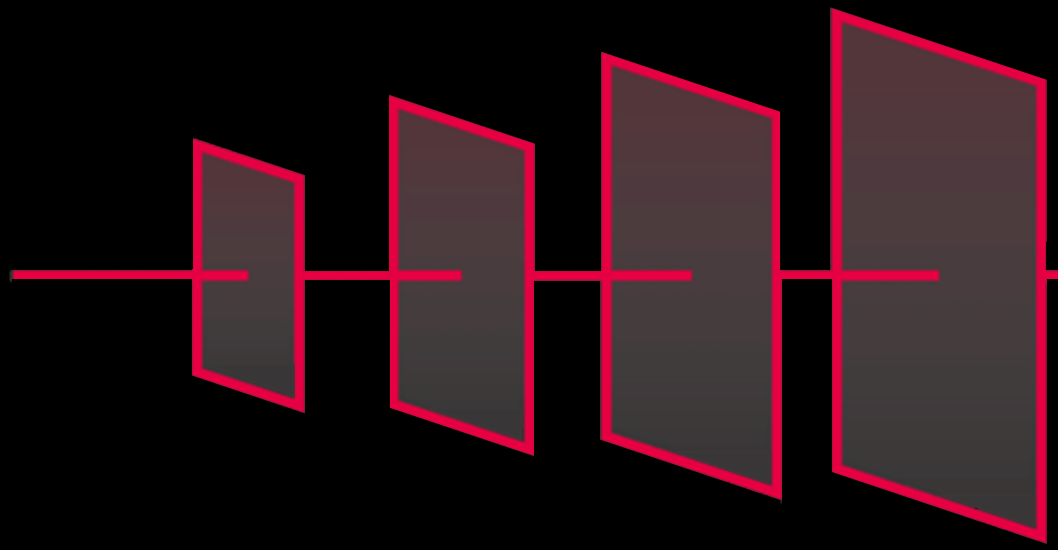
EPLAN EFFICIENCY DAYS 2023

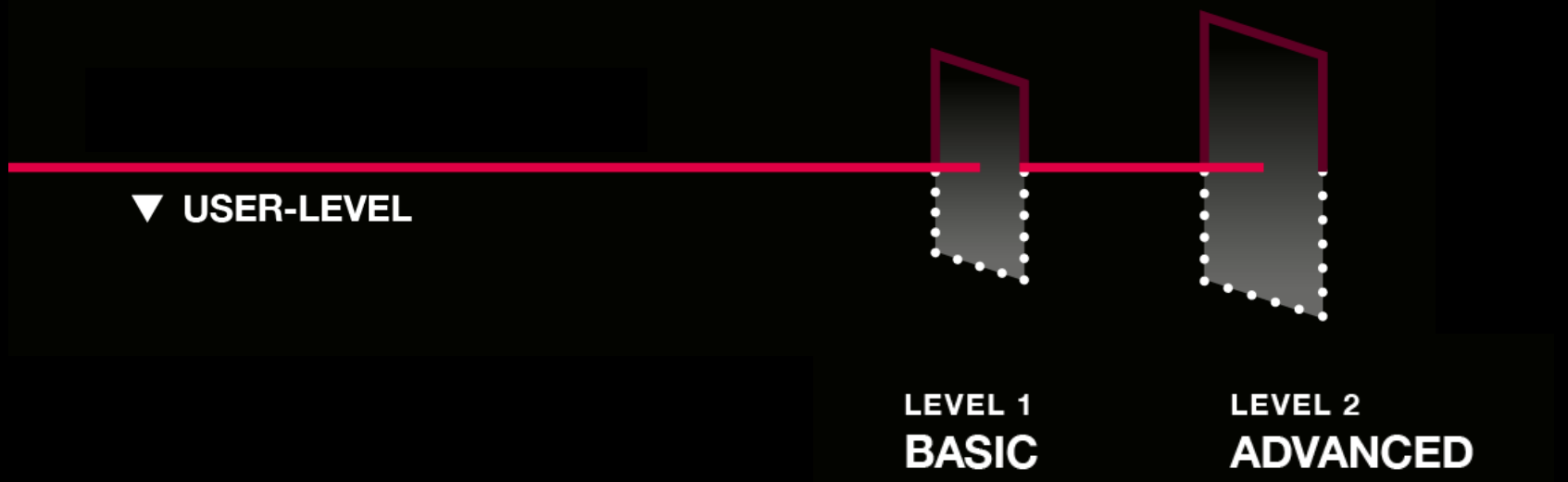
USER TRACK

Van kabelboom naar machinebekabeling



EFFICIENCY DAYS 2023

breakthrough 4 tomorrow


USER-LEVEL
LEVEL 1
BASIC
LEVEL 2
ADVANCED
PRODUCT LEADERSHIP
FUNCTIONAL EFFICIENCY

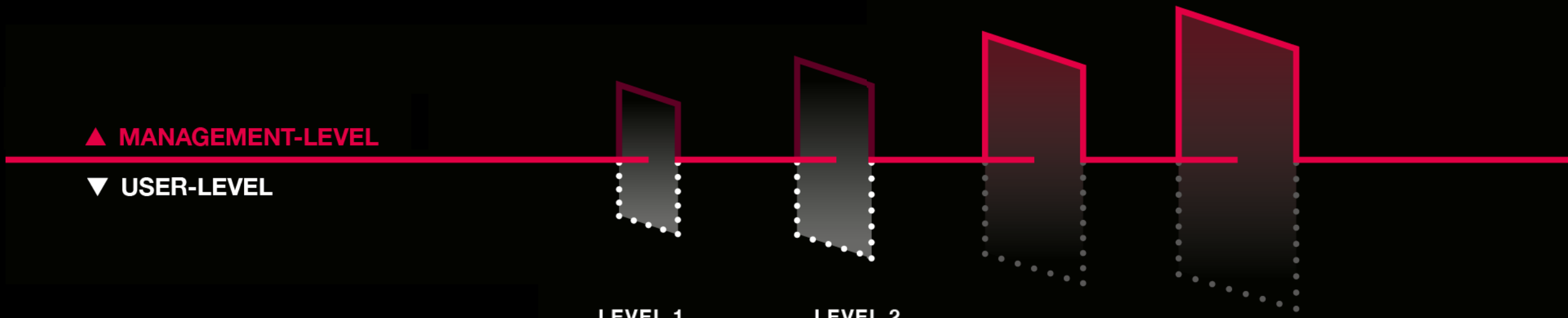
4 LEVELS OF

Digital Transformation Strategy

CUSTOMER INTIMACY
FULLY INTEGRATED

LEVEL 3
EXPERT

LEVEL 4
EXECUTIVE



▲ MANAGEMENT-LEVEL

▼ USER-LEVEL

LEVEL 1
BASIC

LEVEL 2
ADVANCED

PRODUCT LEADERSHIP
FUNCTIONAL EFFICIENCY

Harness

WIKIPEDIA
The Free Encyclopedia

Search Wikipedia | Search

Harness

5 languages

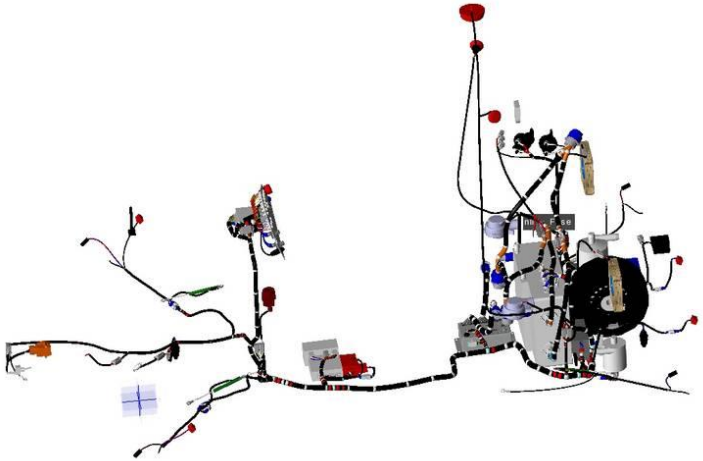
Article | Talk | Read | Edit | View history | Tools

From Wikipedia, the free encyclopedia

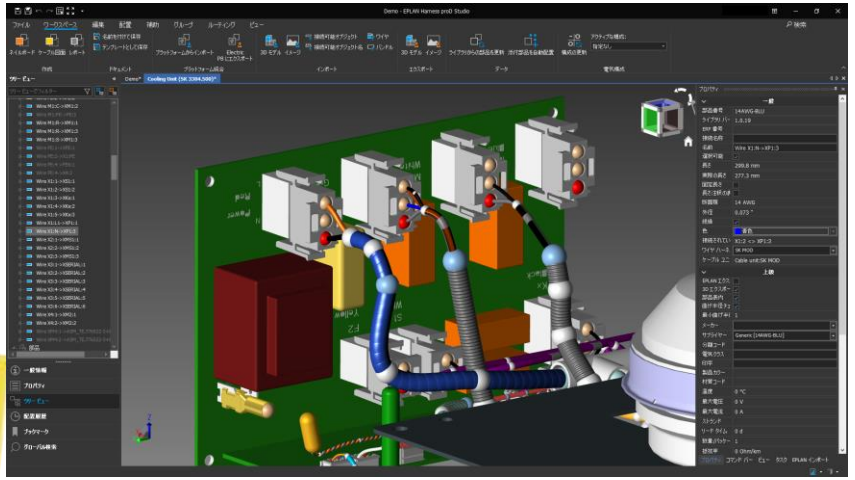
A **harness** is a looped restraint or support. Specifically, it may refer to one of the following harness types:

