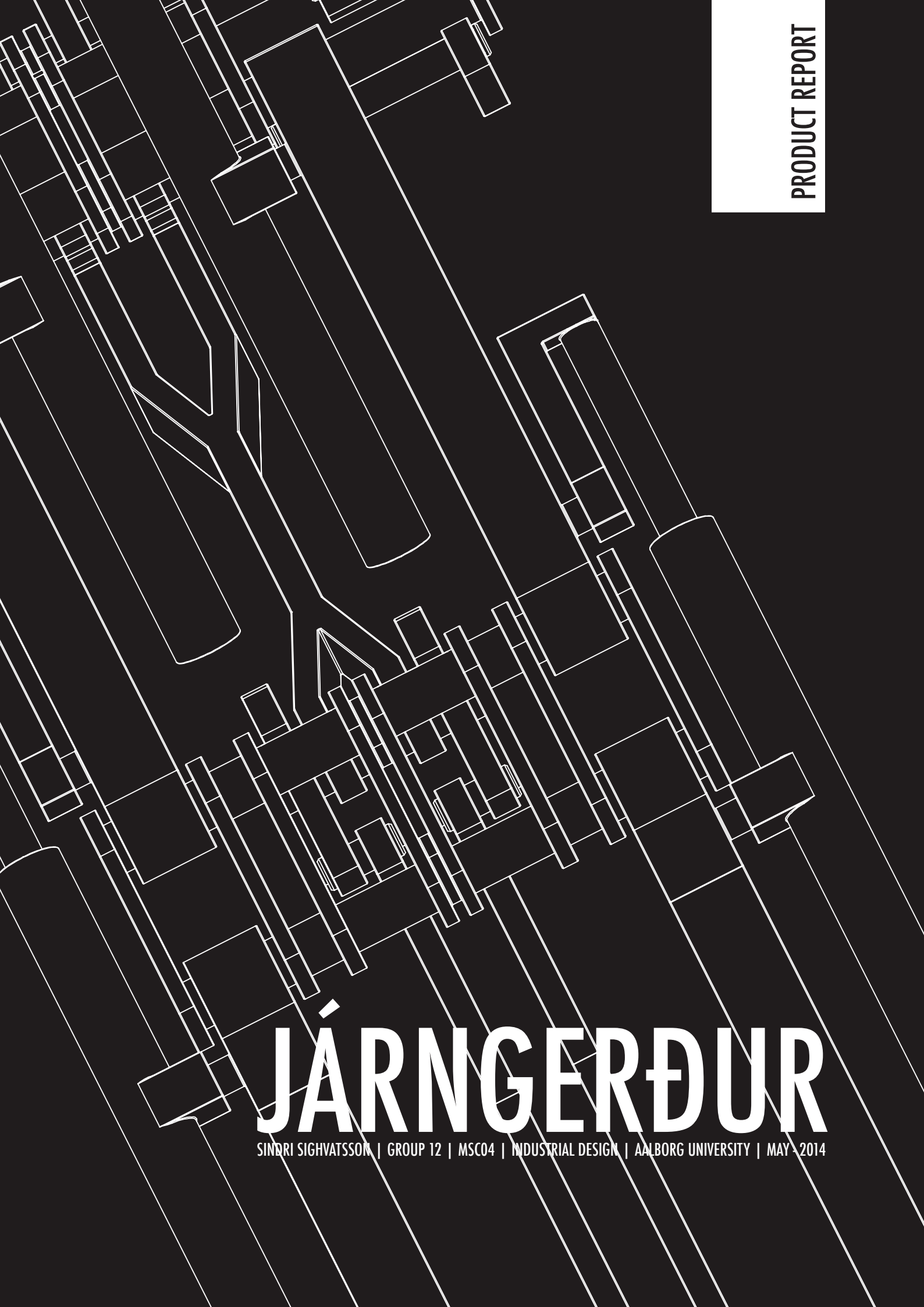
PRODUCT REPORT



JÁRNGERÐUR

SINDRI SIGHVATSSON | GROUP 12 | MSC04 | INDUSTRIAL DESIGN | AALBORG UNIVERSITY | MAY - 2014

ABSTRACT

Reykjavík is a city where people commute mostly by cars. Public transportation usage has been declining through the years.

