



The logo for NIDays Engineer Next is centered on a blue gradient background. It features the text "NIDays" in white, enclosed within a white rectangular border. To the right of this, the words "ENGINEER" and "NEXT" are stacked vertically in a large, bold, white sans-serif font. A yellow graphic element, consisting of three parallel lines forming a stylized arrow or chevron shape, is positioned between the two words, pointing towards the right. The background is decorated with several diagonal stripes: a wide green stripe, an orange stripe, and a red stripe on the left side, and several blue stripes of varying shades on the right side.

NIDays **ENGINEER**
NEXT



Tensile Machine - Static bench AV 015

AV R&D s.r.o - Czech Republic

Ing. Petr Dítě

www.avrnd.eu

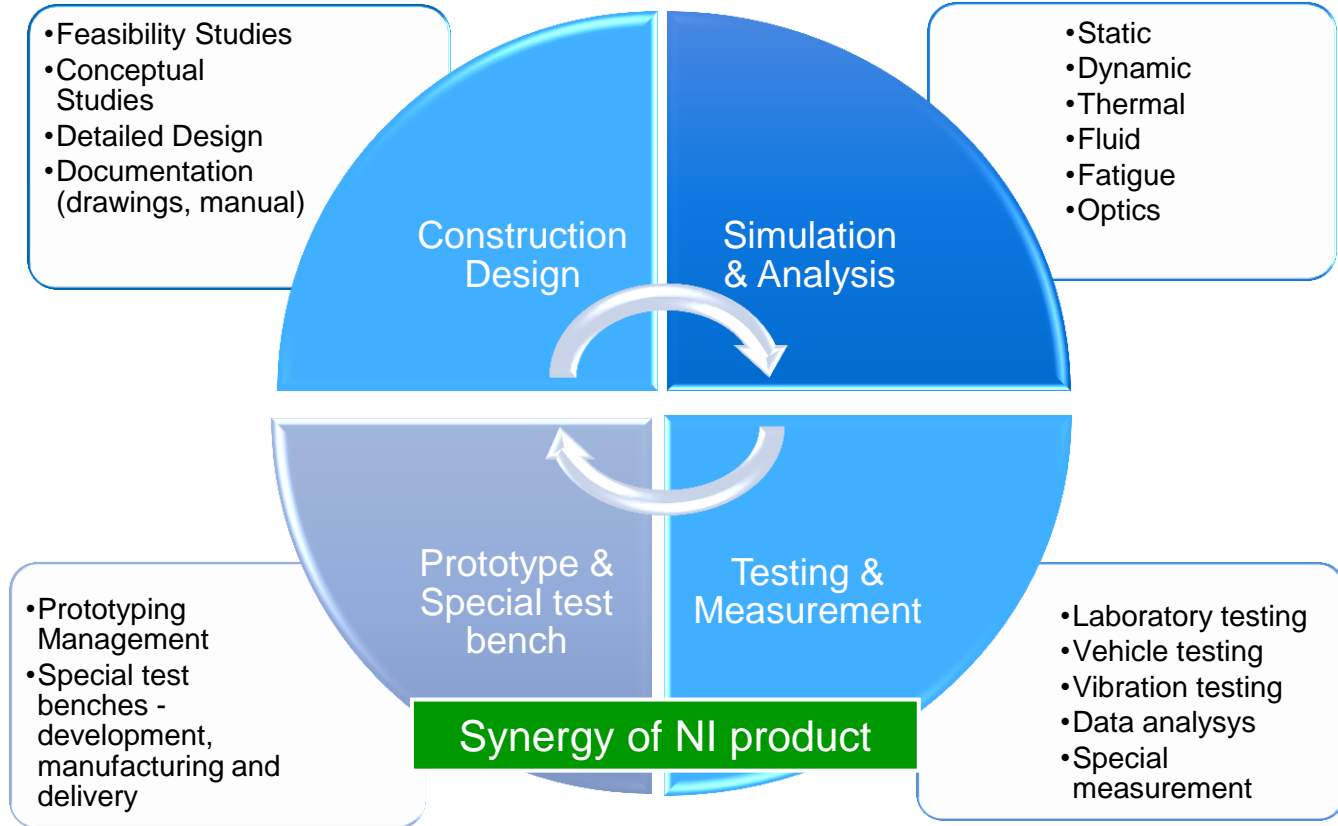


