**Magister en Ciencias de la Ingeniería, mención Ingeniería Industrial**

**Propuesta de Tesis**

**Título:** Lot-Sizing Models in Hybrid Manufacturing and Remanufacturing Systems with Imperfect Production and Rework Processes

**Resumen:** This thesis aims to explore a dynamic lot-sizing problem in hybrid manufacturing/remanufacturing systems, considering imperfect production processes. The research focuses on extending existing models by incorporating heterogeneous quality standards for returned items, rework processes, and joint manufacturing/remanufacturing production lines. Additionally, scenarios with separated production lines will also be examined. The proposed model includes features such as capacity constraints, dynamic demand, and quality assessment for both remanufactured and reworked products. A mixed-integer linear programming approach will be employed to minimize total production costs, considering setup, inventory, and rework costs.

The project addresses gaps in literature by integrating rework processes within hybrid systems, as prior studies have mainly focused on manufacturing or remanufacturing systems independently. Furthermore, the work seeks to analyze uncertainty in key parameters such as demand and quality levels of returns through future stochastic modeling. This research not only provides theoretical advancements but also practical insights for industries transitioning towards circular economy practices, aligning with green supply chain policies like the Extended Producer Responsibility law.

**Palabras Claves:**

Mixed-integer linear programming

Lot-sizing problems

Combinatorial optimization

Imprefect production processes

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