Járngerður is a concept for an elevated personal rapid transit system (PRT, which is a type of small automatic train system) in Reykjavík that aims to satisfy the needs of the people in Reykjavík and get them out of their cars and back to using public transportation.

Its stand-out feature is that it does not need large specific stations/stops, and instead the pod-cars can stop anywhere, on any street where the rail system is installed, and car parking spaces can be dedicated for the pod-cars as “landing strips”. The way it can stop anywhere is by using a dual rail, and an intuitive built-in crane mechanism that raises or lowers the pod-cars from the rail.

By offering a system that can pick up and drop off passengers practically anywhere instead of at specific stations, drive to the destination in a point-to-point manner instead of a predefined route, while providing privacy through the fact of the pod-cars being personal, the system aims to be a viable public transportation option for the inhabitants of Reykjavík, and raise awareness of unconventional transportation options.

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JÁRNGERÐUR

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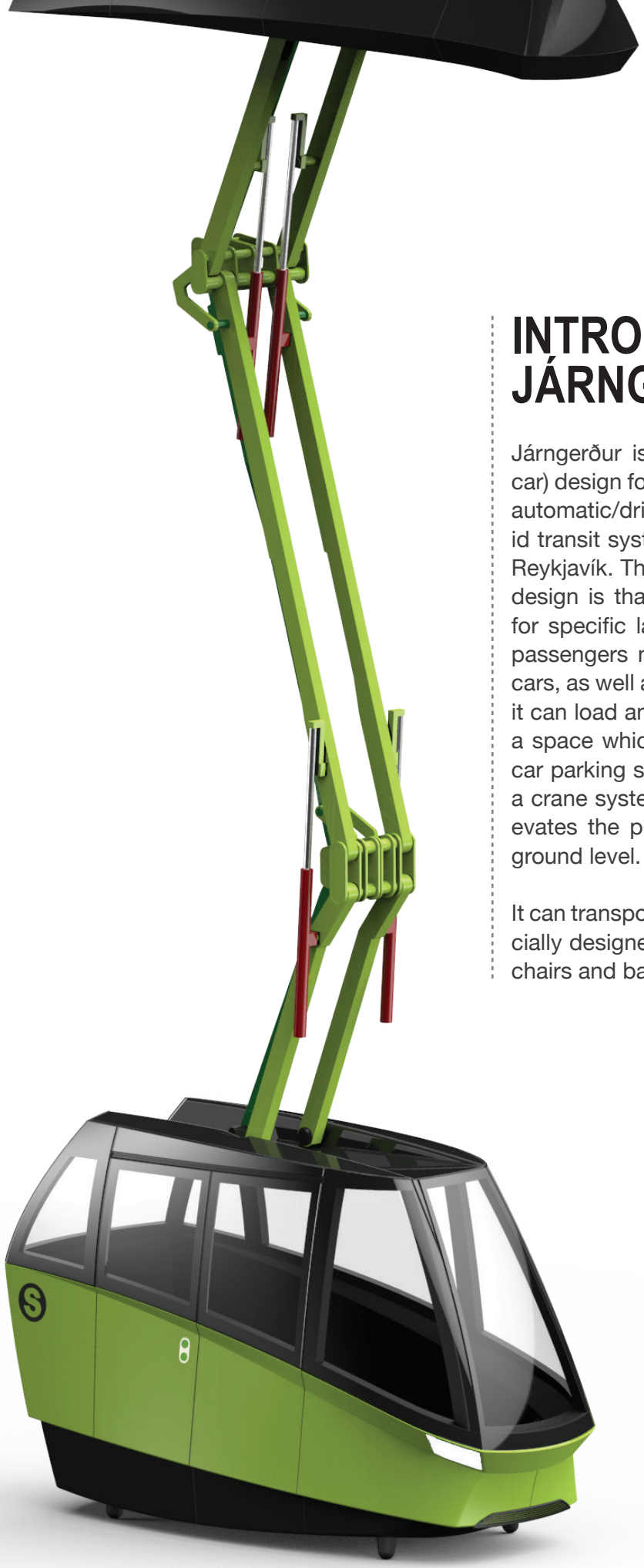
Product Report Pages: 24

Appendix Pages: 12

READING GUIDE & REPORT DIVISION

The project is divided into a process report and a product report. This product report contains a visual representation and description of the main aspects of the final proposal, while the process report contains research, concept work and selected details of the project.