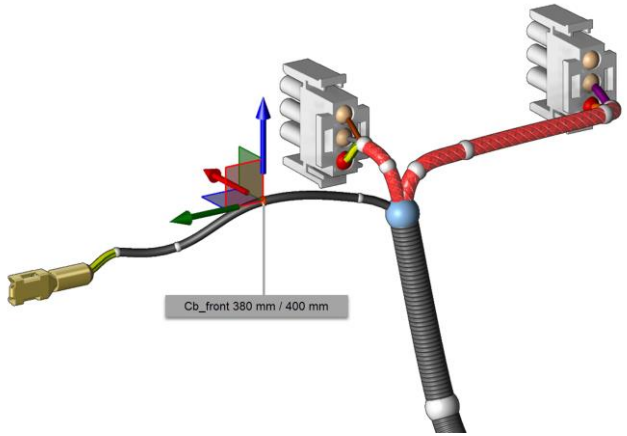
Look up *harness* in Wiktionary, the free dictionary.

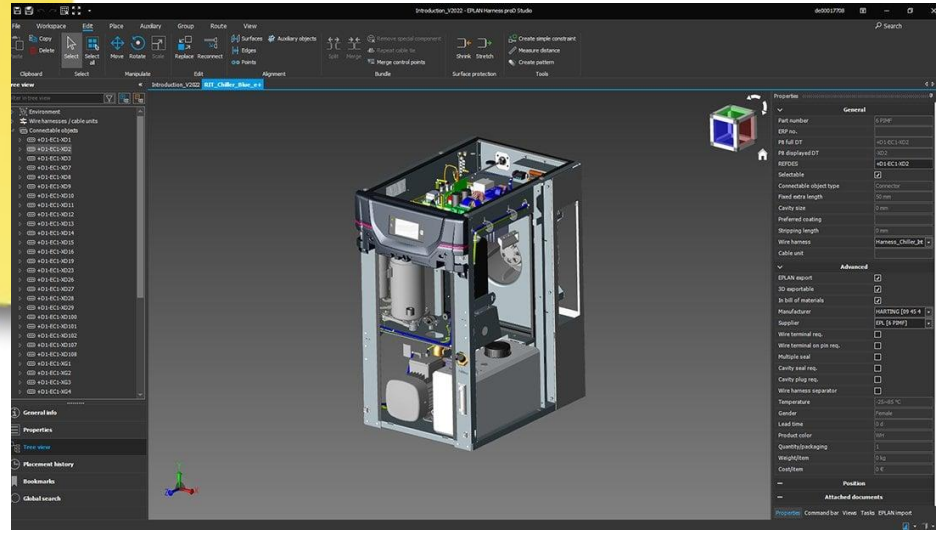
- Bondage harness
- Child harness
- Climbing harness
- Dog harness
- Pet harness
- Five-point harness
- Horse harness
- Parrot harness
- Safety harness
- Windsurfing harness
- The backpack straps of a breathing apparatus