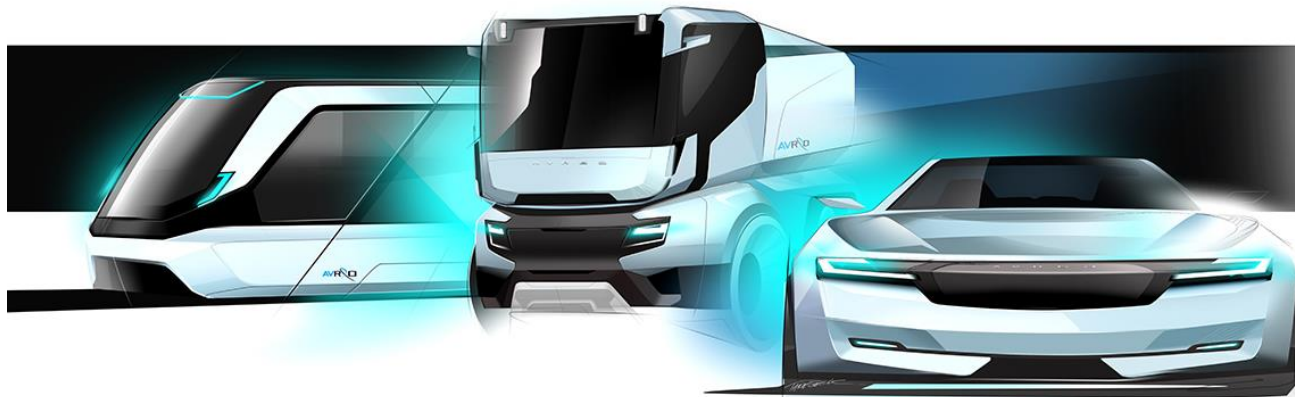


Company introduction

- AV R&D (AV ENGINEERING) was founded in 1993.
- AV R&D is a leading Czech company oriented on the development of products in mechanical engineering.
- We provide services in the area of the development, construction, simulation & analysis, prototypes & special test bench, testing and measurement of new mechanical engineering products.
- **AV R&D (AV ENGINEERING) is NI Alliance partner since 2014 for special test stands and special testing methodology (HW and SW) development.**

Development services of AV R&D





LAB & TRACK TESTING



EIGEN FREQUENCY

VIBRATION



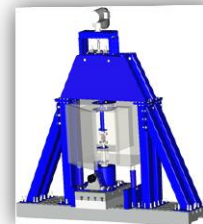
STRAIN GAUGES



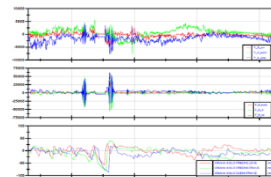
SW CONTROL



SEMI-AUTOMATIC



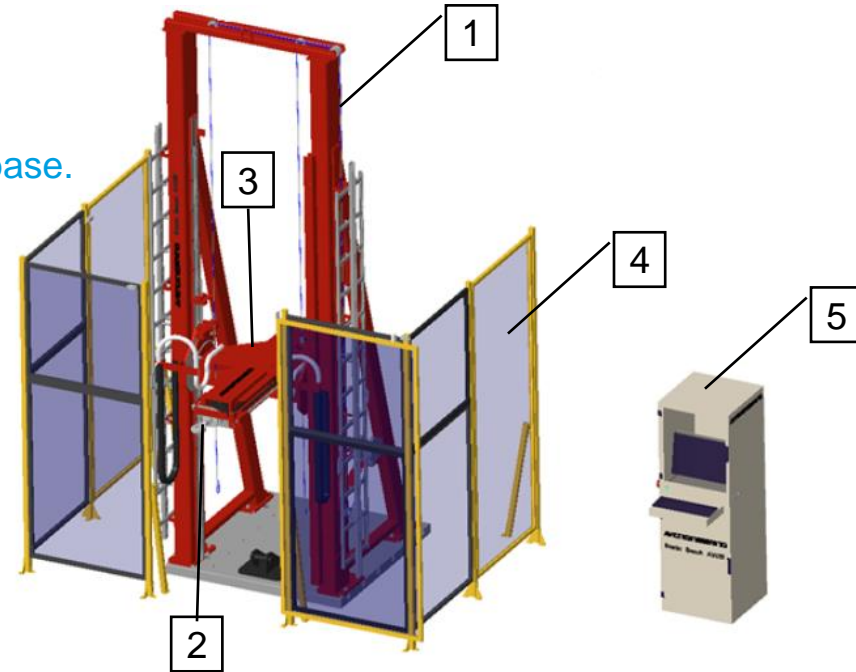
DATA ANALYSIS



Machine description:

The special test stand for vertical tensile tests:

1. Steel welded frame with assembled crossbar and fix base.
2. Movable crossbar in the vertical position from 1380 up to 2380 mm.
3. Actuator - Maximal force - 70 kN, stroke 2000 mm
4. Safety fence with safety regimes
5. Control box with HW and SW



Control software options

- Tester is controlled by PC
- SW control of static bench is manual and automatic
- SW allow programmable interface that allow to move programmatically (relatively and absolutely)
 - Set and hold desired force
 - Stop movement after reach some parameter (position, force, force drop).
- SW allow to make repeatable test loop.
- SW allow possibility to automatically fill premade template (MS excel, word) based on measured data as a test report
- Tester provide graphs (Force on Time, Force on displacement)

NI 9375 (5 DI – safety digital inputs, presentation sensors)

RS232 communication with
frequency converter of servo drive

Embedded UI

LabVIEW
Real-Time
Graphical Development,
Real-Time Results



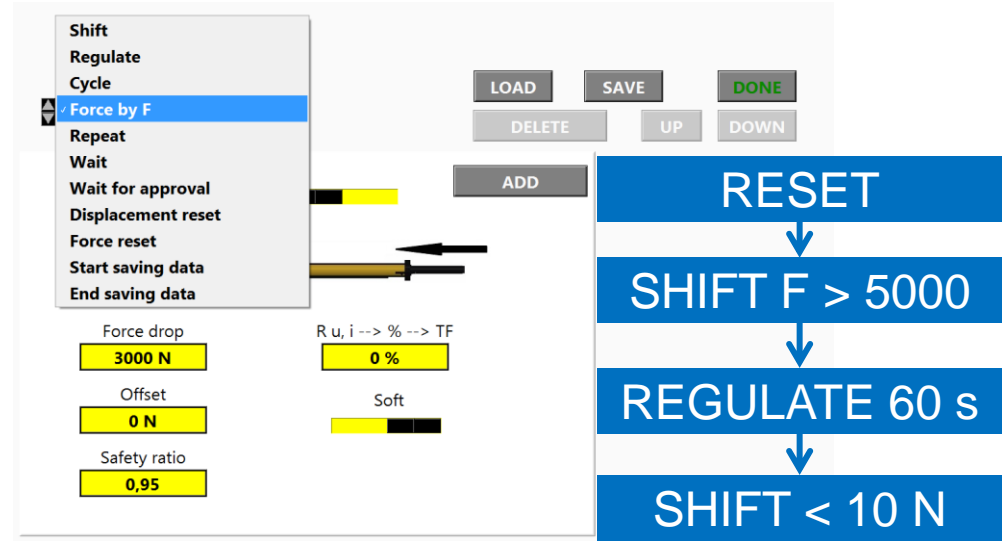
Inputs in FPGA mode –
high speed for encoder inputs

NI 9381 (5 AI – angle, displacement sensor, encoder)