The product report can be read separately from the process report, but for a better understanding of the process, the process report should be read together with the product report, which acts as a visual and explanatory supplement to the process.



INTRODUCING JÁRNGERÐUR

Járngerður is a pod-car (small train car) design for a conceptual, elevated automatic/driver-less personal rapid transit system (PRT) for the city of Reykjavík. The defining feature of the design is that it eliminates the need for specific large stations where the passengers need to board the pod-cars, as well as to disembark. Instead it can load and offload passengers in a space which can be as small as a car parking spot. It does so by using a crane system which lowers and elevates the pod-car to and from the ground level.

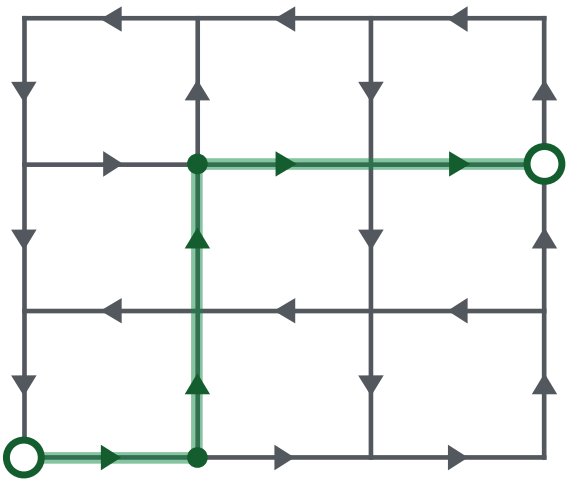
It can transport 4 persons, and is specially designed to fit bicycles, wheelchairs and baby carriages.

SYSTEM OVERVIEW

The rail system is set up as a one-way grid, which the pod-cars use to get to their destinations. It uses two rails, one for traffic, and one for stopping. This means that when a pod-car needs to stop and descend, either to pick up passengers or when it arrives at its destination, it does not hinder other pod-cars in the system.

Where possible, the stop rail is strategically positioned over street side parking as it uses car parking spaces that are reserved for the system, to load and offload passengers. These are marked specially for the system with a green and black pattern.

