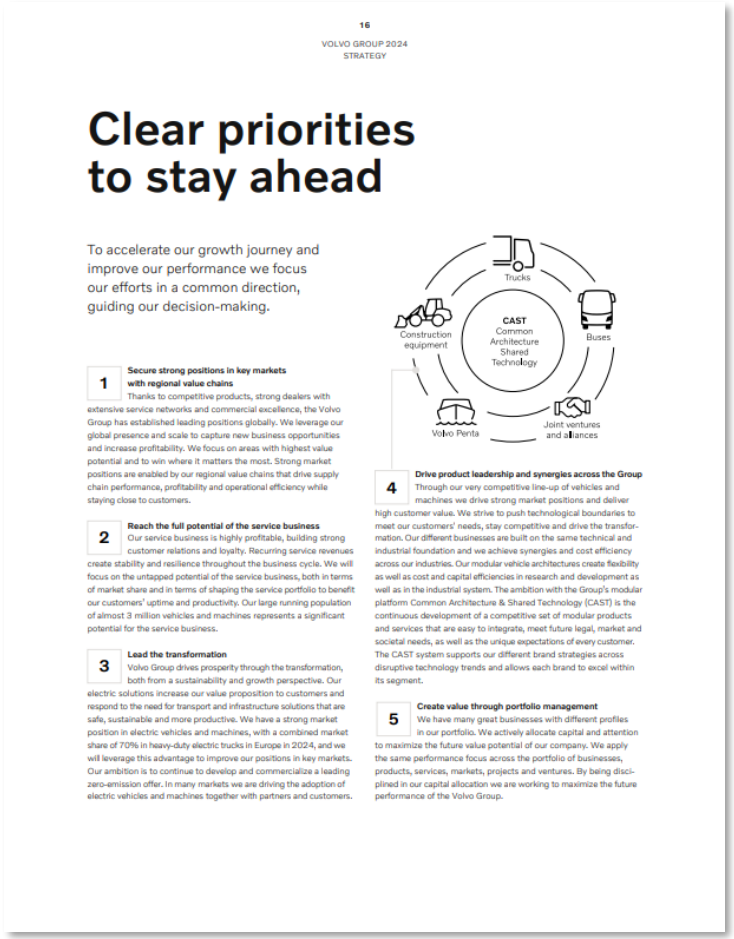
MODULARIZATION GROUP TRUCKS TECHNOLOGY

NEM BAM Q4 2025

Volvo GTT Platform and Architecture | NEM BAM Q4 2025

2025-11-13

The Volvo Group's Annual Report 2024



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VOLVO GROUP 2024
STRATEGY

Clear priorities to stay ahead

To accelerate our growth journey and improve our performance we focus our efforts in a common direction, guiding our decision-making.

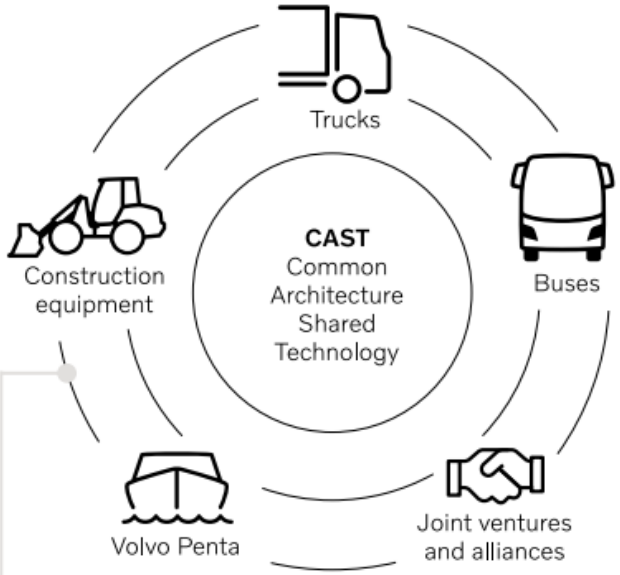
1 **Secure strong positions in key markets with regional value chains**
Thanks to competitive products, strong dealers with extensive service networks and commercial excellence, the Volvo Group has established leading positions globally. We leverage our global presence and scale to capture new business opportunities and increase profitability. We focus on areas with highest value potential and to win where it matters the most. Strong market positions are enabled by our regional value chains that drive supply chain performance, profitability and operational efficiency while staying close to customers.

2 **Reach the full potential of the service business**
Our service business is highly profitable, building strong customer relations and loyalty. Recurring service revenues create stability and resilience throughout the business cycle. We will focus on the untapped potential of the service business, both in terms of market share and in terms of shaping the service portfolio to benefit our customers' uptime and productivity. Our large running population of almost 3 million vehicles and machines represents a significant potential for the service business.

3 **Lead the transformation**
Volvo Group drives prosperity through the transformation, both from a sustainability and growth perspective. Our electric solutions increase our value proposition to customers and respond to the need for transport and infrastructure solutions that are safe, sustainable and more productive. We have a strong market position in electric vehicles and machines, with a combined market share of 70% in heavy-duty electric trucks in Europe in 2024, and we will leverage this advantage to improve our positions in key markets. Our ambition is to continue to develop and commercialize a leading zero-emission offer. In many markets we are driving the adoption of electric vehicles and machines together with partners and customers.

4 **Drive product leadership and synergies across the Group**
Through our very competitive line-up of vehicles and machines we drive strong market positions and deliver high customer value. We strive to push technological boundaries to meet our customers' needs, stay competitive and drive the transformation. Our different businesses are built on the same technical and industrial foundation and we achieve synergies and cost efficiency across our industries. Our modular vehicle architectures create flexibility as well as cost and capital efficiencies in research and development as well as in the industrial system. The ambition with the Group's modular platform Common Architecture & Shared Technology (CAST) is the continuous development of a competitive set of modular products and services that are easy to integrate, meet future legal, market and societal needs, as well as the unique expectations of every customer. The CAST system supports our different brand strategies across disruptive technology trends and allows each brand to excel within its segment.

5 **Create value through portfolio management**
We have many great businesses with different profiles in our portfolio. We actively allocate capital and attention to maximize the future value potential of our company. We apply the same performance focus across the portfolio of businesses, products, services, markets, projects and ventures. By being disciplined in our capital allocation we are working to maximize the future performance of the Volvo Group.



