

Description of an assignment in Advanced Operations and logistics of transport systems

Section: Transport Engineering and Logistics

Supervisor: Dr.W.W.A. Beelaerts van Blokland

Case study: NACO Airport Baggage Systems Design

General

Towards logistic systems for “Smart Industries”

The near future asks for value systems of large scale companies operated from a value chain integral perspective by use of real time available information to operate and synchronise demand, supply and (re) assembly processes to achieve a higher competition level. This vision is supported by the initiative of Industry 4.0 “Smart Industries”.

Components and sub-assemblies can be provided with digital information or tracked to make them operated “self-steering” or “autonomated” for internal in conjunction with external logistical operations. Developments around the physical internet fit seamless into this vision. By building in automated couplings between department related information and the physical goods flow, the processes can be operated in a more synchronised way finally to generate in the first place lead time reduction or faster processing of value with minimising down time in transport system operations. Whilst operating faster, the cost can be relatively lowered and the competitive position will be improved. As a statement it can be advocated processes should be operated “Faster, Cheaper and Better”.

Mission:

The goal of the research is to investigate the potential in the industry for the advancement of synchro operated processes and departments by eliminating resistance or “waste” linked within the information and goods flow as depicted in the theories around Lean Manufacturing. Research topics emphasize the digital coupling between departments and its processes of the focal company, its customers and its supplier’s processes to shorten lead times and increase the flow through the processes. Research within the industry is necessary to design and test new concepts of processes. Specific cases can be conducted in maintenance, industry and transport system related logistic processes.

Objectives:

The focus is to adopt a Process Engineering and Design perspective for design of transport related models, systems and processes related to the operations logistic performance of Industry 4.0 implementation with belonging KPI’s at company level and process level.

Current Swimlane and Value Stream Analysis (VSM) methods can be further developed to support the digitised and synchro operated company departments from a chain integral perspective. Advancement in operations can be applied to industry in general, transport industry and assets-maintenance industry.

Case research can provide generic elements contributing to the development of theory around advanced operations in transport logistic systems in general.

Preliminary title of the case study research, assignment with NACO:

Subject:

Methodical parametric design of airport baggage handling system concepts

Modern day airports exist in various sizes and types, From local airports to regional airports and intercontinental hub airports, each requiring baggage handling facilities. These facilities may already be existent and need a capacity expansion whilst in other cases a design is made from scratch. In order to understand the complexity of baggage handling systems at airports, such systems may be divided into multiple functions.

NACO Special Airport Systems department is designing these BHS systems for clients globally. NACO, as initiator of this assignment, is looking for a tool to facilitate parametric design of a baggage handling system. Prior research on baggage handling system design has primarily focused on the tracking of design requirements in Microsoft Office Excel forms (Lemain, 2002). Manuals have been written on airport terminal design, in which chapters elaborate on baggage handling systems (Bradley, 2010). These manuals are supported by generic design recommendations from the International Air Transport Association. Based on the recommended systems, a tool may be used to optimize system layouts (Grigora & Hoede, 2007). A design process for baggage handling systems however has not been found in literature. Your assignment is to find a design process description for designing baggage handling system concepts at airports and use this to construct a model.

An example of a design process is described by Pielage (2005), who has developed a design process for complex automated freight transport systems, a group that baggage handling systems are part of. Of particular interest are:

- identifying existing baggage handling sub-systems
- defining design process criteria
- creating feasible options
- comparing the selected design process and current design process in a case study

Leading previous Thesis Research

Lean Design Engineering

Company

NACO is a world-leading independent airport consultancy and engineering firm. We have over 65 years of experience working in the aviation and air transport industry – from major landmark designs to smaller domestic airports. Our Special Airport Systems department is responsible for the baggage handling projects.

Reason for the assignment

NACO is looking for the possibilities of further enhancement in its engineering process. Parametric design in the conceptual phase could potentially speed up this process.

Aim of this assignment

Create a model in such a way that it is capable to interact with Revit and potentially other tools.

Approach

Master thesis, research into international standards and rules of thumb, design process description, (decision) model creation and validation. Finally delivering a working model developed in such a way that it is capable to interact with Revit via Dynamo or similar tool. Tested with an existing BHS project.

Supervision

Taco Spoor, team lead of NACO BHS team.
Taco.spoor@naco.rhdhv.nl

Time frame

Estimation of the duration of the assignment: 6 months
Desired starting period: ASAP