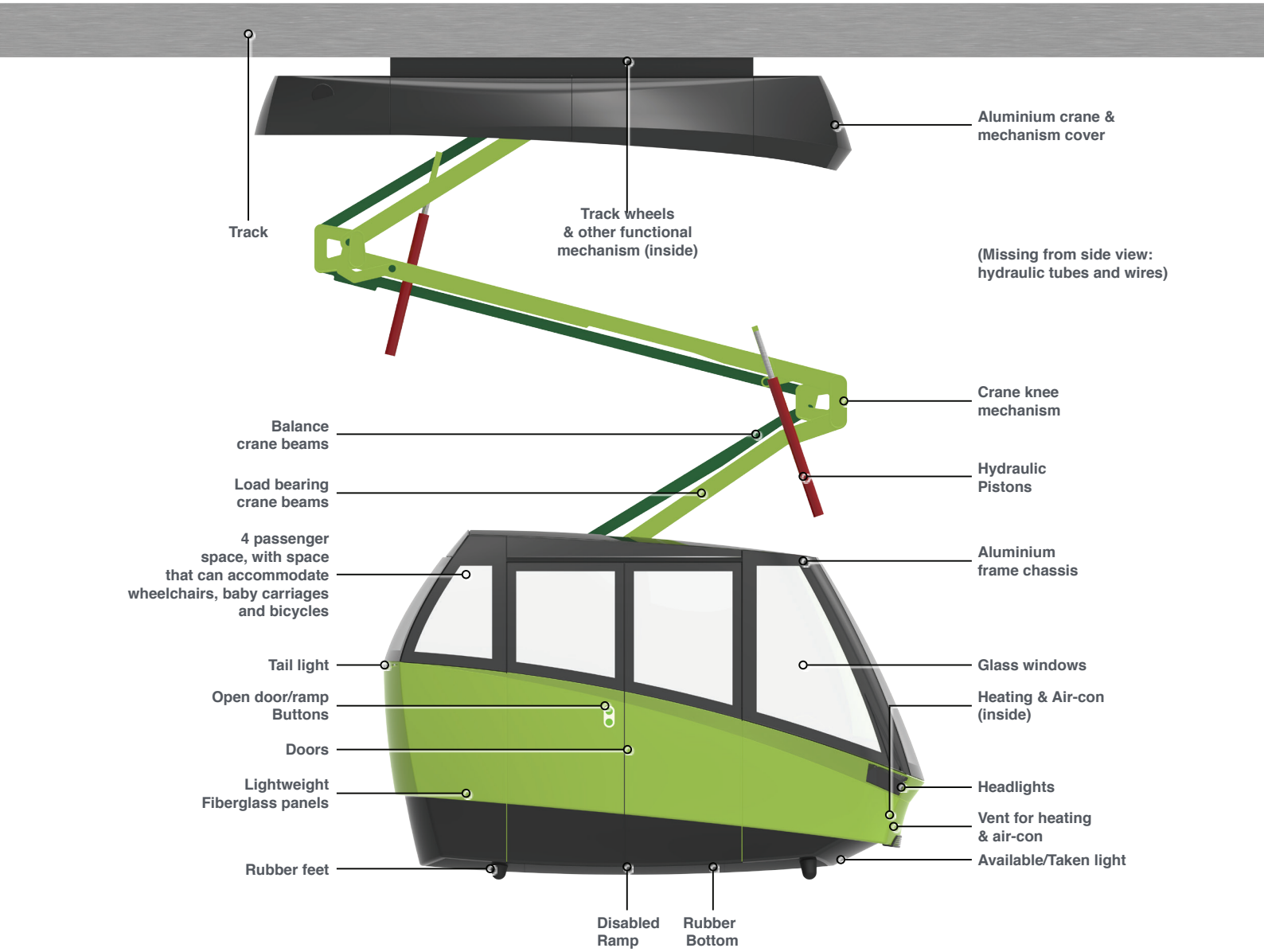
The system uses a grid network topology, and the pod-cars can maneuver over this grid to get to their destination in a point-to-point fashion.