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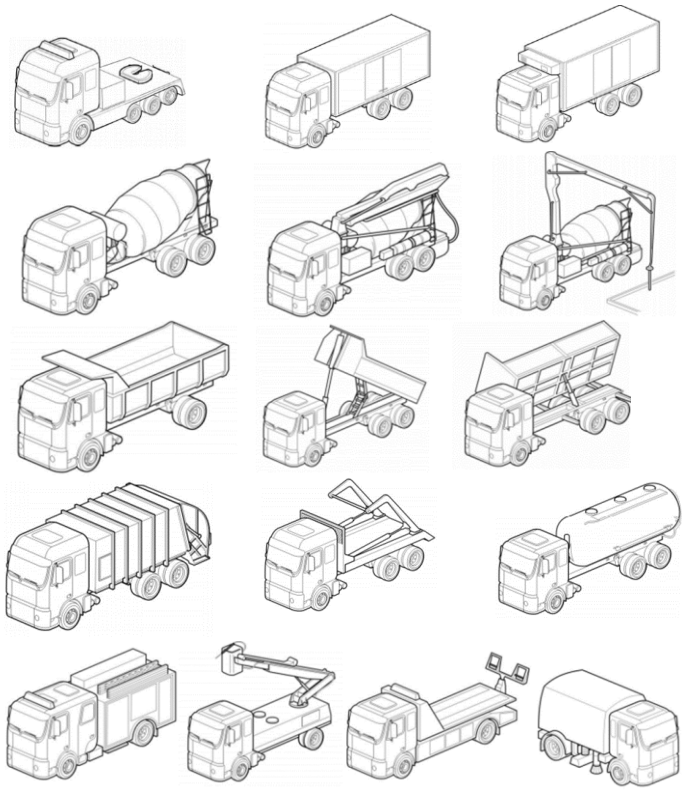
Products, Product lines and Platform

- Volvo example

Products

Configured products



Product lines

Product classes and ranges

24 - ICE
E4 - EV

FM FH FMX

23 - ICE
E7 - EV

T T-High C K

04

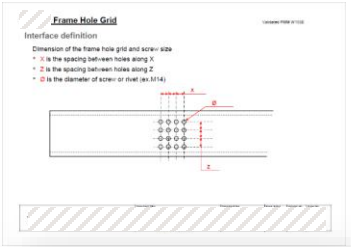
28
29

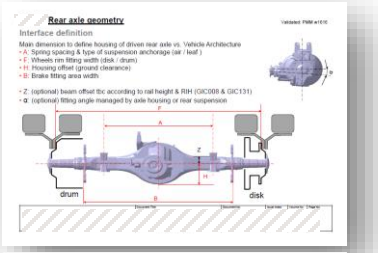
Platform

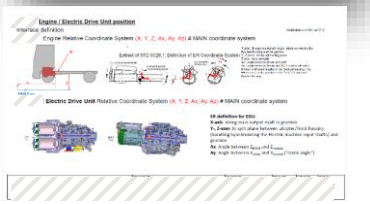
Heavy duty platform

Common Architecture

Common Interfaces & configuration rules

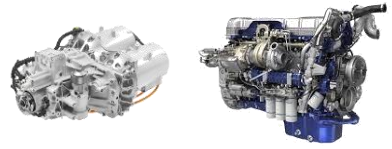


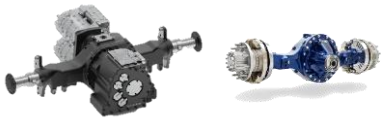


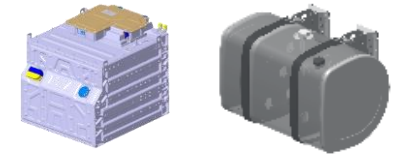


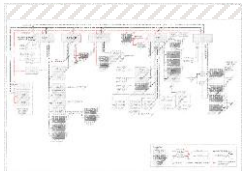
Shared Technology

Common parts & sol.



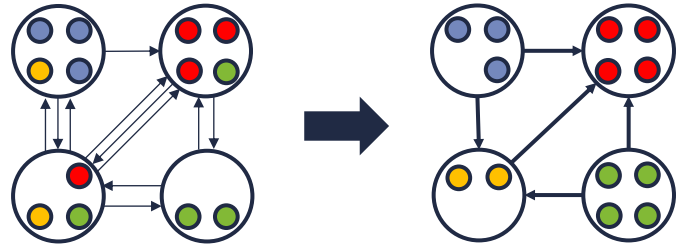


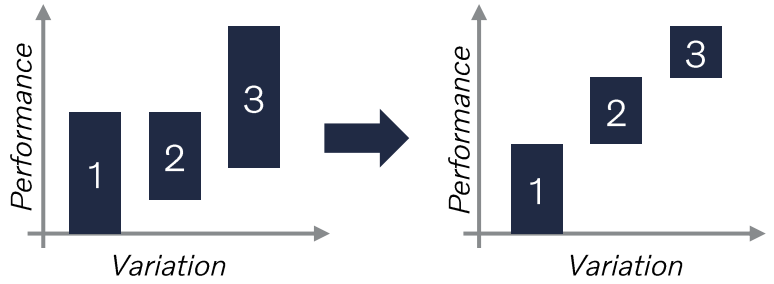


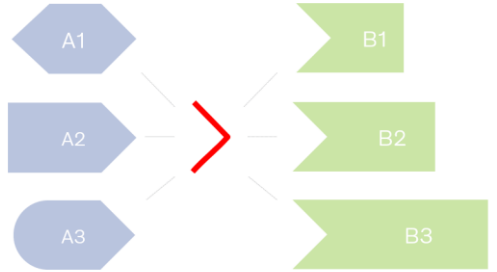


Modularization principles

- Isolation of functionality and variability within the modules
- Distinct performance steps
- Standardized interfaces





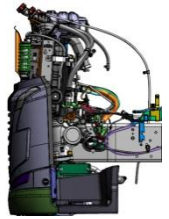


Modularization of the truck

Product break down structure

Vehicle

Top Level Modules



Top level Area
Vehicle Front End

Module
Cooling package

Sub-module
Exp. tank module

Component
Expansion tank

VMS

The products within Volvo GTT are part of a modular concept.