Harness proD







PROCESS CONSULTING | ENGINEERING SOFTWARE | IMPLEMENTATION | GLOBAL SUPPORT

EPLAN
EFFICIENCY DAYS 2023

Robin
Senior Consultant

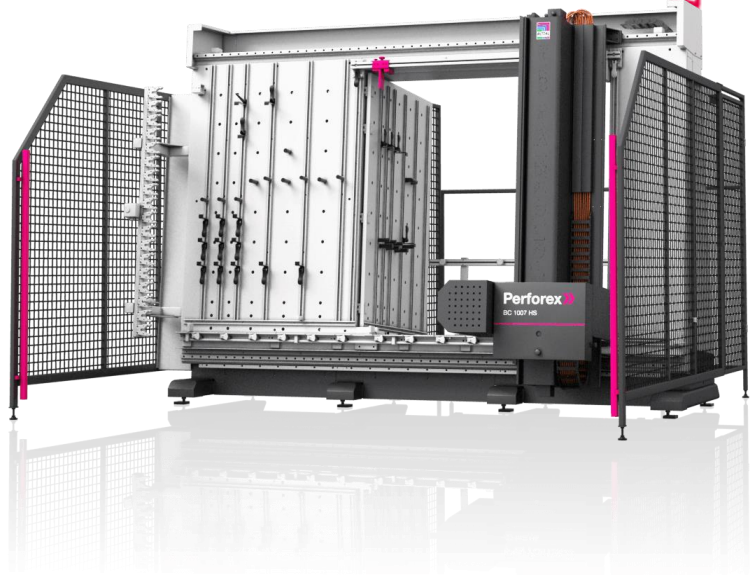
Lukas
Business Owner Rapid Design

Special vehicles

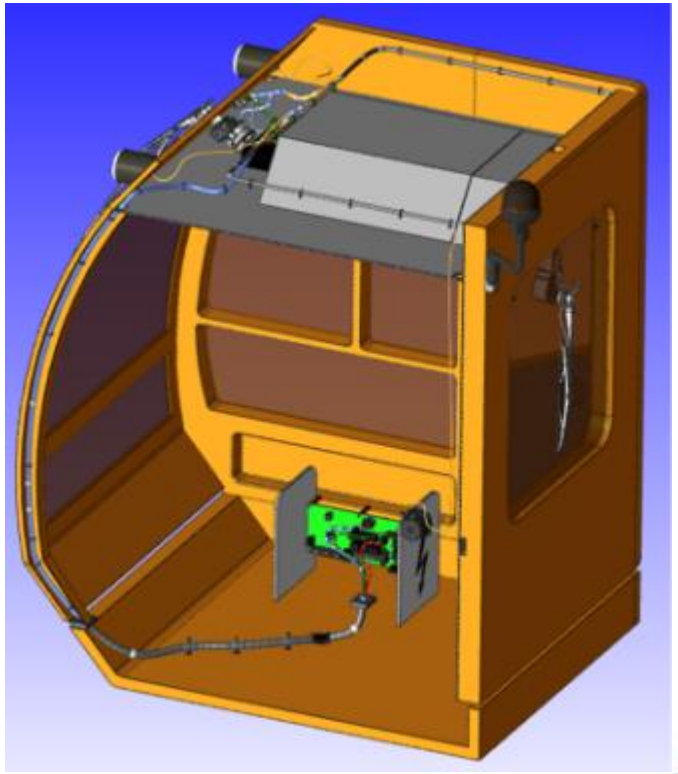
Machine cabling

ePLAN Harness proD

Device cabling

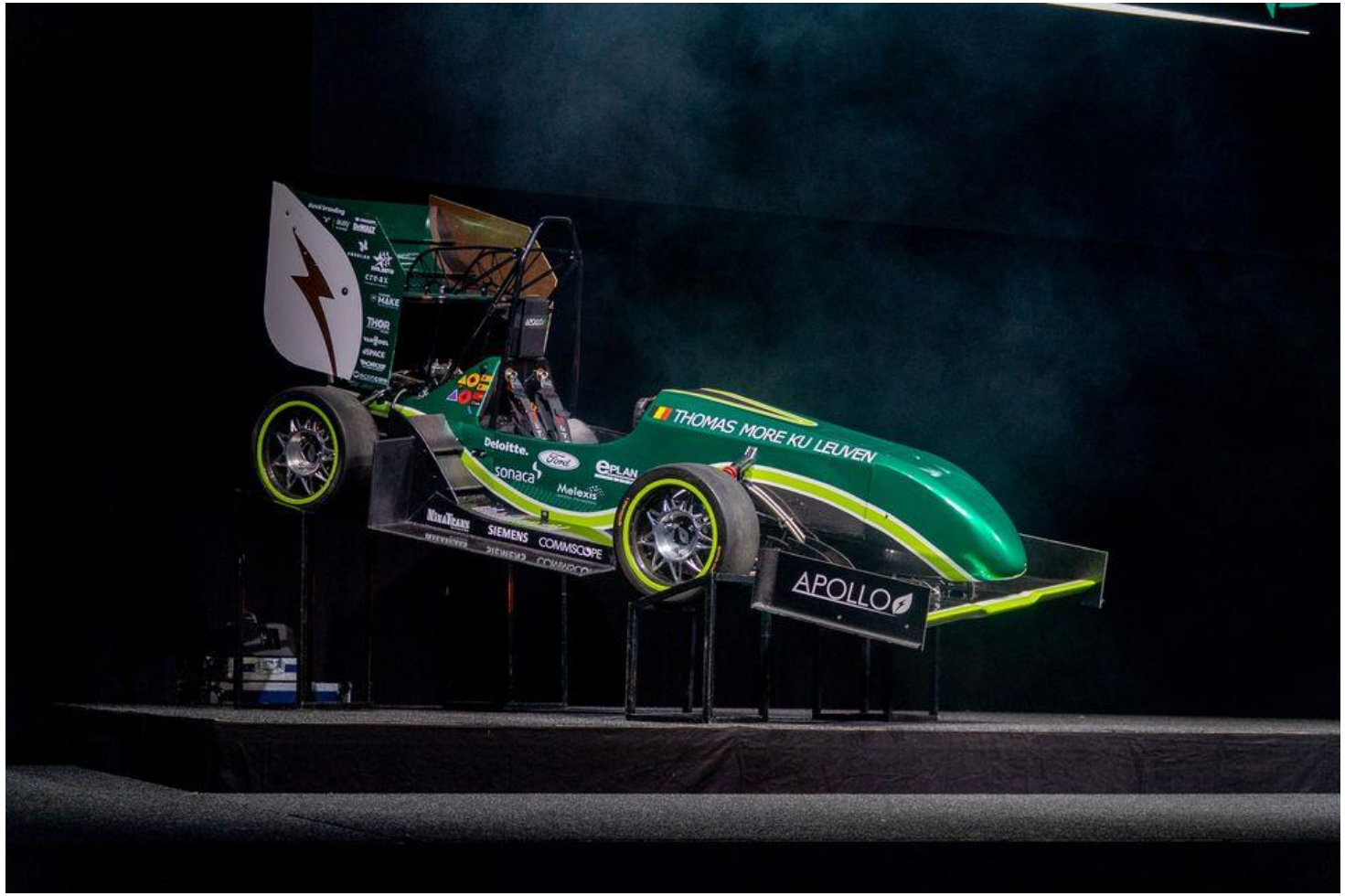


Special vehicles



Special vehicles

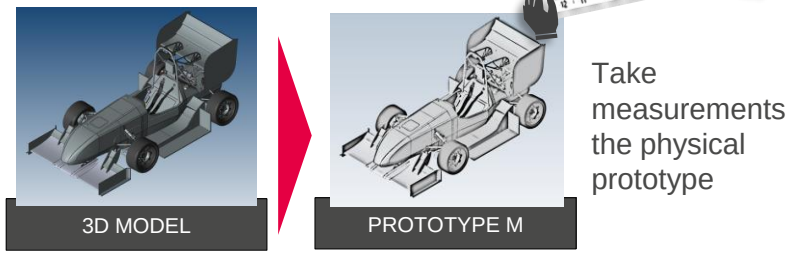
Formula Electric Belguim



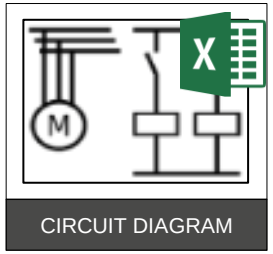
Challenges in Special Vehicle

Example typical process

3D + Circuit diagram design → Prototype → Wire Harness Design → Wire Harness Prototype → Assembly → Wire Harness Documentation

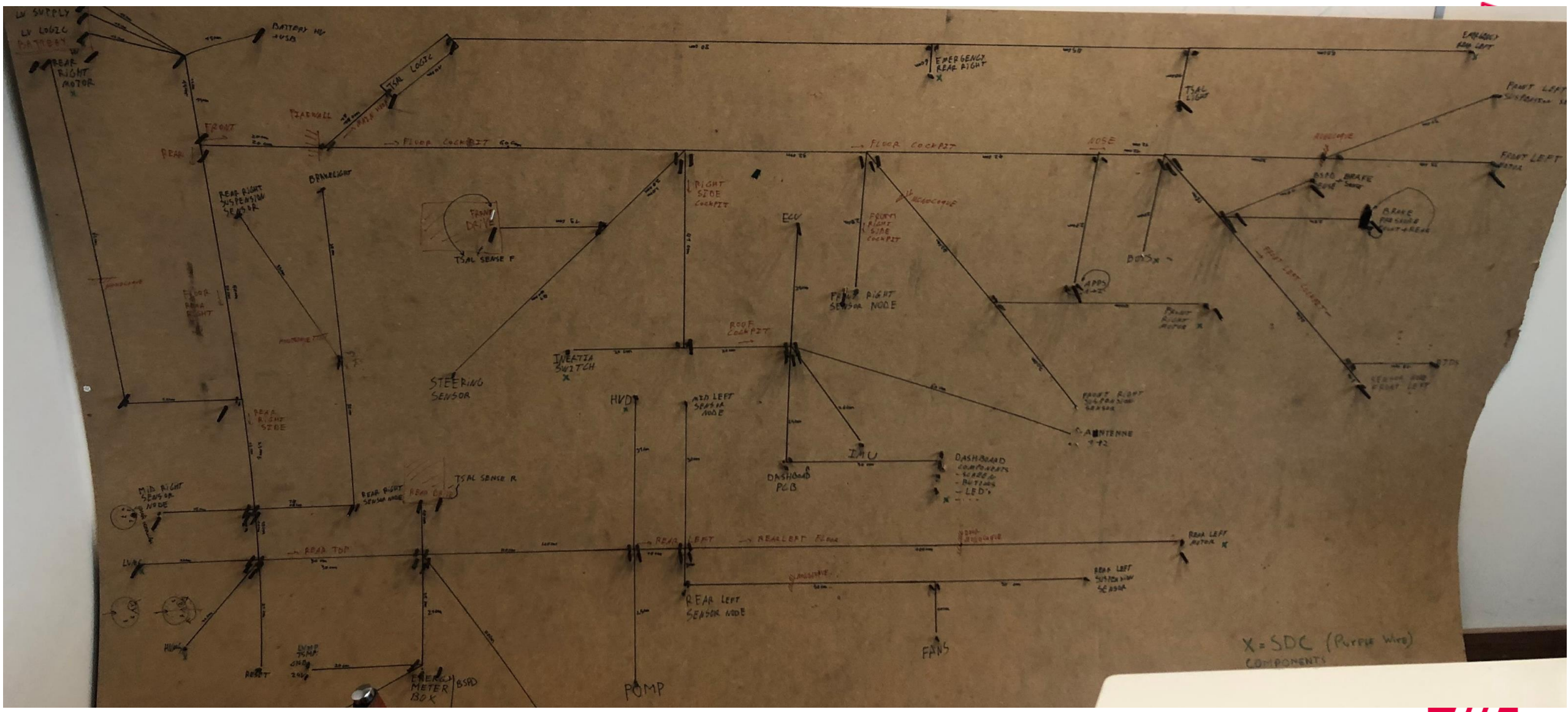


Take measurements of the physical prototype



- Mechanical 3D Model
- Max. Circuit Diagram incl. various sections intended to support the production

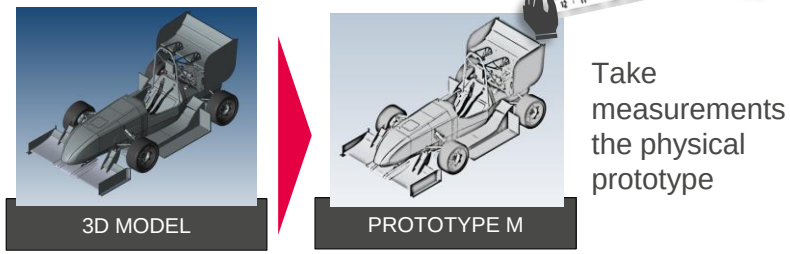
- Wire harness layout manually drawn
- Feedback concerning space availability from the mechanical department


LV SUPPLY
LV LOGIC
BATTERY
REAR RIGHT MOTOR
BATTERY HV +USB
TSAL LOGIC
FIREWALL
FRONT
REAR
FLOOR COCKPIT
BRAKELIGHT
REAR RIGHT SUSPENSION SENSOR
FRONT DRIVE
TSAL SENSE F
RIGHT SIDE COCKPIT
ECU
FRONT RIGHT SIDE COCKPIT
FRONT RIGHT SENSOR NODE
EMERGENCY REAR RIGHT
TSAL LIGHT
NOSE
APPS
BOOS
FRONT LEFT
FRONT LEFT SUSPENSION
FRONT LEFT MOTOR
BRAKE
FRONT RIGHT MOTOR
ROOF COCKPIT
INERTIA SWITCH
STEERING SENSOR
HVD
MID LEFT SENSOR NODE
REAR RIGHT SIDE
FRONT RIGHT SUSPENSION SENSOR
ANTENNE
IMU
DASHBOARD PCB
DASHBOARD COMPONENTS
MID RIGHT SENSOR NODE
REAR RIGHT SENSOR NODE
TSAL SENSE R
REAR TOP
REAR LEFT
REAR LEFT FLOOR
REAR LEFT MOTOR
REAR LEFT SUSPENSION SENSOR
REAR LEFT SENSOR NODE
FANS
RESET
ENERGY METER BOX
BSPD
POMP
X = SDC (Purple Wire)
COMPONENTS