THE POD-CAR

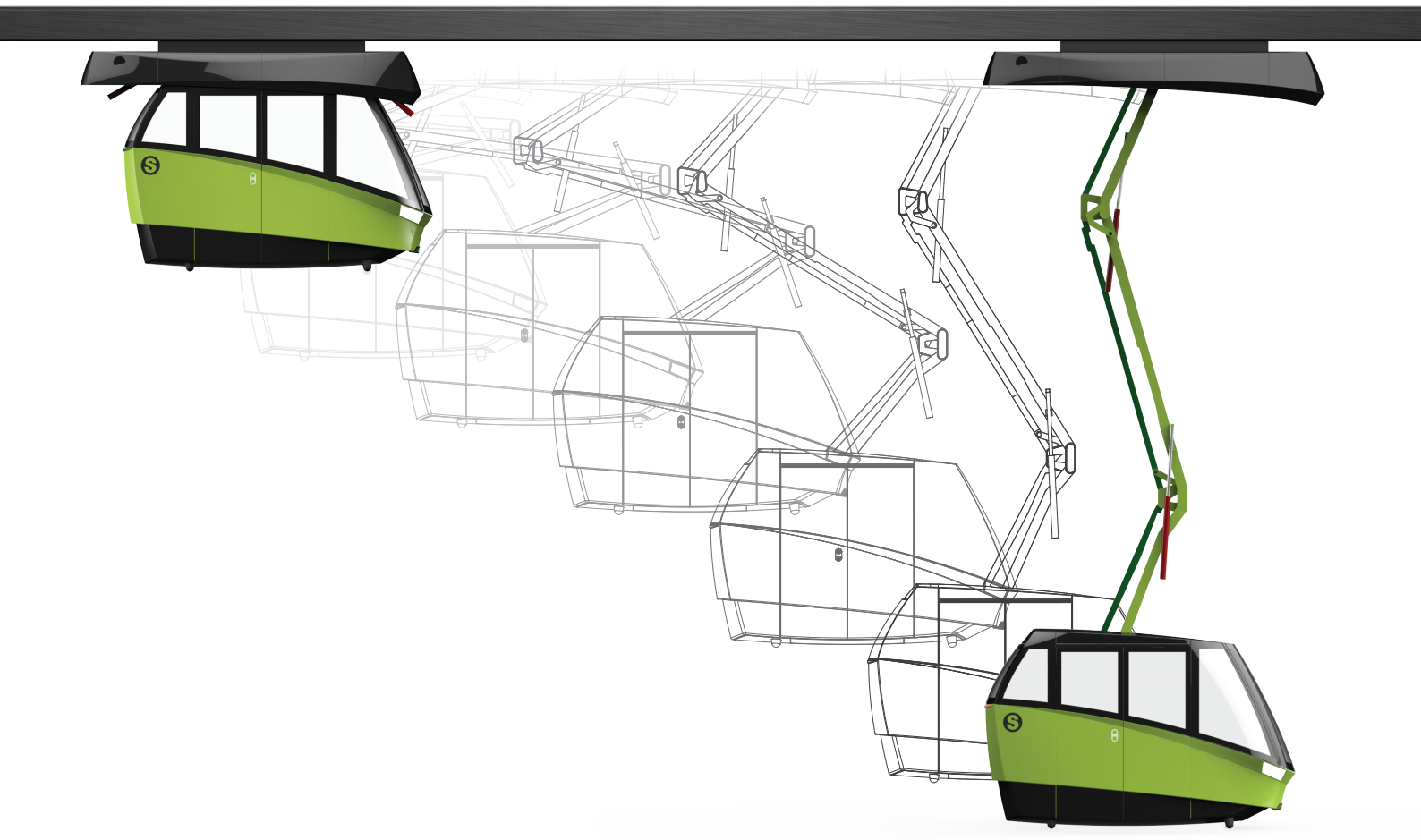
The pod-car is a lightweight vehicle employing materials that keep the weight down, both for energy concerns and to lessen the need for the rail infrastructure being larger. Slow speed (25km/h - 40km/h) means that it is a safe way of commuting, even though on average it is faster than other means of transport.

The size is made as small as possible without reducing the usability and comfort for the passengers.



LOWERING & ELEVATING MECHANISM

The system employs a crane mechanism for lowering and elevating the pod-cars to and from the ground-level. The design of the crane system assures that the pod-cars are always level when ascending and descending. The proposal allows for the standard 5,2 meter clearance over roads, as the crane can extend to around 5,4 meters. The crane uses four powerful hydraulic pistons to lift the cars and the whole mechanism is shielded from the elements when elevated by an aluminum cover. The pod-car only lowers or elevates when stationary.



CAR PARKING SPACES AS STOPS/STATIONS

The rail is strategically positioned over the streets as to make the “stop” rail be directly over side parking spaces, so parking spaces can be marked as being a pod-car stop.

This has the side effect that the more persons that use the system instead of owning a personal car, the more spaces can be used as pod-car stops.

SAFETY

The pod-car employs various safety precautions. It uses sensors on the underside to assess if it is close to the ground, and to make sure no obstructions are in the way. When it descends to the ground it moves slowly for the last meter to make sure persons have time to get out of the way. If the sensors perceive an obstruction, the pod-car stops and makes an alert sound.

The interior features a safety glass hammer, emergency lowering and door opening handle, as well as a emergency radio system to contact emergency services.

An emergency battery is located close to the rail mechanism to allow for safe travel to a secure zone and lower the pod-car in case of a power failure. This is important in the case the pod-car is over road or water when a power failure happens.

Numerous CCTV cameras are throughout the pod-car, to record and monitor the pod-cars for security reasons and prevent vandalism.

USER INTERACTION

The user interaction can be divided into two separate elements: Interaction with an ordering system, which is used to order, or call a car to a specific location, and the interaction with the car itself.

