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Efficacy of the NEH Heuristic in a Hybrid Flow Shop Environment

C. Edwards¹ and D.L. Santos²

¹Department of Mathematical Sciences

²Systems Science and Industrial Engineering (SSIE) Department
Binghamton University – State University of New York

Corresponding author's Email: santos@binghamton.edu

Author Note: Courtney Edwards is an undergraduate senior at Binghamton University studying mathematical science. Her interests in math include applications of probability and statistics and heuristics. This past summer she conducted research under the LSAMP (Louis Stokes Alliance for Minority Participation) Summer Research Internship Program, funded by the National Science Foundation. She is interested in pursuing graduate studies in industrial and systems engineering. Daryl Santos is a Professor in the SSIE Department and also serves as the university's Vice Provost for Diversity and Inclusiveness.

Abstract: This paper examines the efficacy of the well-known Nawaz, Enscore, and Ham (NEH) heuristic for use in hybrid flow shop (HFS) scheduling where makespan, or time to process all jobs through the system, is the performance measure. Although existing for over 30 years, the NEH heuristic is still considered a dominant heuristic for makespan schedules in a pure flow shop; i.e., the flow shop environment that has one machine per processing stage. We examine the use of NEH for scheduling in flow shops where, for at least one stage, there exist multiple processors. Herein, we consider the multiple processors to be identical in speed. Prior studies have shown that using a good permutation sequence at the first stage of an HFS, with a FIFO progression in the remaining stages, can produce near optimal, and sometimes optimal, makespans. We test the efficacy of this approach on a set of small to mid-sized HFS problem instances with known optimal solutions, and from a larger, 20-job problem with known optimal makespan.

Keywords: Hybrid Flow Shop, Production Scheduling, Makespan, NEH