Challenges in Special Vehicle

Example typical process

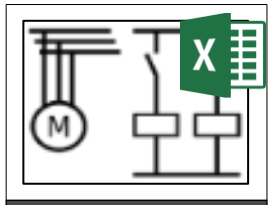
3D + Circuit diagram design → Prototype → Wire Harness Design → Wire Harness Prototype → Assembly → Wire Harness Documentation



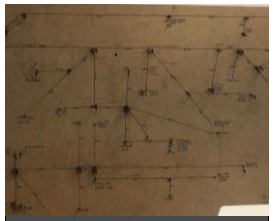
3D MODEL

PROTOTYPE M

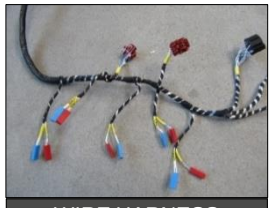
Take measurements of the physical prototype



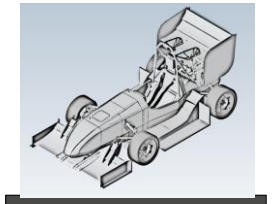
CIRCUIT DIAGRAM



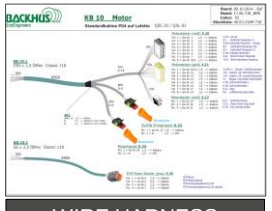
2D SKETCH – WIRE HARNESS LAYOUT



WIRE HARNESS MANUFACTURE



ASSEMBLY



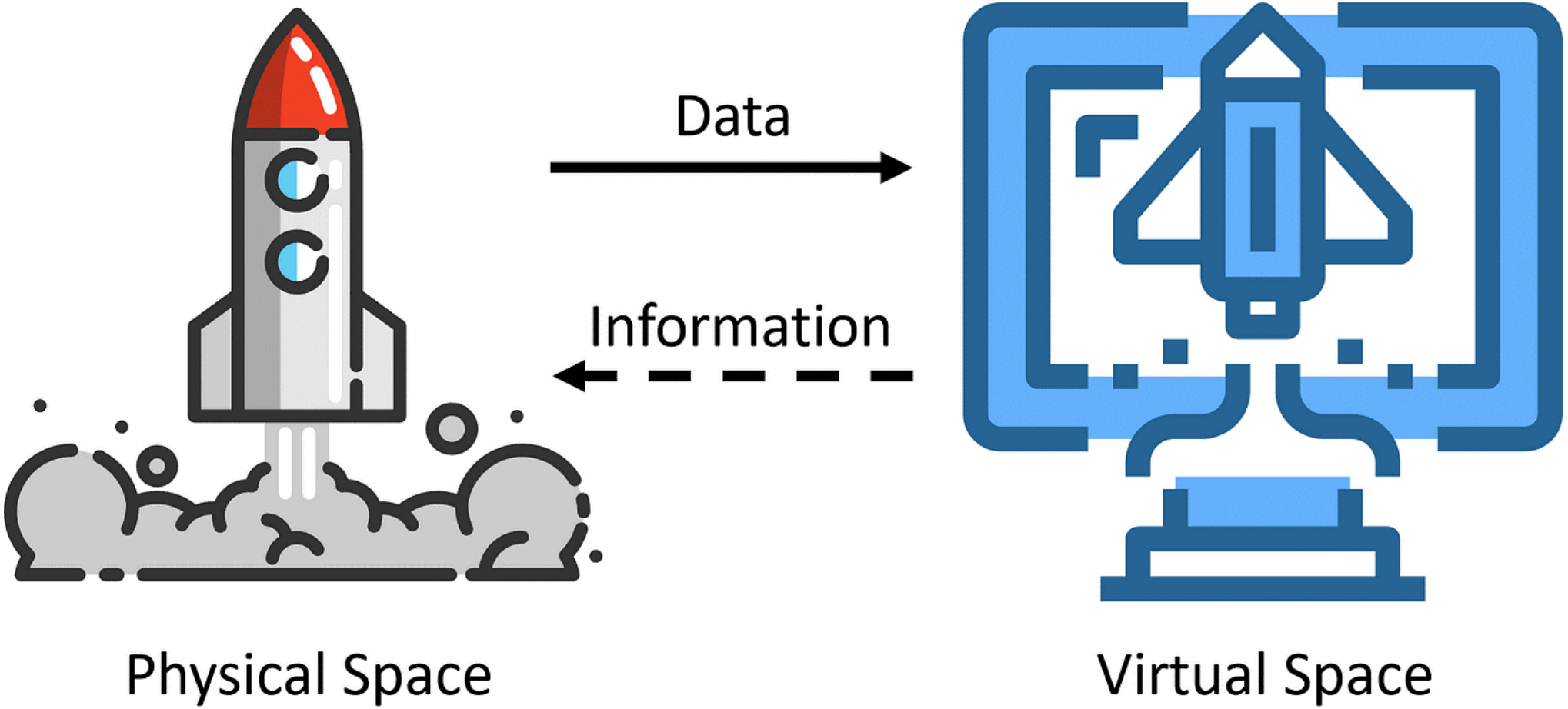
WIRE HARNESS DRAWING

- Mechanical 3D Model
- Max. Circuit Diagram incl. various sections intended to support the production

- Wire harness layout manually drawn
- Feedback concerning space availability from the mechanical department

- Final adaptations to the wire harness prototype

- Wire harness documentation

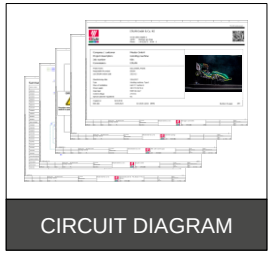

Data
Information
Physical Space
Virtual Space

Workflow of cabling

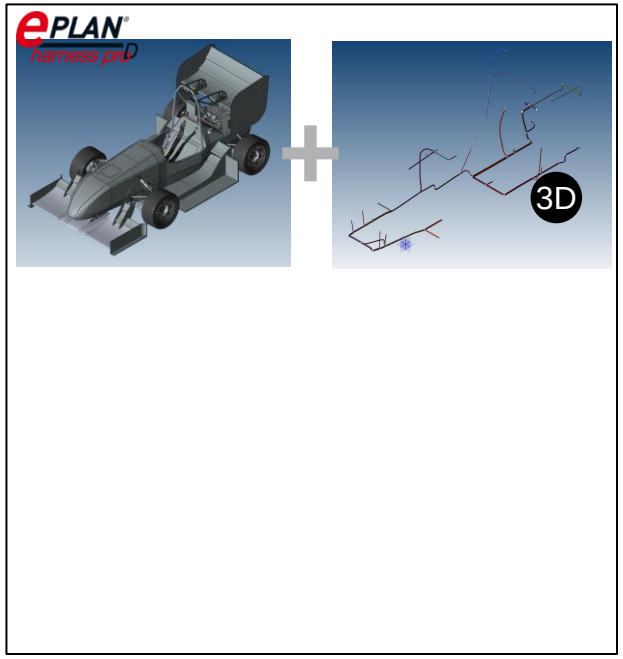
Example typical process Special Vehicle

3D + Circuit diagram design → Wire harness design incl. wire harness documentation → Wire harness Manufacture → Assembly