INTERACTING WITH THE ORDERING SYSTEM

The way to order a pod-car is by a website and smart-phone application. The ordering system has the possibility to let the user subscribe to a car arriving at specific times each day. Two fallback methods are also offered; an automatic phone system that can be called whereas the caller is lead through the process of ordering a car, and then strategically placed poles with a button to request a car.

INTERACTING WITH THE POD-CAR

When a car arrives, it shows if it is available, already ordered or not on route (unavailable) by a taken/available status light. When entering the pod-car, user must first put their payment card up against a check-in/payment console inside the pod-car, to be able to select a destination and start the travel. Destination change can be done en-route.

PAYMENT METHOD

The systems employs special payment cards, similar to the Danish Rejsekort. It can be charged online or at specific charging stations which are positioned at selected locations, for example bus stops, etc.

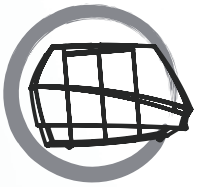
USAGE SCENARIO

To make the usage more understandable, a typical usage scenario outline is listed here below.

You go on the website or open the smartphone app, and request a pod-car to your location. You get an order number / code, which you can use to identify your car. The system tells you where and when the pod-car will arrive and where it will stop and wait for you for 3 minutes. Alternatively you can call the automated phone system or just walk to one of the spots which have dedicated “request pod-car” buttons.

You walk to the specified point, and at the time specified, your pod-car arrives and descends. You enter the pod-car and put your payment card up against the card sensor.

You specify the destination via the on-board touch screen interface.



The pod-car closes its doors, ascends, moves over to the “go” rail, and after a few minutes you arrive at your destination.

The pod-car moves over to the “stop” rail and then descends. When at the ground, the door opens and you disembark.

EXTERIOR DESIGN

The design of the pod-car takes inspiration from automobiles to give them a hint of familiarity for the inhabitants of the city, for example with the headlights and tail lights and obvious difference between the front and back section. The shape inspiration comes mostly from eighties cars to arrive at a retro aesthetics that includes hard lines with a touch of softness. Attempt is made to camouflage the height of the pod-car with a low cut and a black underside. Dark glass covers the whole upper part and the windows are bonded to give a border-less look. The bottom features a rubber bottom and feet.

INFRASTRUCTURE POSSIBILITIES

As there is no need for large stations or stops, the rail has more possibility of being installed in smaller streets where other kinds of rails would be impossible to be set up. This means that the possibility of putting up the rail infrastructure where needed is increased, as well as the area needed for the infrastructure is decreased.

The rail infrastructure is based on a one-way grid system with a dual track (one for driving and one for stopping) which is relatively easy to modify and grow with time because of the fact that the track is elevated. This means that the system could be set up first where most needed, and then expanded as required.