cRIO – 9030

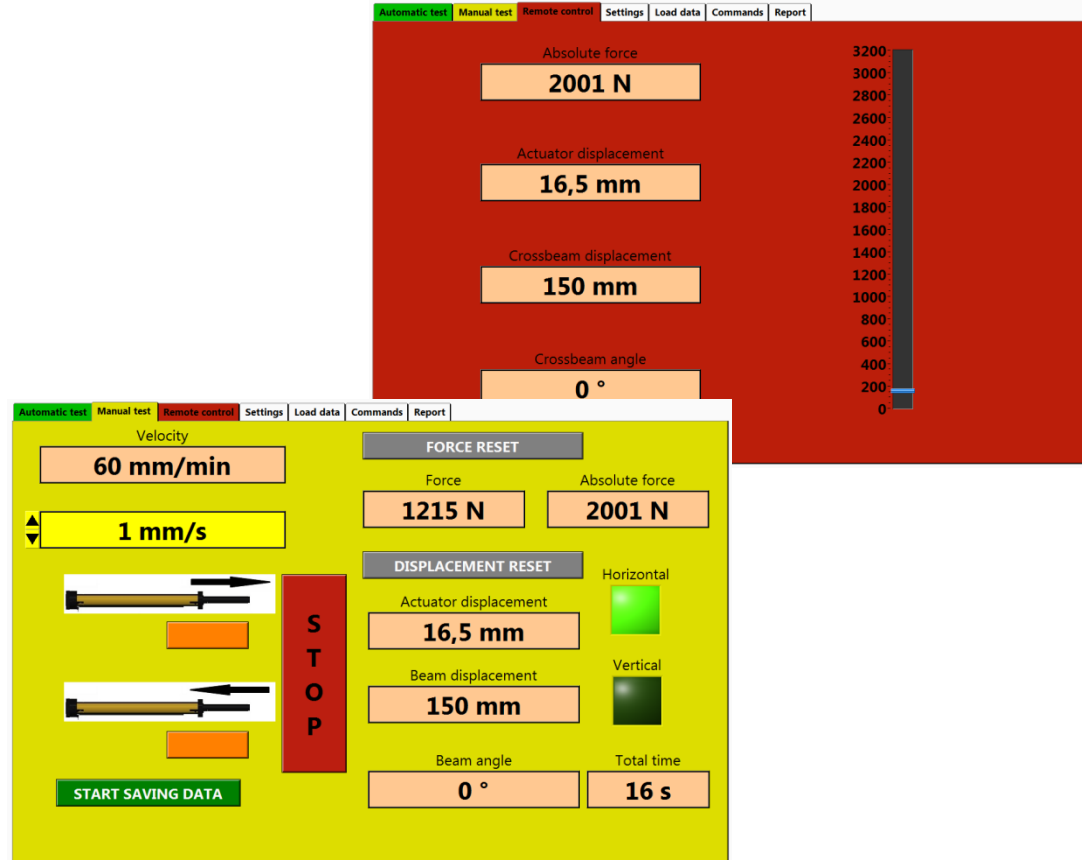
NI 9237 (1 bridge AI – Force sensor)

- “Programming” UI
- 11 commands for test program
 - Action commands (shift, regulate, cycle, force by F)
 - Saving commands (start/stop saving data)
 - Control commands (Repeat, Wait, Wait for approval)
 - Displacement reset
 - Force reset
 - Start saving data
 - End saving data
- Program execution
 - Sequential program execution with repeat function possibility
- Load/save test program