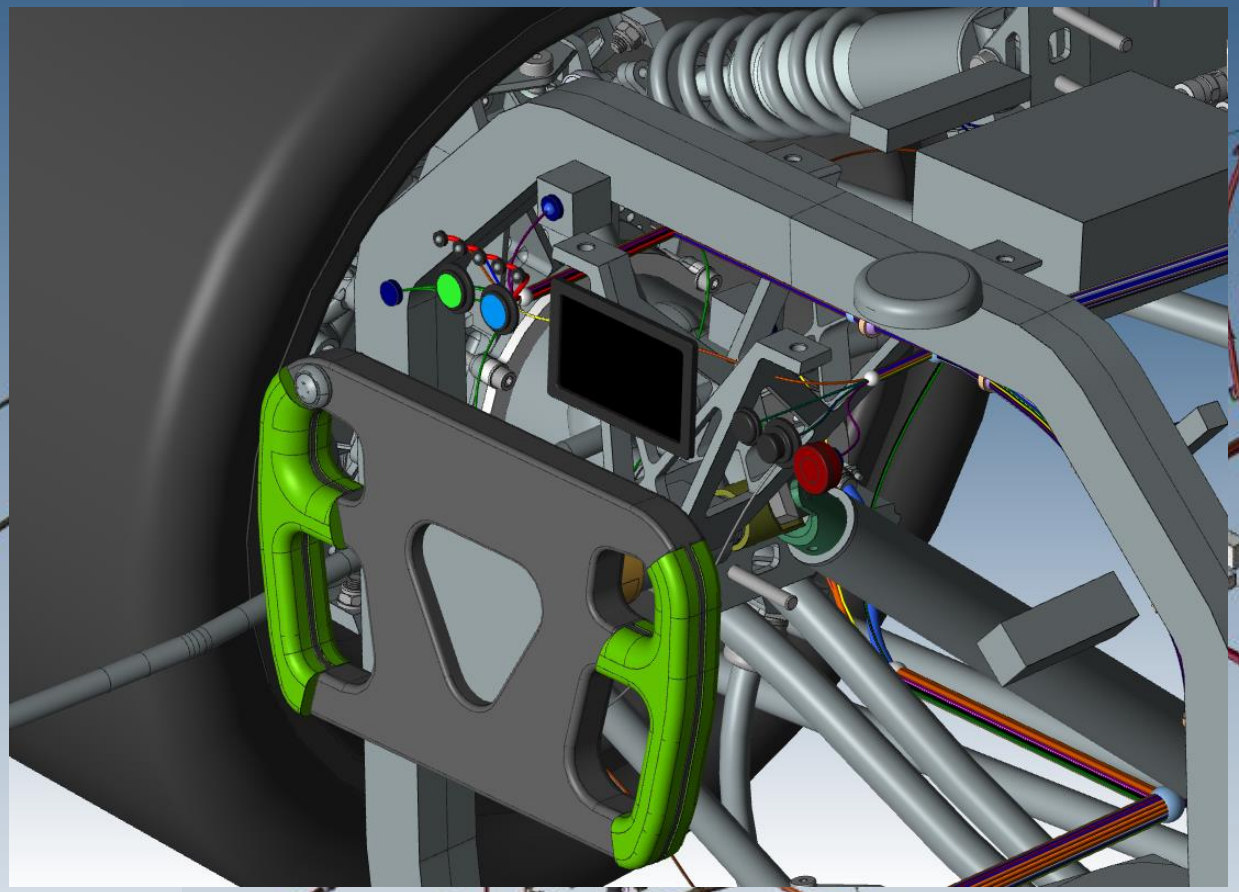
3D MODEL



CIRCUIT DIAGRAM



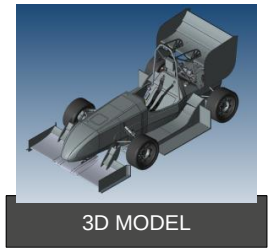
- Mechanical 3D Model
- Max. Circuit Diagram incl. various sections intended to support the production



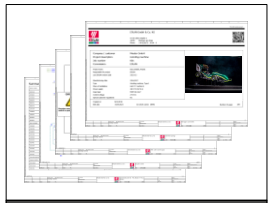
Workflow of cabling

Example typical process Special Vehicle

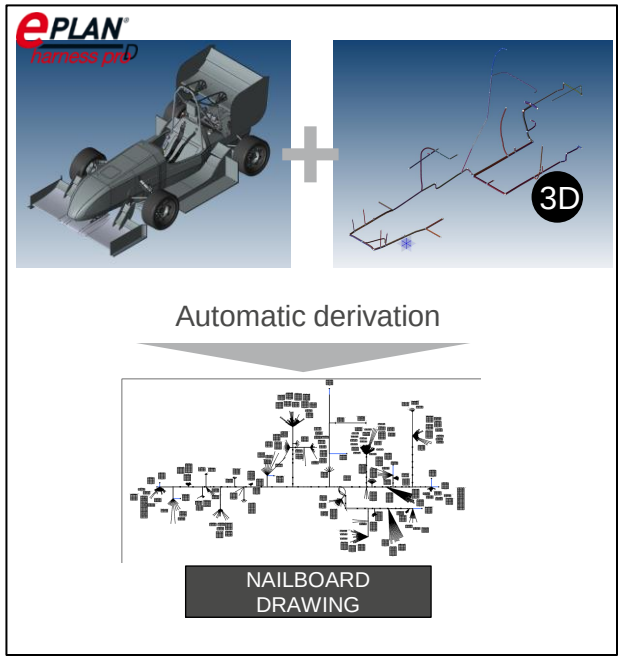
3D + Circuit diagram design → Wire harness design incl. wire harness documentation → Wire harness Manufacture → Assembly



3D MODEL

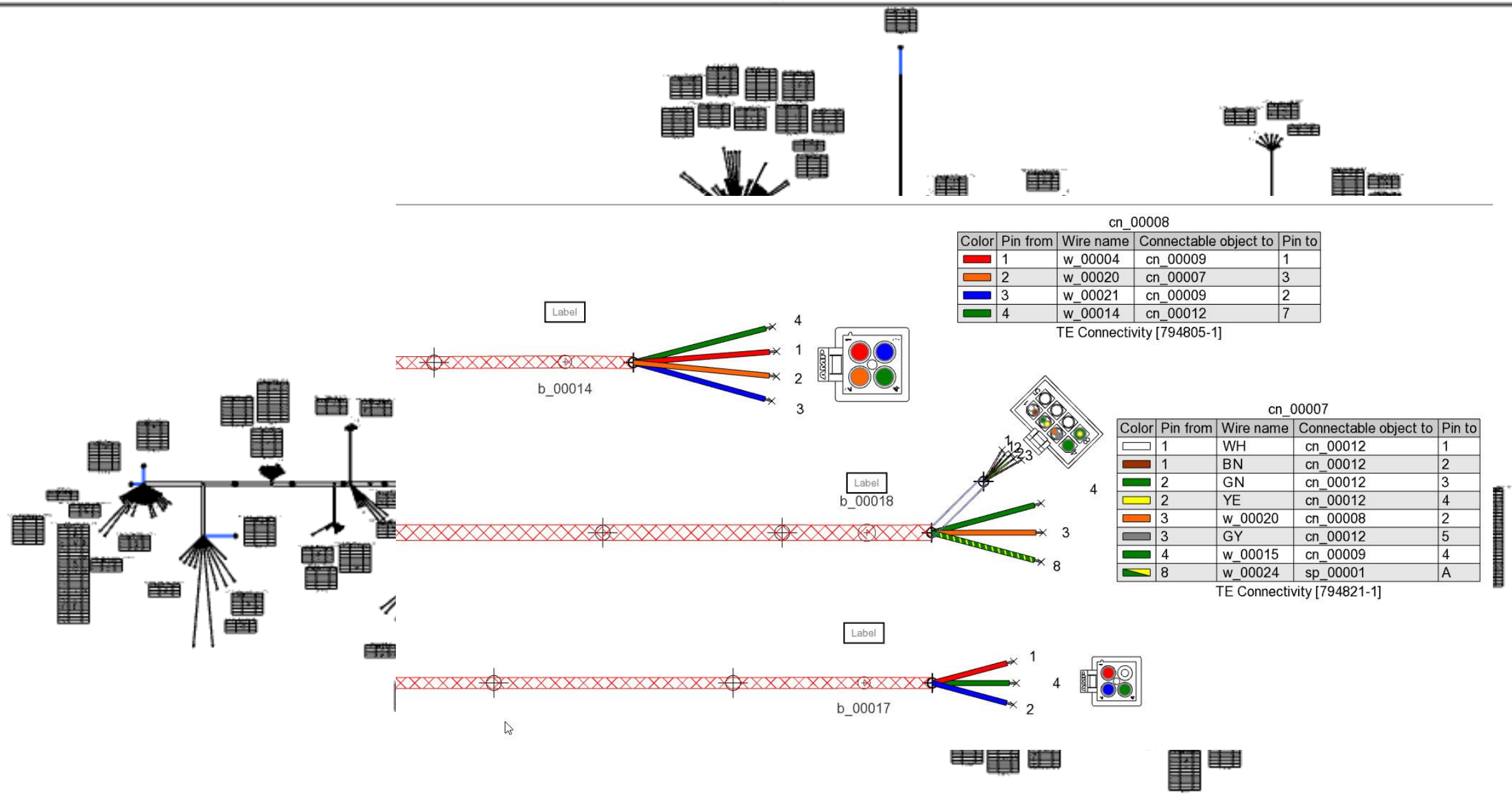


CIRCUIT DIAGRAM



- Mechanical 3D Model
- Max. Circuit Diagram incl. various sections intended to support the production

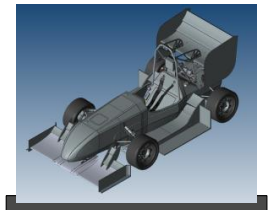
- Digital 3D prototype of the wire harnesses
- Automatic derivation of manufacturing documents


cn_00008
Color | Pin from | Wire name | Connectable object to | Pin to
1 | w_00004 | cn_00009 | 1
2 | w_00020 | cn_00007 | 3
3 | w_00021 | cn_00009 | 2
4 | w_00014 | cn_00012 | 7
TE Connectivity [794805-1]
Label
b_00014
4
1
2
3
Label
b_00018
4
3
8
cn_00007
Color | Pin from | Wire name | Connectable object to | Pin to
1 | WH | cn_00012 | 1
1 | BN | cn_00012 | 2
2 | GN | cn_00012 | 3
2 | YE | cn_00012 | 4
3 | w_00020 | cn_00008 | 2
3 | GY | cn_00012 | 5
4 | w_00015 | cn_00009 | 4
8 | w_00024 | sp_00001 | A
TE Connectivity [794821-1]
Label
b_00017
1
4
2

