

ETPN 2024/2025: project

Vehicle Inspection and Emissions-Testing Process

Task

Your assignment is to model and analyse the “as is” business process model for a Vehicle Inspection Process and to redesign and automate a “to be” process. The baseline for describing the “as is” process and identifying its issues is provided in the case study “*Frumherji Ltd. Reykjavik: Vehicle Inspection and Emissions-Testing Process*,” available on Fenix. For the ‘as-is’ part of the project, be sure to incorporate the modifications to the Vehicle Inspection and Emissions-Testing Process that are described in the Appendix at the end of this document.

When the case study description is not detailed enough, you must make your own assumptions and write them down in your report.

Your work starts with **understanding the “as is” process**. To this end, you will model the process in BPMN, starting from a value chain and drilling down to sub-processes where appropriate. This process model should cover the “normal course of action” (happy path), as well as foreseeable errors or exceptions and how these are handled.

Next, you **will analyse the “as is” process model quantitatively and qualitatively leading to an “issue register”**. You do not need to apply all analysis techniques introduced in the lectures, but rather you should select those techniques that are applicable given the data provided in the case study. **For the quantitative analysis, whenever it gets too complex to perform by your calculations, you can run a process simulation and support your analysis with that data.**

Based on the identified issues, you will then design a “to-be” process. You will explain the proposed changes, and how and to what extent these changes help to address the issues identified before. Also, report what other possible changes you considered, why could they also be potentially relevant, and why did you discard them. This will lead to a “to-be” process model. **The proposed changes to the process should be validated by running a simulation of the to-be process, and the results compared with the as-is analysis.**

What to Submit?

You should submit a deliverable as a PDF file with the following sections:

1. **The “As is” process model.** If the size of the diagrams allow so, please copy the process model(s) into your report. But if some diagrams are too large, submit them as separate PDF file(s). Please also inform what was the tool you used to create the model, and include the source file with the submission.

2. **The “As is” process model analysis:** This section should include the issue register as a bare minimum (try to conceive and use a handy table for this purpose), but may include also why-why diagrams, a Pareto chart, a waste table or value-added analysis table. To perform the flow analysis and simulation you will be required to make assumptions, given the provided data. You must present all assumptions in a clear way, and make sure they are also used in the analysis of the to-be process.
3. **The Process Redesign:** This section should include: (i) the proposed process changes and justification for each proposed change; (ii) a discussion of the expected benefits of the proposed changes; (iii) alternative changes that, according to the subject of the course, could be considered as potentially relevant but you discarded, explaining the reasons for all that; (iv) the “to be” process model in BPMN (can be submitted in separate files); and (v) the results of the simulation showing the expected behaviour of the process and the gains over the as-is.

Each team must deliver a live presentation of their report on the project presentation date planned for this course, which means the presence of all the team members in this session is mandatory. The presentation should explain the outcomes of the analysis and redesign, as well as a pre-recorded demonstration of the executable process model.

Indicative grading: Each of the four three above is worth 6 points, which will be each assessed according to the quality of their presentation in the report. The live presentation is worth another 2 points.

Notes:

- Delivery date and Group presentation date are stated in Fenix

Appendix

Frumherji Ltd., Reykjavik: The Vehicle Inspection and Emissions-Testing Process

Updated Requirements for Electric and Hybrid Vehicles

In addition to traditional internal combustion engine (ICE) vehicles, the inspection and emissions-testing process now includes provisions for electric vehicles (EVs) and hybrid vehicles (HVs). These updates align with the latest Icelandic and Swedish regulations regarding the inspection of electric and hybrid vehicles.

Government Inspection Requirements for Electric and Hybrid Vehicles

1. Electric Vehicles (EVs):

- **Initial Inspection:** New electric vehicles must undergo an initial inspection at the dealership before they are sold, similar to traditional vehicles.
- **Subsequent Inspections:** The first government-mandated inspection is required when the vehicle is three years old, then at five years, followed by annual inspections.
- **Battery Health Check:** Inspections include a battery health assessment, checking the state of health (SoH) of the battery to ensure it retains sufficient capacity and performance.
- **Charging System Check:** The charging port and cable integrity are inspected, along with the vehicle's ability to charge correctly.
- **Electrical System Inspection:** The high-voltage electrical system is checked for insulation and proper functioning to ensure safety.

2. Hybrid Vehicles (HVs):

- **Initial Inspection:** Hybrid vehicles are also inspected at the dealership prior to sale.
- **Subsequent Inspections:** Similar to EVs, hybrid vehicles undergo inspections at three and five years of age, with annual checks thereafter.
- **Emissions Testing:** The internal combustion engine component of hybrid vehicles undergoes emissions testing following the same procedures as traditional vehicles.
- **Battery and Electrical System Check:** Similar to EVs, the battery and electrical systems are inspected for health and safety.

Vehicle Inspection and Emissions-Testing Operations at the Hestháls Station in Reykjavik (modifications for the 'as-is' process)

To accommodate the inspection of traditional, hybrid, and electric vehicles, several modifications have been made to the operations at the Hestháls station.

Step 1: Customer Arrival and Check-in

- Customers now indicate the type of vehicle (traditional, hybrid, or electric) during check-in.
- Receptionists verify documentation and vehicle type, ensuring that the appropriate inspection procedures are prepared.
- For EV and HV owners, additional information about the battery and charging system is collected.

Step 2: Inspection Lane Entry, Inspection, and Emissions Test at Base 2

1. **Traditional Vehicles:**
 - Emissions testing through the exhaust pipe.
 - Standard inspection of mechanical components.
2. **Hybrid Vehicles:**
 - Inspection of the hybrid system, including the electrical components.
 - Inspection of mechanical components.
3. **Electric Vehicles:**
 - No emissions testing required.
 - Comprehensive check of high-voltage electrical system (focusing on insulation and connector safety for high-voltage components, specific to fully electric systems).
 - Inspection of mechanical components.
 - Inspection of the charging port and cable functionality.

Step 3: Inspection at Base 3

- **Traditional and Hybrid Vehicles:** Continue with brake inspections as before.
- **Electric Vehicles:** Additional checks on regenerative braking systems.

Step 4: Inspection at Base 4

- **Traditional Vehicles:** Undercarriage inspection for mechanical integrity.
- **Hybrid Vehicles:** Inspection includes both mechanical and electrical components under the vehicle.
- **Electric Vehicles:** Focus on the structural integrity of the battery housing and high-voltage wiring under the vehicle.

Step 5: Recording Results into the Database

- Inspection results for all vehicle types are recorded, with specific fields for electrical system status for EVs and HVs.
- Any discrepancies or issues are flagged for follow-up and communicated to the vehicle owner.

Electrical Vehicles are expected to be 20% of the total number of Vehicles, and hybrid Vehicles are expected to be 35 % of the total number of Vehicles.