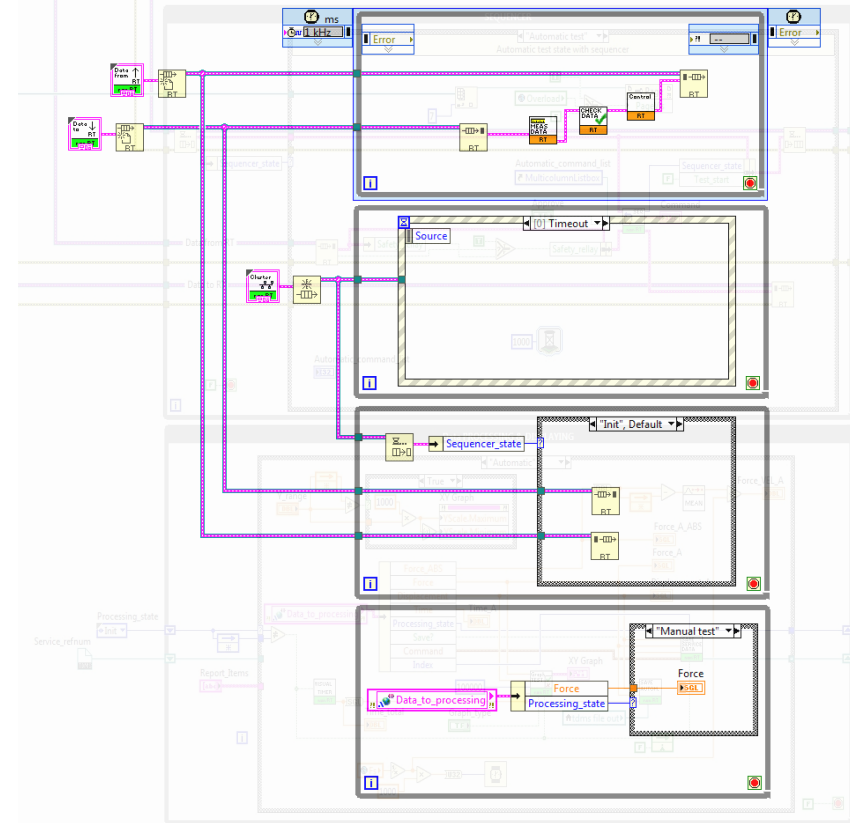


SW design – front panel design

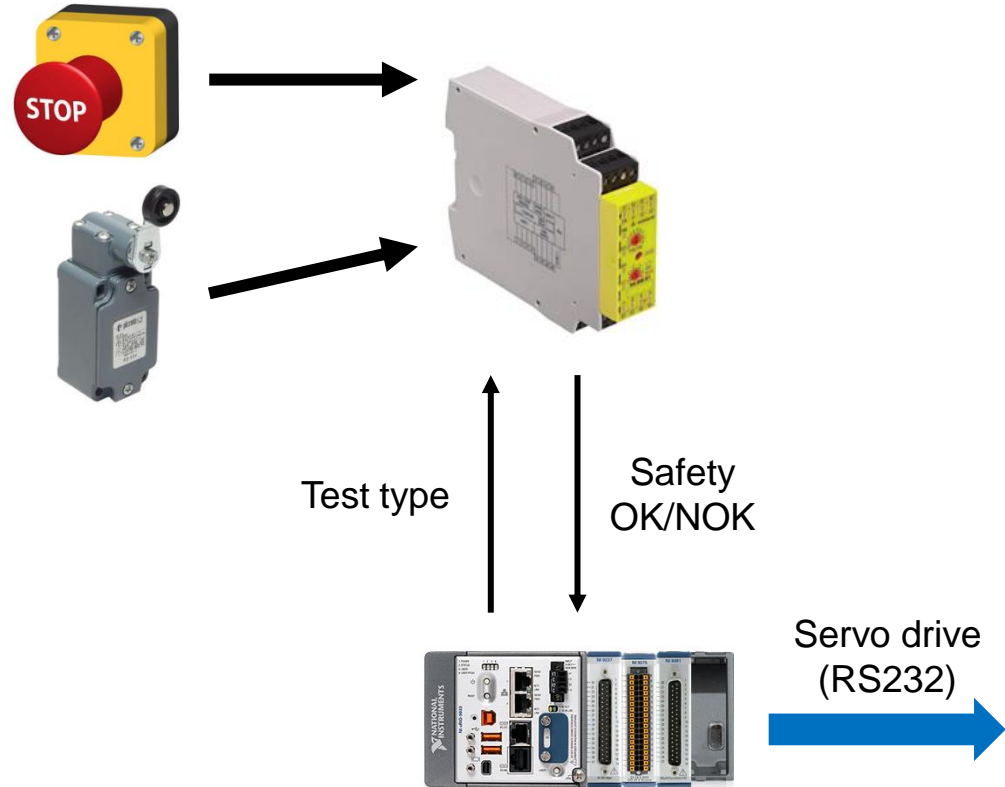
- Different control modes
 - Automatic test
 - Manual test
 - Remote control
 - Overload
- Automatic saving of operational data
- Loading of saved data for quick search of force drops etc.



- RT loop
 - 1 kHz: Measure – Check – Control
- UI loop
 - Embedded UI interaction
 - Event structure
- SEQUNCER loop
 - Controls all other loops
 - Major function in Automatic program execution
- DATA SAVE & DISPLAY loop
 - Saving data in Manual/Automatic regime
 - Displaying data



- Cooperation between cRIO & safety relay (SIL 3)
- Safety functions
 - HW (stop buttons, safety module)
 - SW (maximum force, maximum displacement, limits)
- Software force limitations
 - 4 force sensors (5 kN, 20 kN, 50 kN, 100 kN)
 - 2 type of test (horizontal: 30 kN, vertical: 70 kN)
 - Remote control regime (150 N)