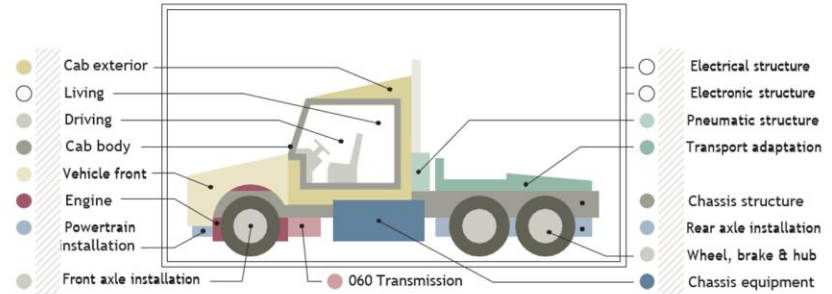
Within this concept, the Vehicle has been divided into a number of Vehicle Modules (Top picture).

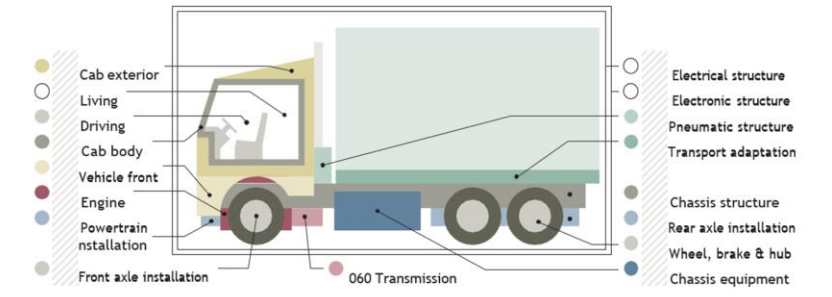
Each Vehicle Module consists of several Modules, which in turn may contain of one or more Sub-Modules.

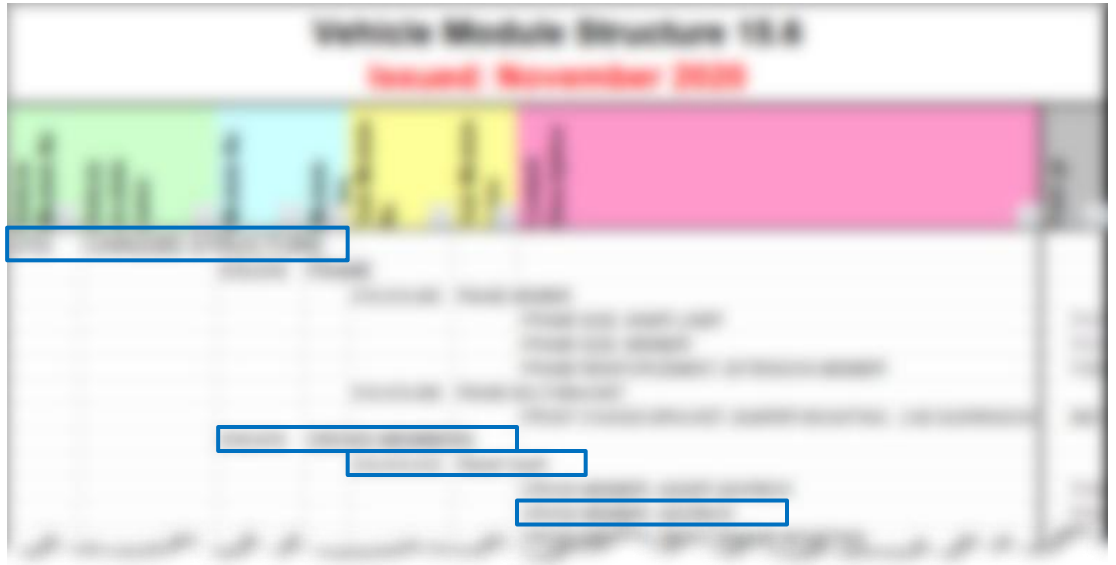
This structure is referred to as the Vehicle Module Structure (Lower picture).

Example: *Gear box crossmember*
Vehicle module: *010-Chassis structure,*
Module: *015-Cross members,*
Sub-module: *010-Front part*

➔ *Cross member, gear box = 010-015-010*







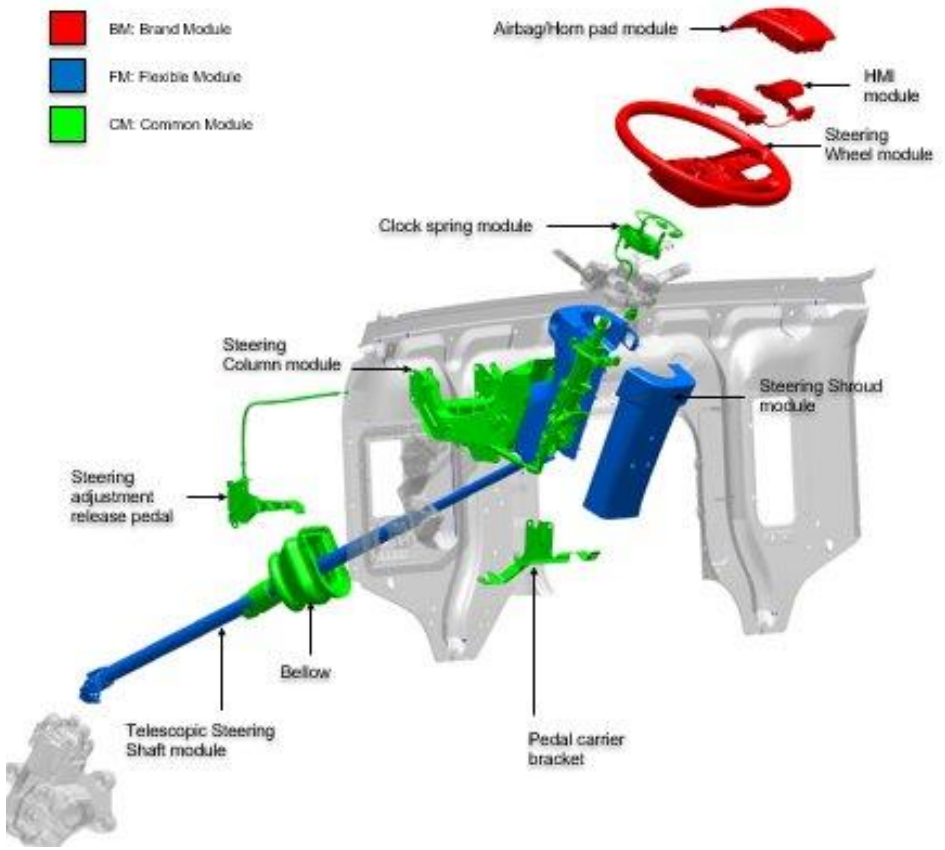
Module drivers

- On vehicle level, the modularization is mainly about handling variance, in both product and brand differentiation:
  - To be able to tailor-make the truck as close as possible to the customer needs - “Performance steps”
  - To be able to create brand differentiation where needed while keeping synergies everywhere else - “Visual brand distinction”
  - In different technology platforms other module drivers may exist depending on evolution speed: “Carry over” or “Technical evolution”
  - The manufacturing process is also an important driver for defining the module and its content