1. Downtown area & east town
2. Denser plan
3. Expansion to other neighborhoods and further denser plan

USER INTERFACE

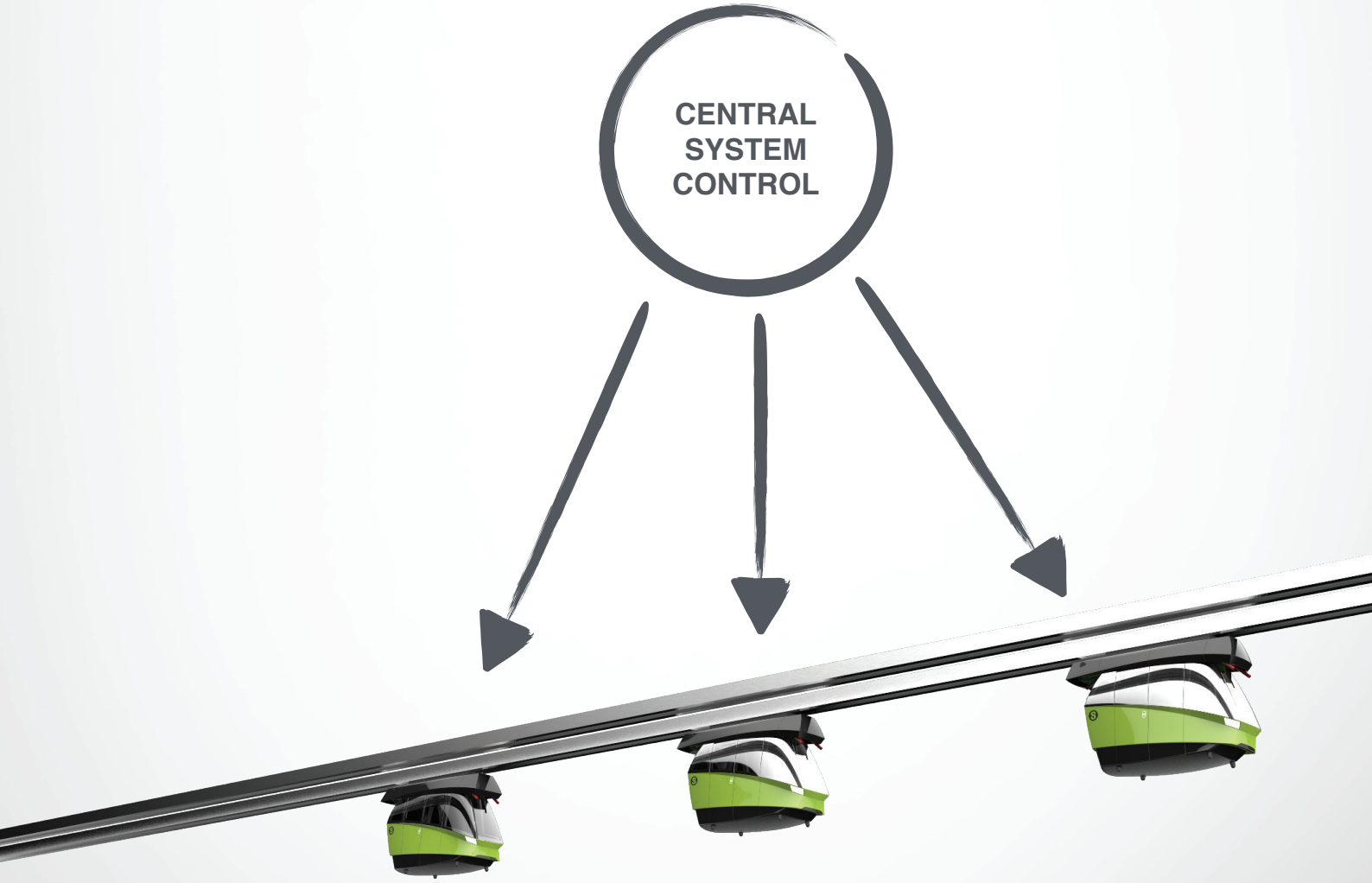
The user interface is intuitive and easy to navigate and understand. Both the website and the smart-phone application allow for charging the payment cards and subscribing to getting a pod-car sent at specific times every day as well as just ordering a pod-car. The system also shows the load on the system based on areas of the city, and can show estimated waiting time in each area.

The interface of the touch system in the pod-car is intuitive as well and makes it easy to select or change destination.

AUTOMATIC CONTROL

The whole system is automatic and monitors distances between cars, demand for cars and so forth. It is self-learning system that with time, will learn the demand for cars in relation to different times of the day and week and send out the calculated needed amount of cars at every specific time of the day. The system can be manually overridden when needed, for example on holidays and specific days when traffic is foreseen to be greater or less than normal, and the demand for cars more or less.

The cars themselves are completely controlled by the central system control.



DISABLED ACCESS

The pod-car employs a wheelchair ramp to ease the access of disabled. The interior is specially sized to be able to accommodate a wheelchair. Handles are in strategic locations to ease the entry and movement of the disabled and elderly.

The ramp is engaged by pushing a button which is located on the door along with the “open door” button.

3RD PARTY POD-CARS

The possibilities for 3rd party pod-cars are endless. It could be foreseen that the mail service, pizza deliveries and many other services could have and use their own cars which would be in the company brand colors and markings.