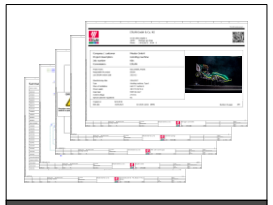
Workflow of cabling

Example typical process Special Vehicle

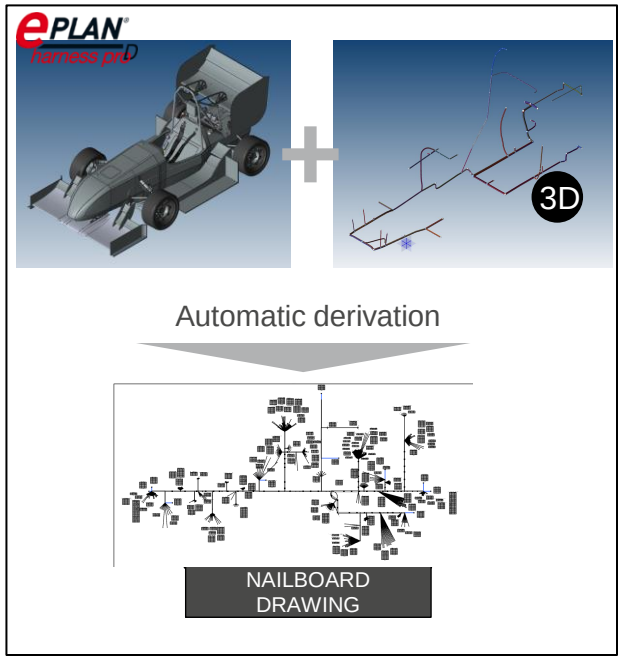
3D + Circuit diagram design → Wire harness design incl. wire harness documentation → Wire harness Manufacture → Assembly



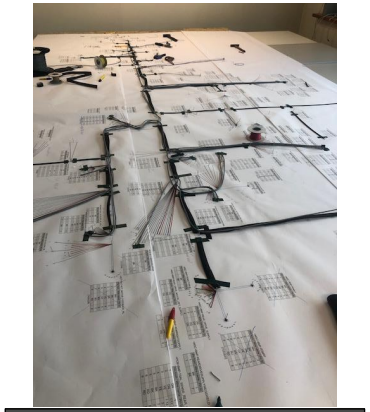
3D MODEL



CIRCUIT DIAGRAM



NAILBOARD DRAWING



TENDERING PROCESS (EXTERN)

- Mechanical 3D Model
- Max. Circuit Diagram incl. various sections intended to support the production

- Digital 3D prototype of the wire harnesses
- Automatic derivation of manufacturing documents

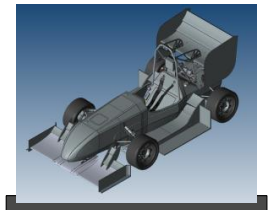
- More flexibility when selecting a wire harness manufacturer (best value for money)

=MSC+BMP-REAR_DRIVE_MOTOR_LEFT_SUPPLY
Pin from
Wire name
Pin to
1
2
3
4
=MSC+BMP-REAR_DRIVE_MOTOR_RIGHT_SUPPLY
Pin from
Wire name
Pin to
1
OG
1
2
OG
2
3
OG
3
=MSC+BMP-RDMOTORLS
Pin from
Wire name
Pin to
1
BK
2
BK
20

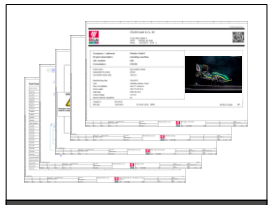
Workflow of cabling

Example typical process Special Vehicle

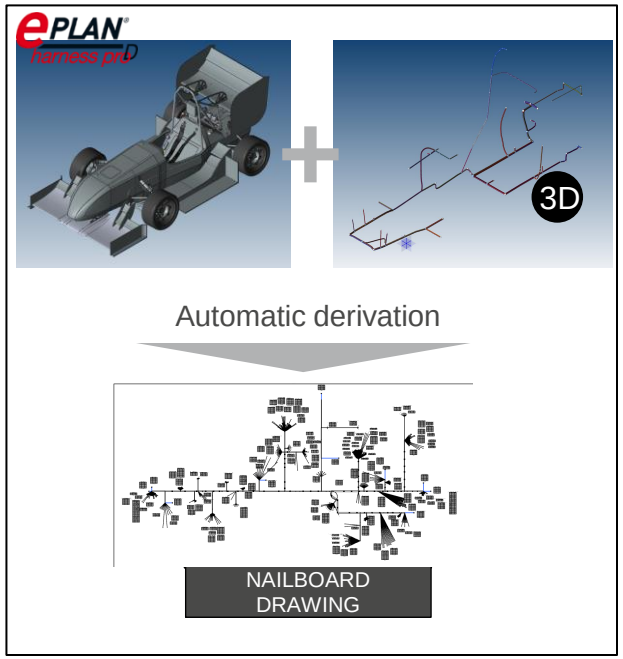
3D + Circuit diagram design → Wire harness design incl. wire harness documentation → Wire harness Manufacture → Assembly



3D MODEL



CIRCUIT DIAGRAM



NAILBOARD DRAWING

TENDERING PROCESS (EXTERN)

ASSEMBLY

- Mechanical 3D Model
- Max. Circuit Diagram incl. various sections intended to support the production

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- Automatic derivation of manufacturing documents

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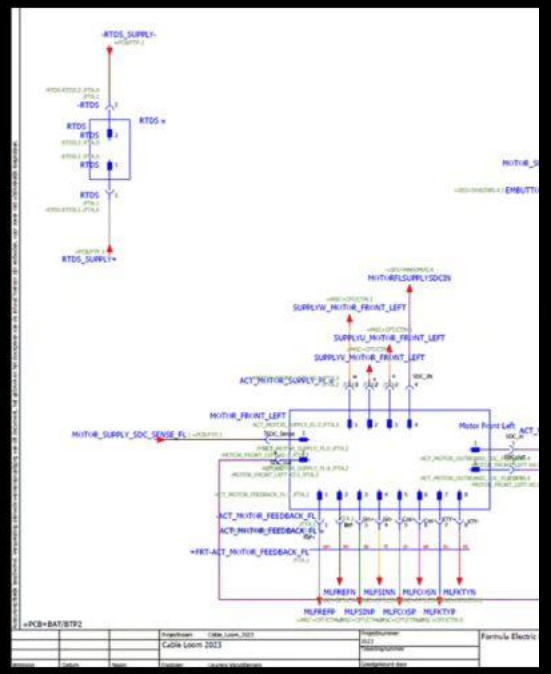
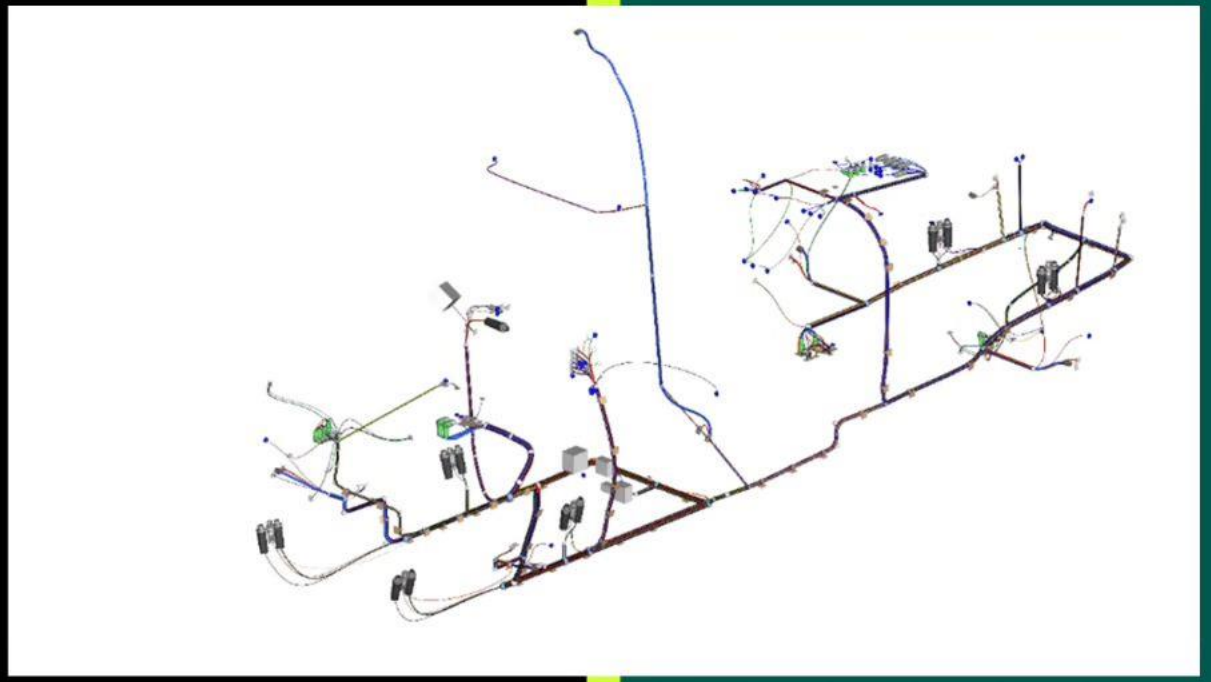




With Harness proD, we bring together these electrical schematics with the mechanical dimensions of the car, to obtain the final cable harness design

Thanks for helping us with our cable loom!