Module driver type	Module driver
Develop and design	Carry over / carry across
	Technical evolution
	Planned design changes
Variance	Different specifications
	Styling (Branding)
Manufacturing	Common unit
	Process / Organization
Quality	Separate testing
Purchase	Supplier availability
After sales	Service / maintenance
	Upgrading
	Recycling

Visual brand distinction

- Identification of the system and modules that should carry brand differentiation.
  - Modules that the customer frequently interacts with or that is linked to differentiation In performance or brand image
- Red: Brand differentiation modules - though unique parts and tooling
- Blue: Brand differentiation modules - though unique parts and common tooling by different color or material choices
- Green: Common modules

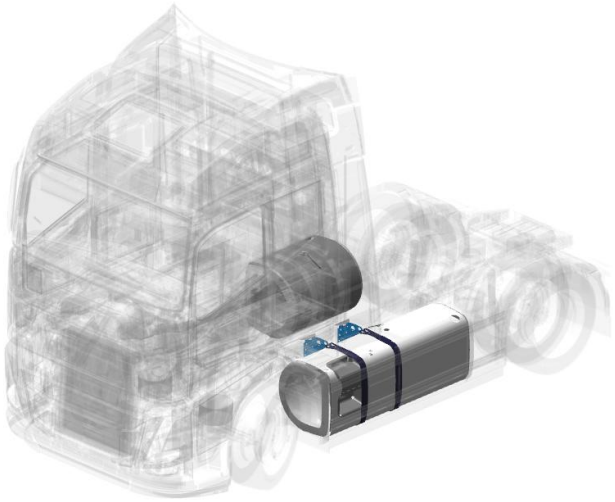


Module performance steps

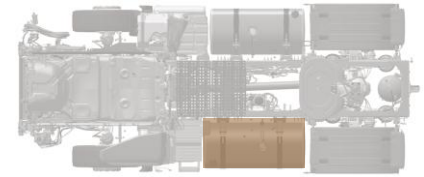
Fuel tank example

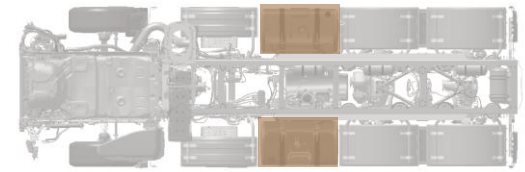
All variants attached to the frame with a standardized interface (GIC)

Fuel tanks

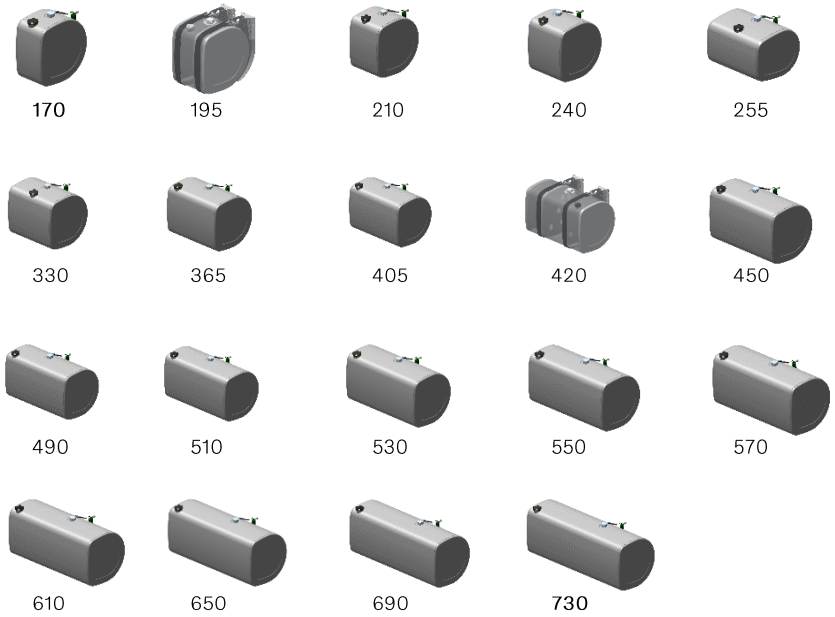


Variation in position (29) (or existence)





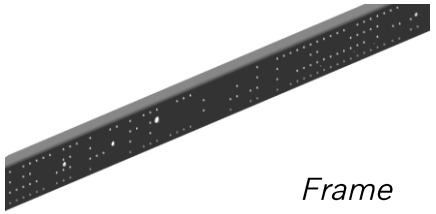
Variation in size (56)



** variation with or without steps (2) * cross section (2) * material (2)*
≈88 fuel tanks

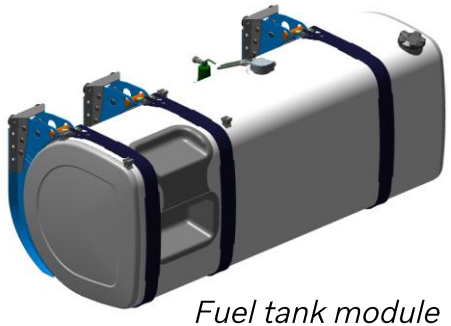
Modules vs Physical modules

Vehicle modules
Isolates variation in frame thickness with variation in fuel capacity through standardized interfaces (hole pattern)