ENVIRONMENTALLY FRIENDLY

By using the clean renewable energy in Iceland, Járngerður does its part in reducing pollution and CO2 emission. By offering a personal point-to-point public transportation option for the inhabitants of Reykjavík, Járngerður hopes to reduce the usage of cars in commuting and general travel within the city limits, and by that, reduce the usage of fossil fuels, improve the air quality and promote a more sustainable city.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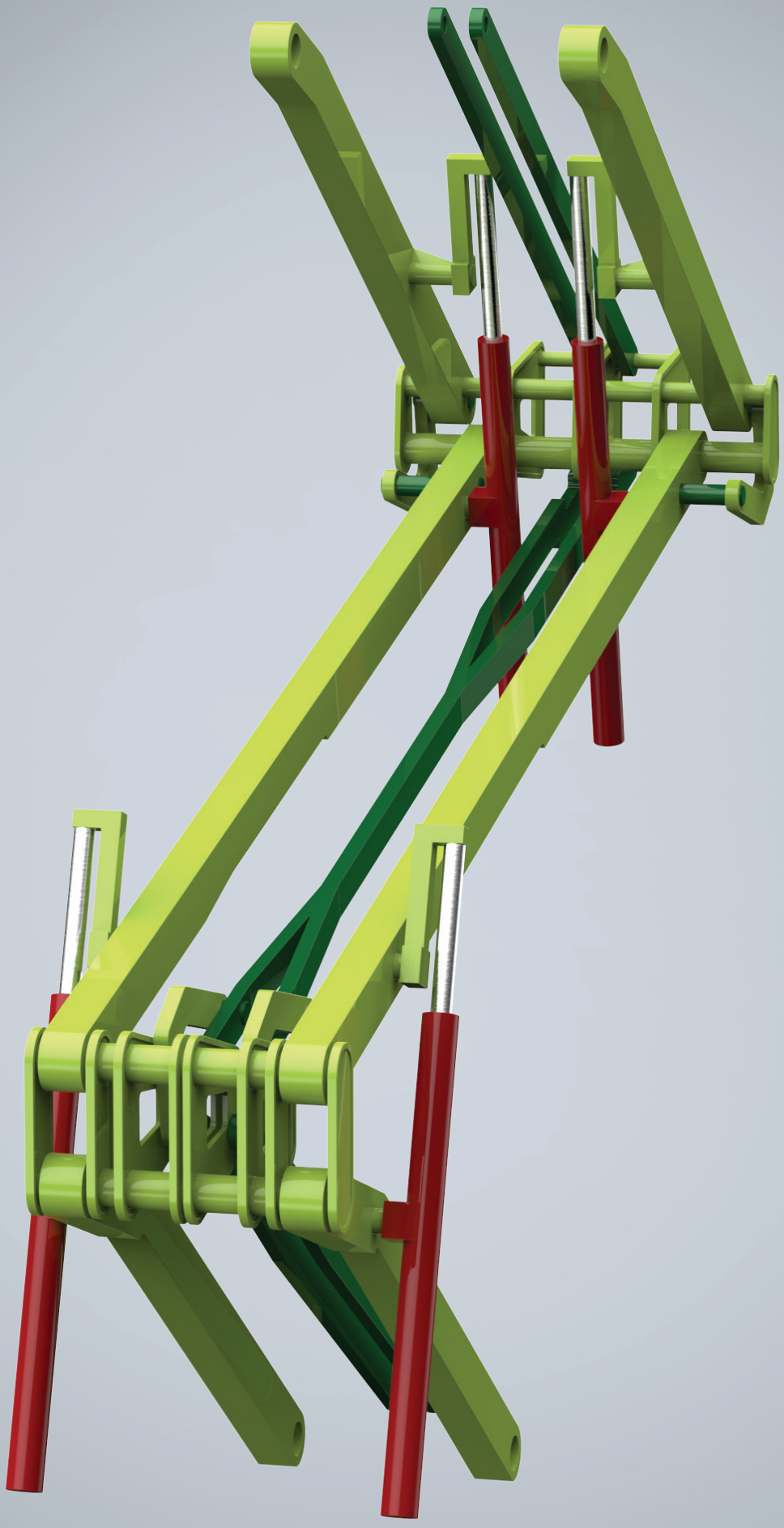

Dedicated to mom and dad