FORMULA ELECTRIC BELGIUM

Added value

Faster result

Simultaneous work for mechanical and electrical

Complete virtual twin

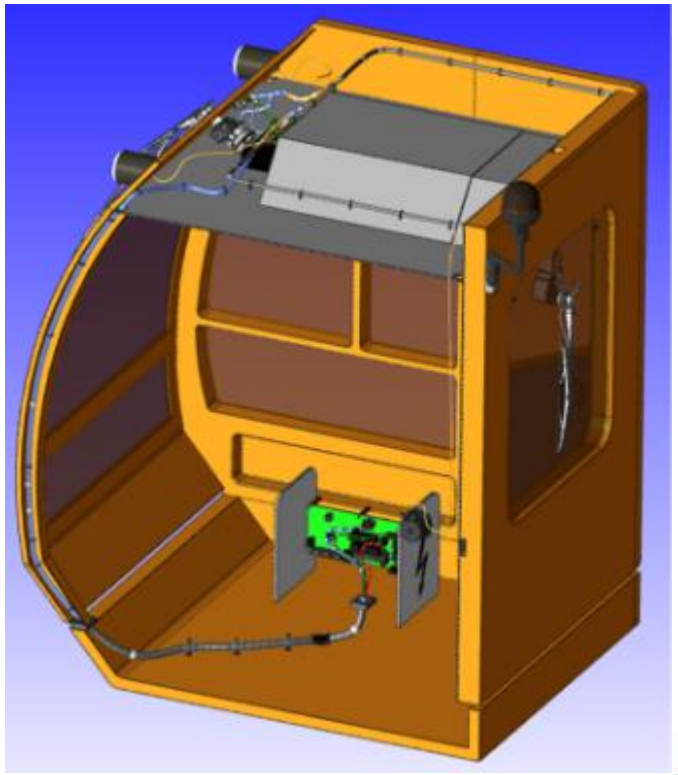
Everything digital,
not from empty page next year

More fun

Nice collaboration between mechanical and electrical

More details on production drawing

Special vehicles

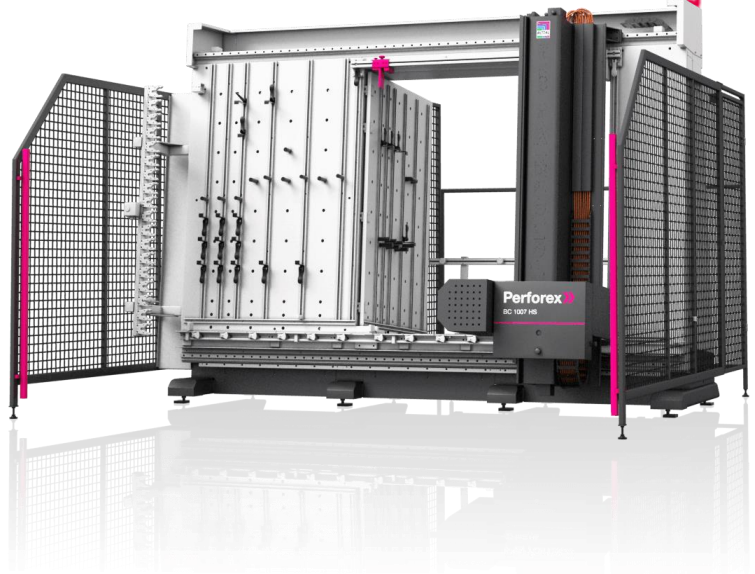


Special vehicles

Machine cabling

Device cabling

ePLAN Harness proD



Challenges in machine cabling

Machine cabling

Lengths are estimated manually (or not)
No digital twin

Subsequent modifications
A lot of waste & remanufacturing

Critical areas are recognized too late
Mechanics first - then electrical engineering

No clear cable paths
Installer decides on cable laying

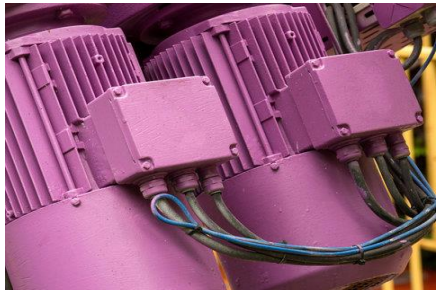
High coordination effort
Meetings and discussions

No 100% engineering data
Errors only visible on the prototype

Challenges in machine cabling

Cost driver - unknown length of cables!

Excess lengths - are “hidden”

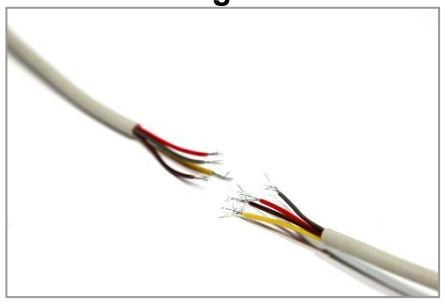


Excess lengths - are “shortened”

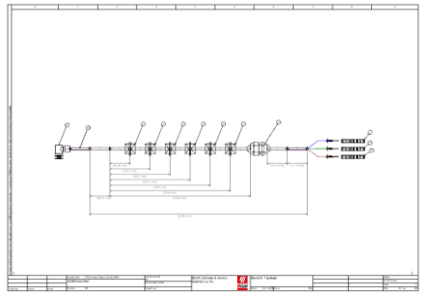
Documentations - are “supplemented”

Cable lengths - you can't do without!

short lengths - are “lengthened”



Special cables - are “manufactured”



SERVO cable - e.g. 5m, price from € 200,- (price without stock)

! Cable lengths have a big impact on time, cost and quality!

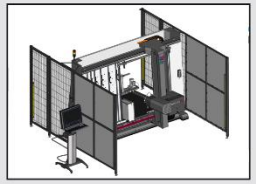
3D design space analysis & schematic design

Component placement & 3D cable engineering

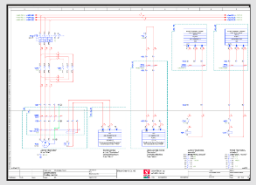
Purchase or confectioner inquiries

Assembly & service

Construction

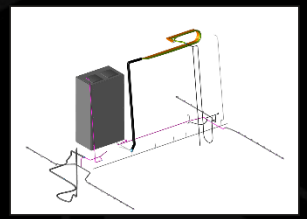


EPLAN Electric P8



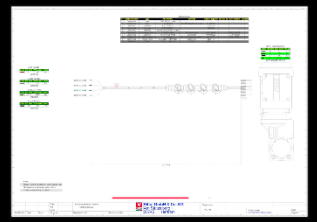
ePLAN Harness proD

Construction & design



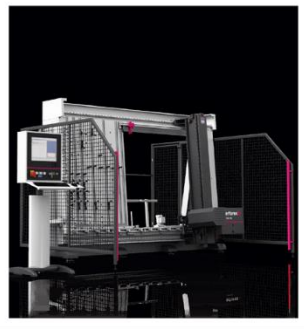
Length determination & derivation

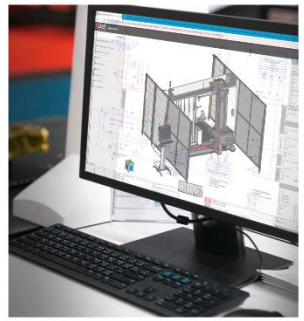
BOM



Cable drawing

Connection lists





Benefits of using Harness proD in machine cabling

Automatic length determination
Digital twin as the basis for manufacturing documents