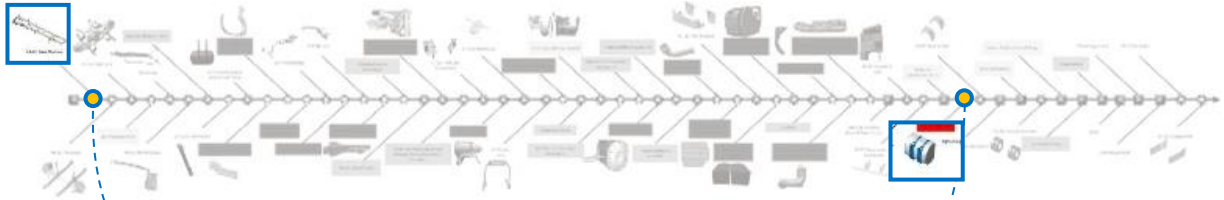
Frame

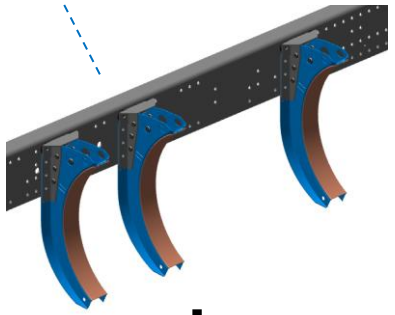
+



Fuel tank module

Assembly sequence





Base module
Fuel tank bracket attached to base module

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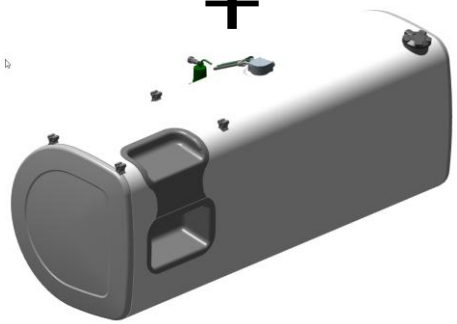

Physical module
Parts pre-assembled in sub-flow main line

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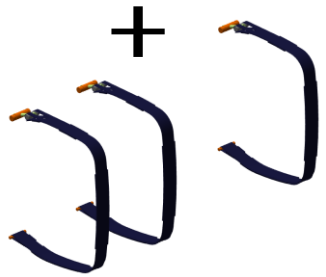

Loose parts
Parts needed to attach physical module to base module on main line

Physical modules
Building blocks that are assembled in different locations along in the assembly sequences

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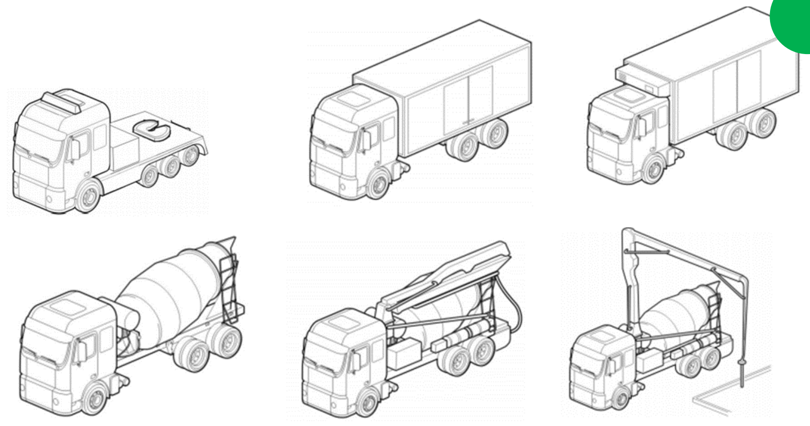
Reasons for modularization

- **Customization:** Provide tailor-made products to each customer and market
- **Differentiation:** Provide product with variable performance, visual expression or product cost
- **Speed:** Modularized products allows us to work more independent and agile by reducing the number of dependencies to other areas
- **Efficiency:** Spending less time on developing, testing and maintaining similar solution means more resources can be spent on developing new solution and improve quality
- **Cost:** Reuse of solutions and less dual offering increases commonality and provides economy of scale, thus reducing product cost.
- **Sustainability:** Modularization can also be an enabler for circular design

Unique product for unique needs



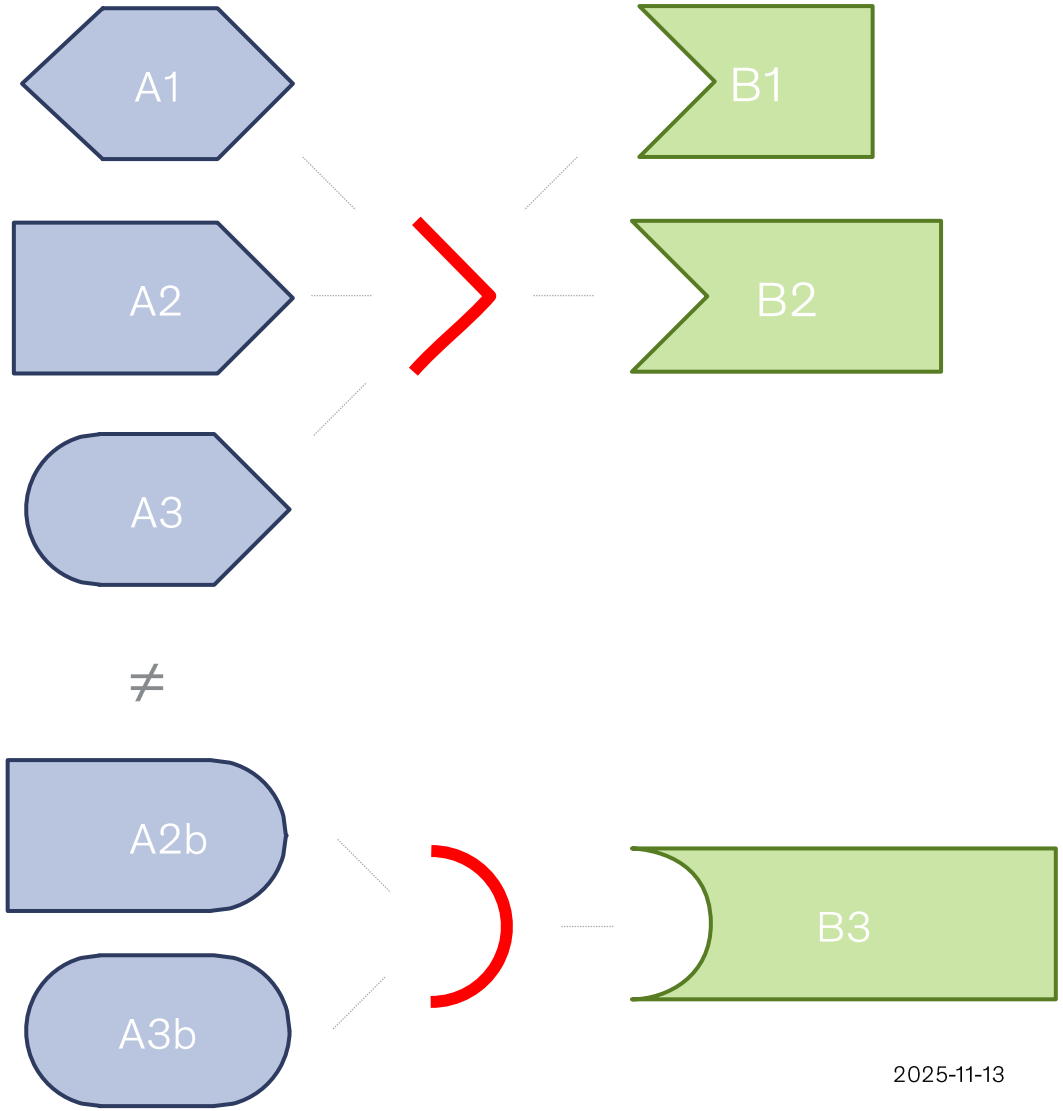
2^{500} = 32734 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 possible configurations