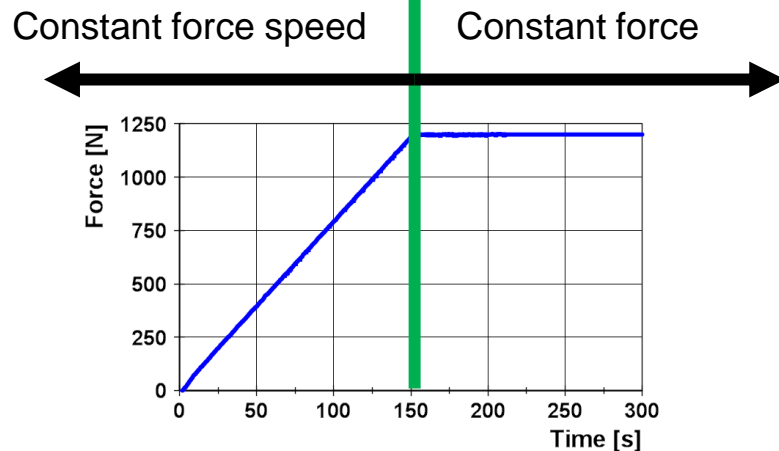


▪ Force speed

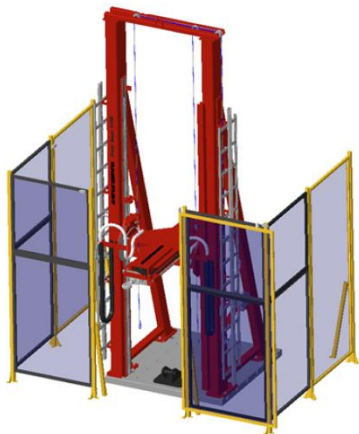
- Regulation to constant Force speed up to required Force
- Parameters:
 - Force drop
 - Direction
 - Offset

▪ Regulate

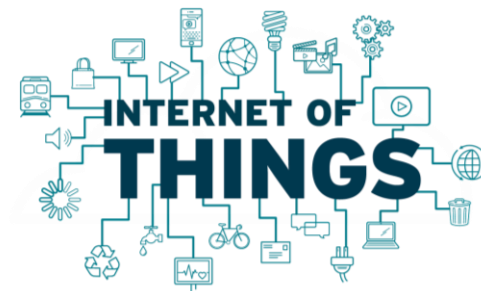
- Regulation to constant force for a required time
- Limits:
 - Maximum force
 - Minimum force
 - Maximum displacement
 - Minimum displacement



Project

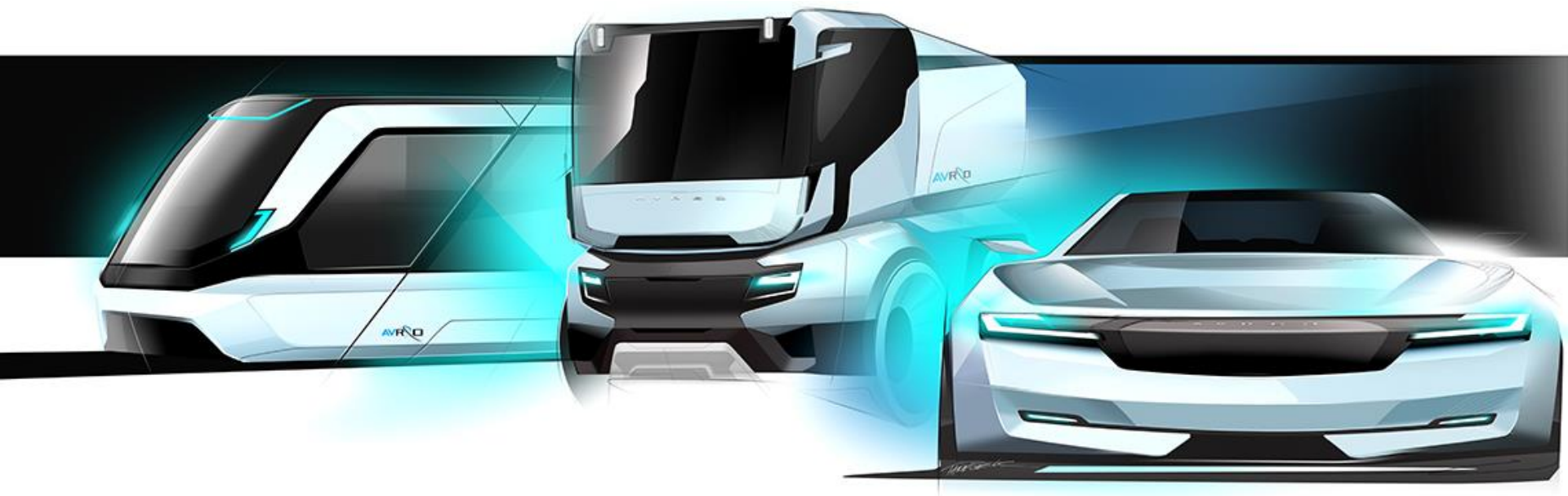


Reality



Future
Development





Thank you for your attention

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