Optimized & error-free assembly
No waste & subsequent assembly

Early detection of critical areas
Parallel mechanical & electrical engineering

Specification of cable paths
Assembler focuses on the essentials

Single source of truth
Work with the digital twin and create facts

Reliable engineering data
Errors are already detected on the 3D model

RECAP

From Idea to realisation

Collaboration

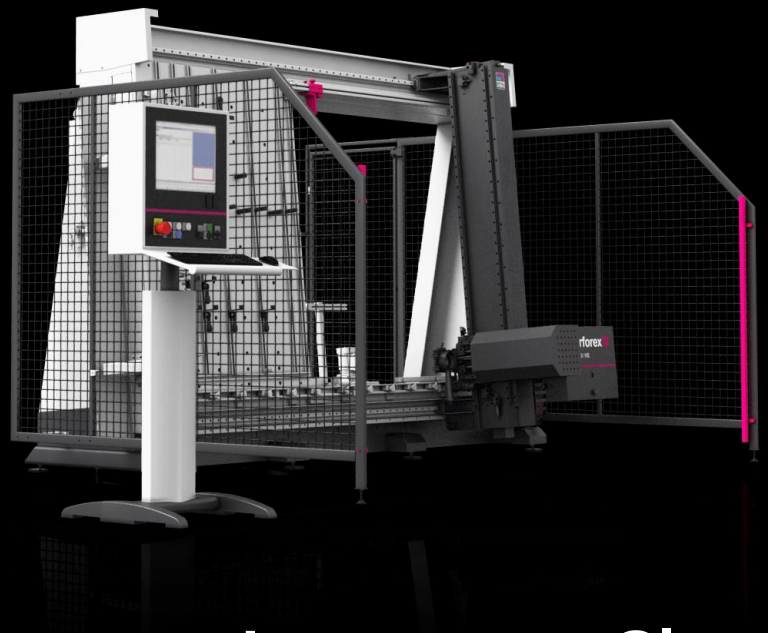
Work together

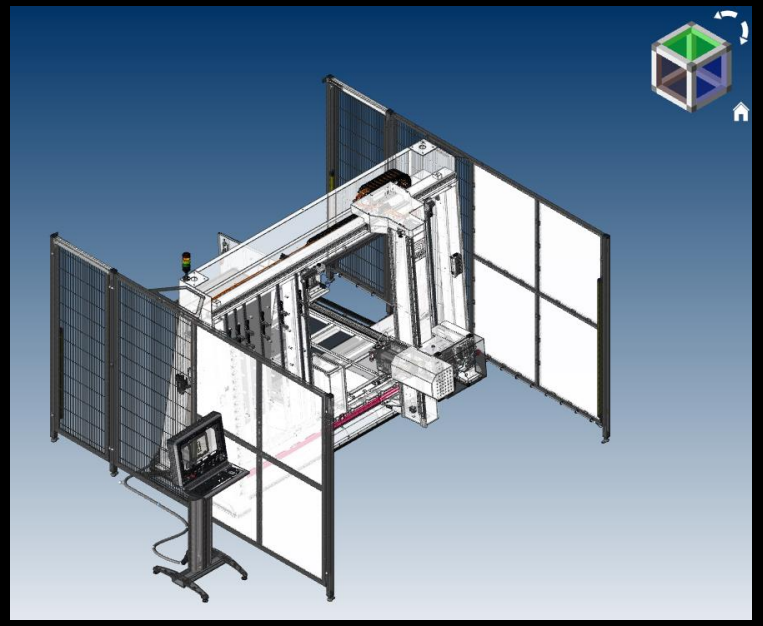
Communication between departments

Fun @ Work

Smooth work process

Complete digital twin





Less error - Clear communication to production and costumer

No physical prototype needed - Early error detection

Agile development

- Faster result
- Not needed to wait until another department is ready
- Before production, all details are known
- reduced costs due to smoother cooperation

Operational excellence

Customer centric

Data driven decision

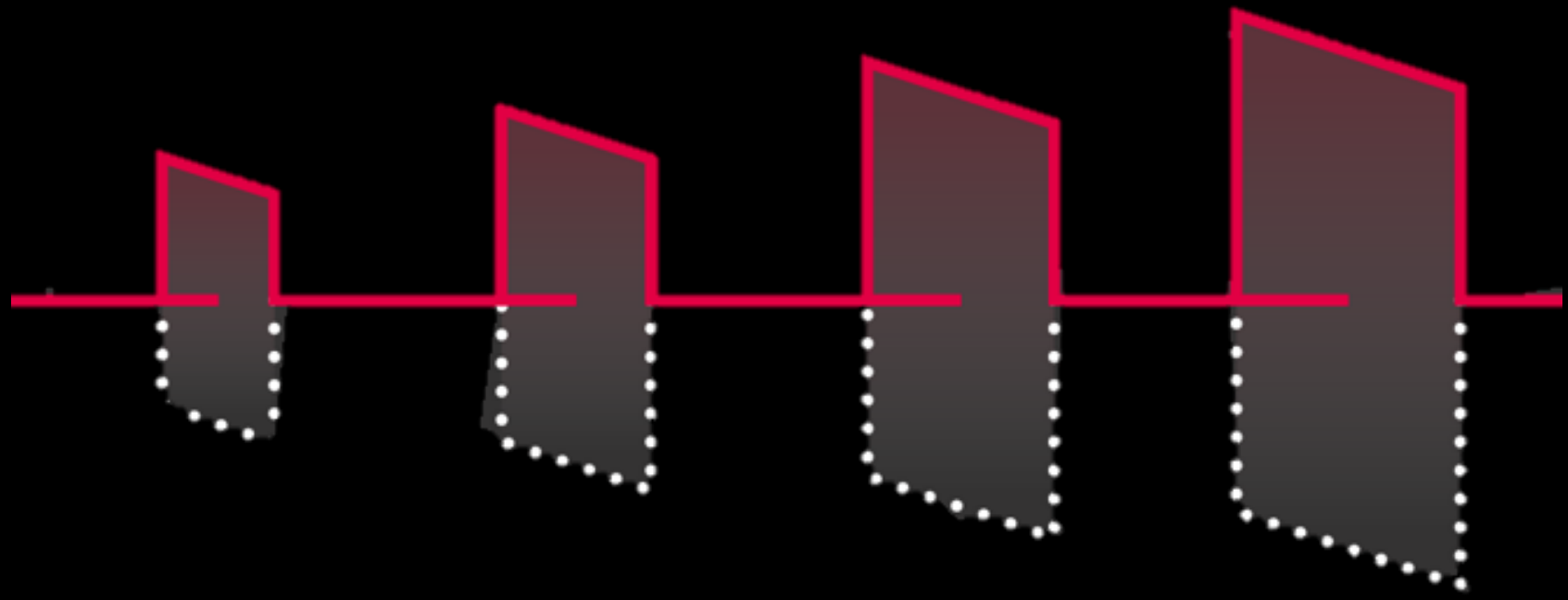
Flexibility

Innovation

EPLAN

efficient engineering.

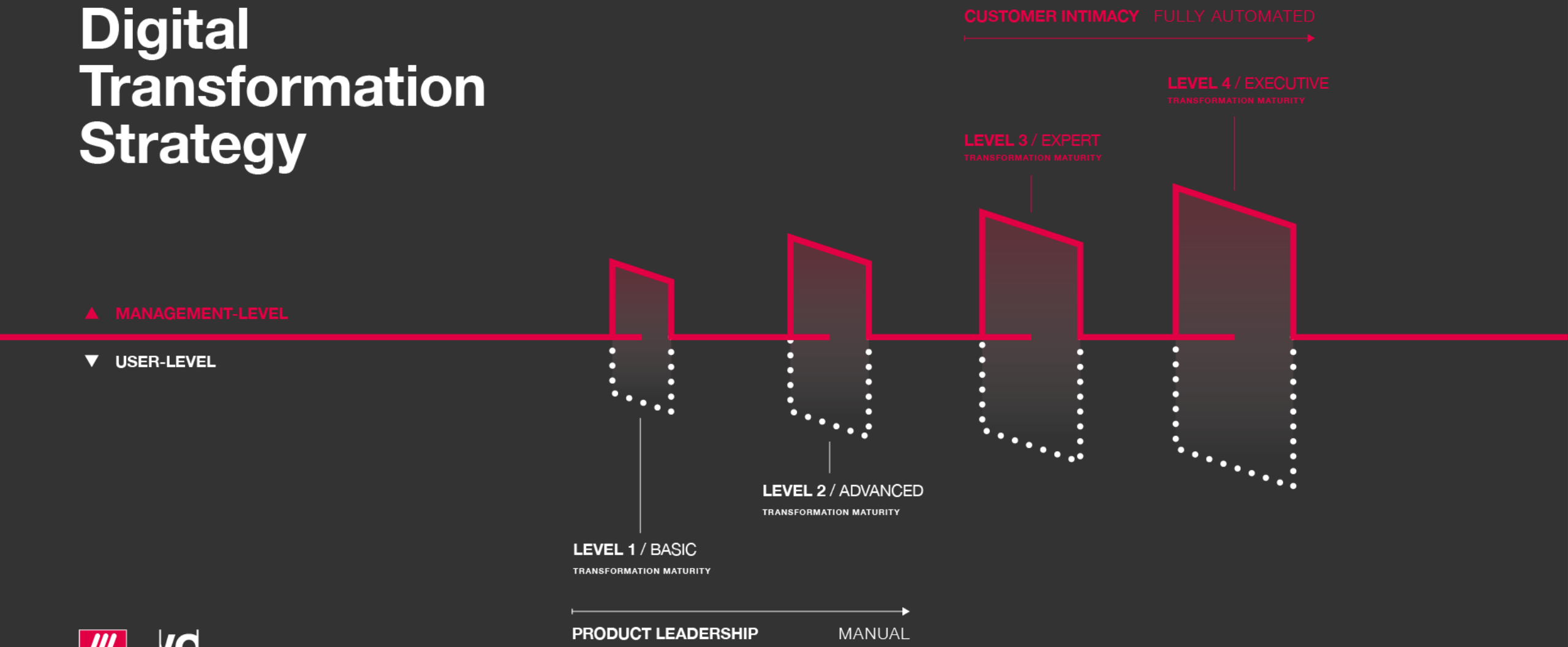
Digital transformation



Breakthrough 4 tomorrow

4 LEVELS OF

Digital Transformation Strategy



Thank you