Different visual appearance

Interfaces – Introduction

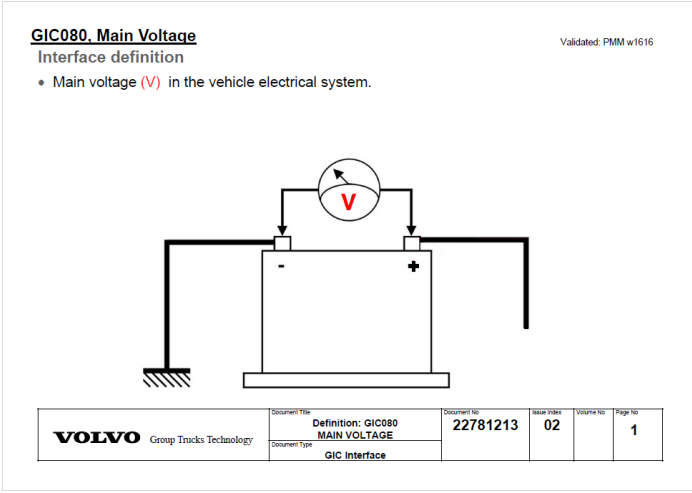
- **Interfaces** (>) describes the interaction and compatibility between modules

- A **standardized interface** allows for free interchangeability of any of the performance steps of the modules on either side of the interface (Enables agility and independence)
  6 Modules ➔ 9 Configuration
- If a module (B3) does not follow a standardized interface, unique versions of the adjacent modules (A2b and A3b) are needed, even if the performances are the same (as A2 and A3)
  8 Modules ➔ 8 Configurations



Interfaces – Introduction

- An **Interface definition** is a generic description of the interface, that describes the aspects of the interface to be standardized.
  Referred to as GIC (Generic Interface Component)



GIC: V = Main voltage level

- An **interface instance** is a defined/dimensioned interface specifying the aspects of the definition for that GIC.
  Sometimes referred to as SIC (Specific Interface Component)

SIC: V = 24V

- When variation exist within an interface (i.e., when it is non-standardized), all variations are identified and documented

