

# Master Thesis

Problem characteristics for the multi-stage capacitated lot-sizing problem

# The multi-stage capacitated lot-sizing problem (MLCLSP): Model characteristics and problem generator

## Prerequisites:

- ▶ Knowledge in discrete optimization for MILPs (optimal capacitated lot-sizing problems)
- ▶ Programming languages: Python
- ▶ Basic knowledge about production planning (lot-sizes, capacity planning, bill of materials)

## Related literature:

- ▶ MLCLSP literature reviews:
  - ▶ Buschkühl, Lisbeth, et al. "Dynamic capacitated lot-sizing problems: a classification and review of solution approaches." *Or Spectrum* 32.2 (2010): 231-261.
  - ▶ Quadt, Daniel, and Heinrich Kuhn. "Capacitated lot-sizing with extensions: a review." *4OR* 6.1 (2008): 61-83.
- ▶ MLCLSP data providers:
  - ▶ Akartunalı and Miller (2009): *A heuristic approach for big bucket multi-level production planning problems*
  - ▶ Suerie and Stadtler (2003): *Multi-Level Lot Sizing with Setup Times and Multiple Constrained Resources: Internally Rolling Schedules with Lot-Sizing Windows*
  - ▶ Tempelmeier and Hilger (2015): *Linear programming models for a stochastic dynamic capacitated lot sizing problem*

## Access to content:

- ▶ Datasets of Akartunalı and Miller (2009), Suerie and Stadtler (2003) and Tempelmeier and Hilger (2015)
- ▶ Datasets anonymized real-world data (tablets manufacturing, acrylic acid manufacturing)

## Expectations:

- ▶ Understanding of MLCLSP model characteristics based on classification from literature and already published data sets
- ▶ Development of a python procedure which detects model characteristics based on a data set from literature
- ▶ Development of a problem generator based on a prefilled problem characteristics template
- ▶ Apply problem generator and provide numerical studies discussing the outcomes

## Supervision:

- ▶ Prof. Dr. Stefan Nickel (Lehrstuhl IOR)
- ▶ Michael Simonis (Senior consultant at Camelot ITLab, PhD candidate KSRI at KIT)

