that no such bound holds for undirected graphs. We present new results involving rank numbers for a family of trees containing t copies of a path on t vertices.

We will also discuss applications of rankings to job scheduling and assembly of manufacturing systems.