SIC_1 for FH: V = 24V
SIC_2 for VNL: V = 12V

Interfaces types and classification

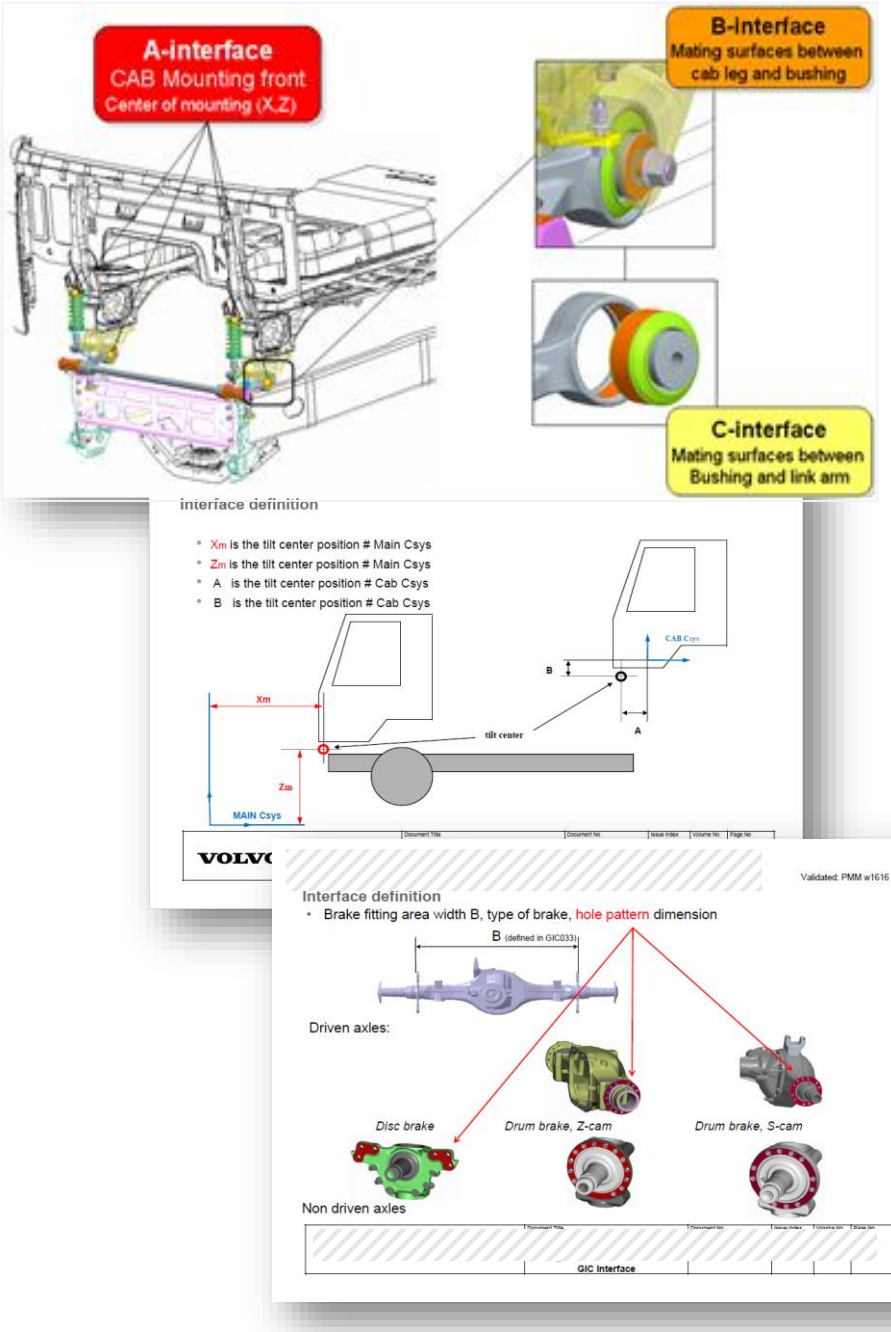
Classifications

Interfaces between vehicle modules are classified as A or B-interface, where A-interfaces are prioritized interfaces which are documented in the Gross list

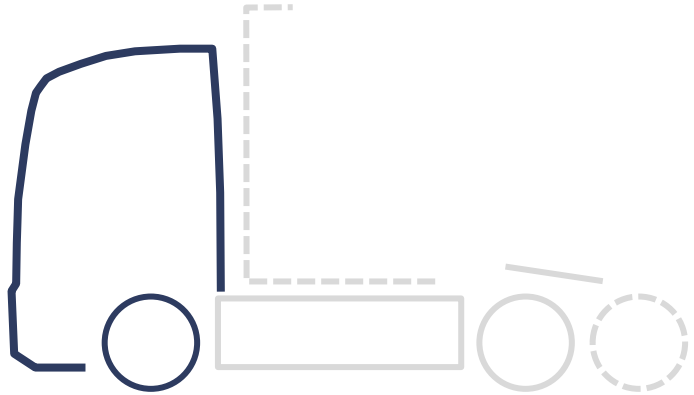
There are currently 83 A-interfaces and theses are document in the Interface gross list with links to the definitions.

Types

- **Geometrical**: Positioning coordinate systems or Geometrical boundaries
- **Contact**: physical connection (hole group, connector, flanges,...)
- **Media / Information**: Data or physical properties, such as: voltage, air pressure
- (Energy flow or Material flow)

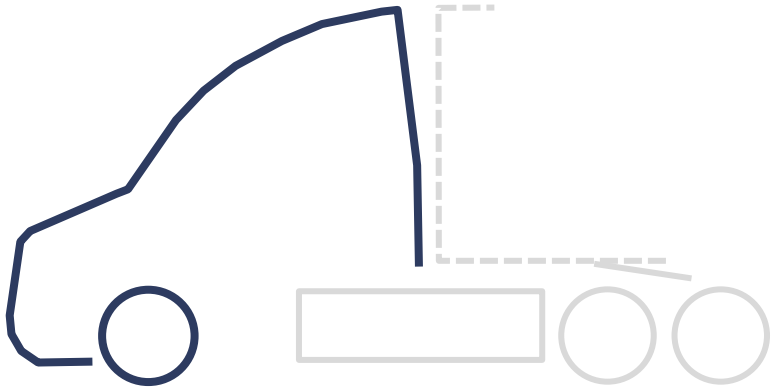


Vehicle ranges / Silhouettes

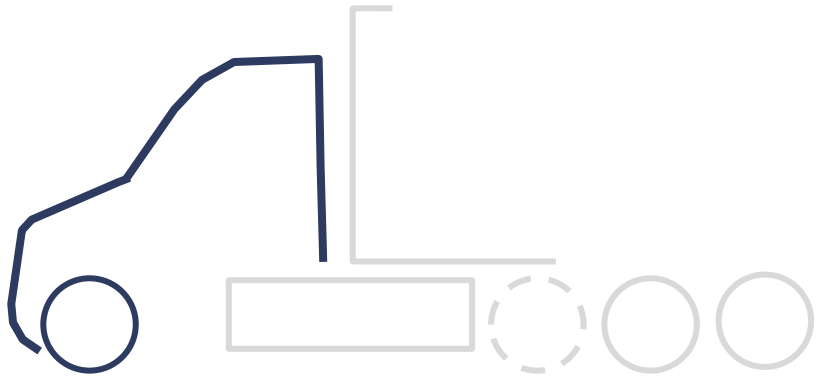


COE Tractor and Rigid

LEC Rigid



CONV AB Tractor and Rigid



CONV AF Tractor and Rigid

LCOE Rigid

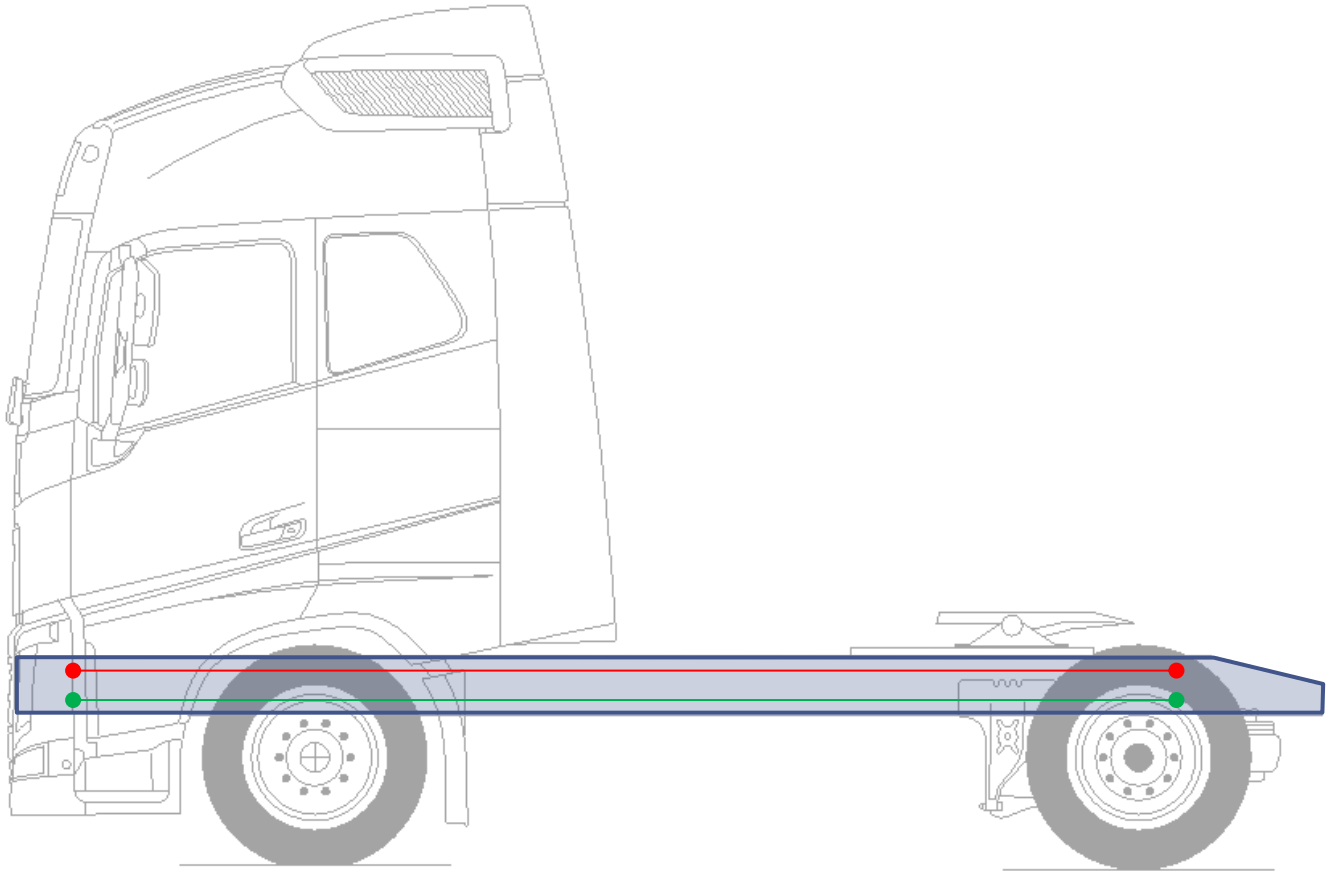
Platform defined by Platform interfaces

Frame dimensions:

- Front width
- Rear width
- Hole grid
- Section height / thickness

Media interface

- Main voltage level
- Electrical architecture communication



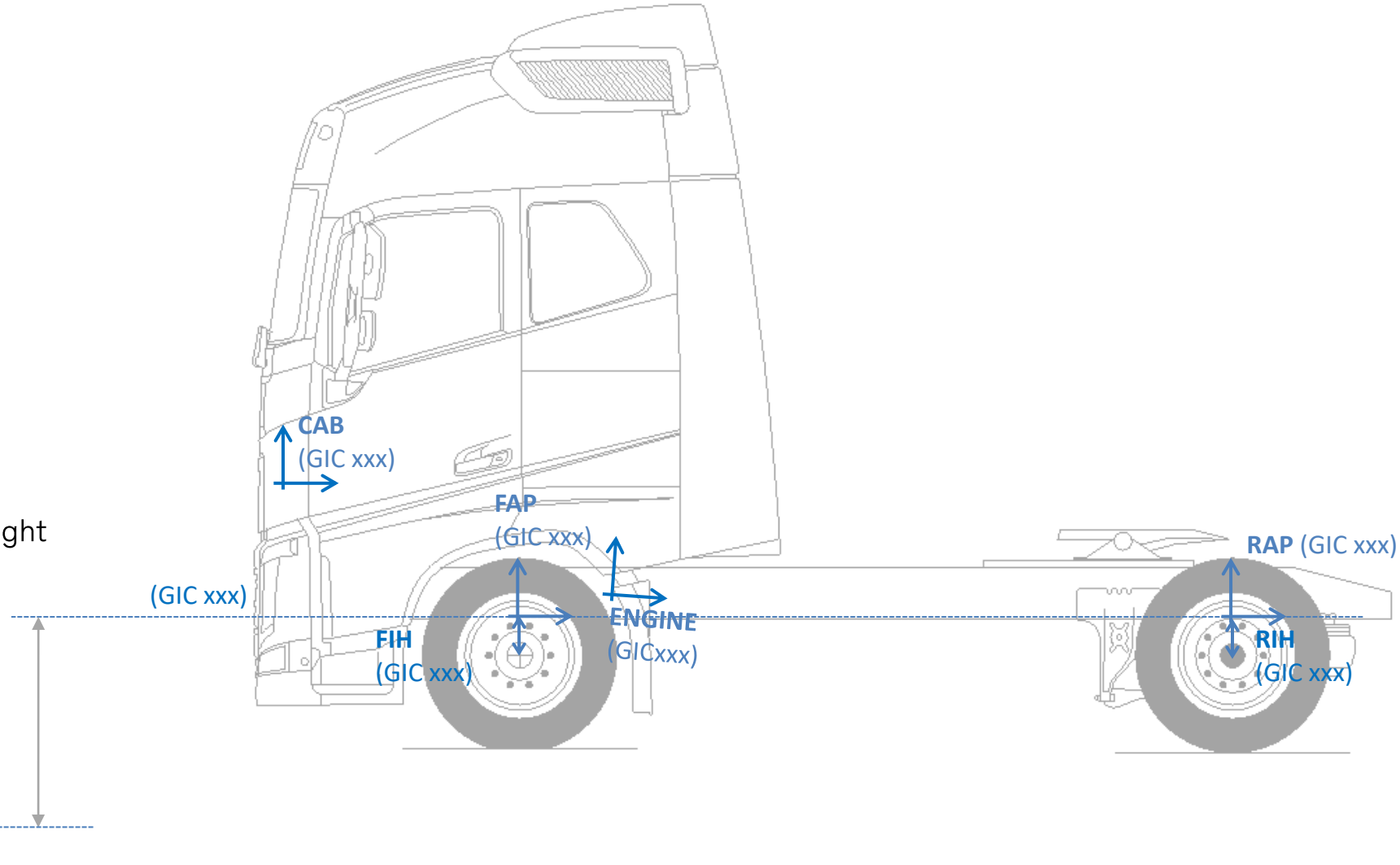
Architecture defined by Architecture interfaces

Vehicle coordinate systems:

- MAIN (Origo)
- CAB position
- ENGINE position
- FAP (Front axle position)
- RAP (Rear axle position)

Parametric

- Front / Rear installation height
- Front and rear axle spread



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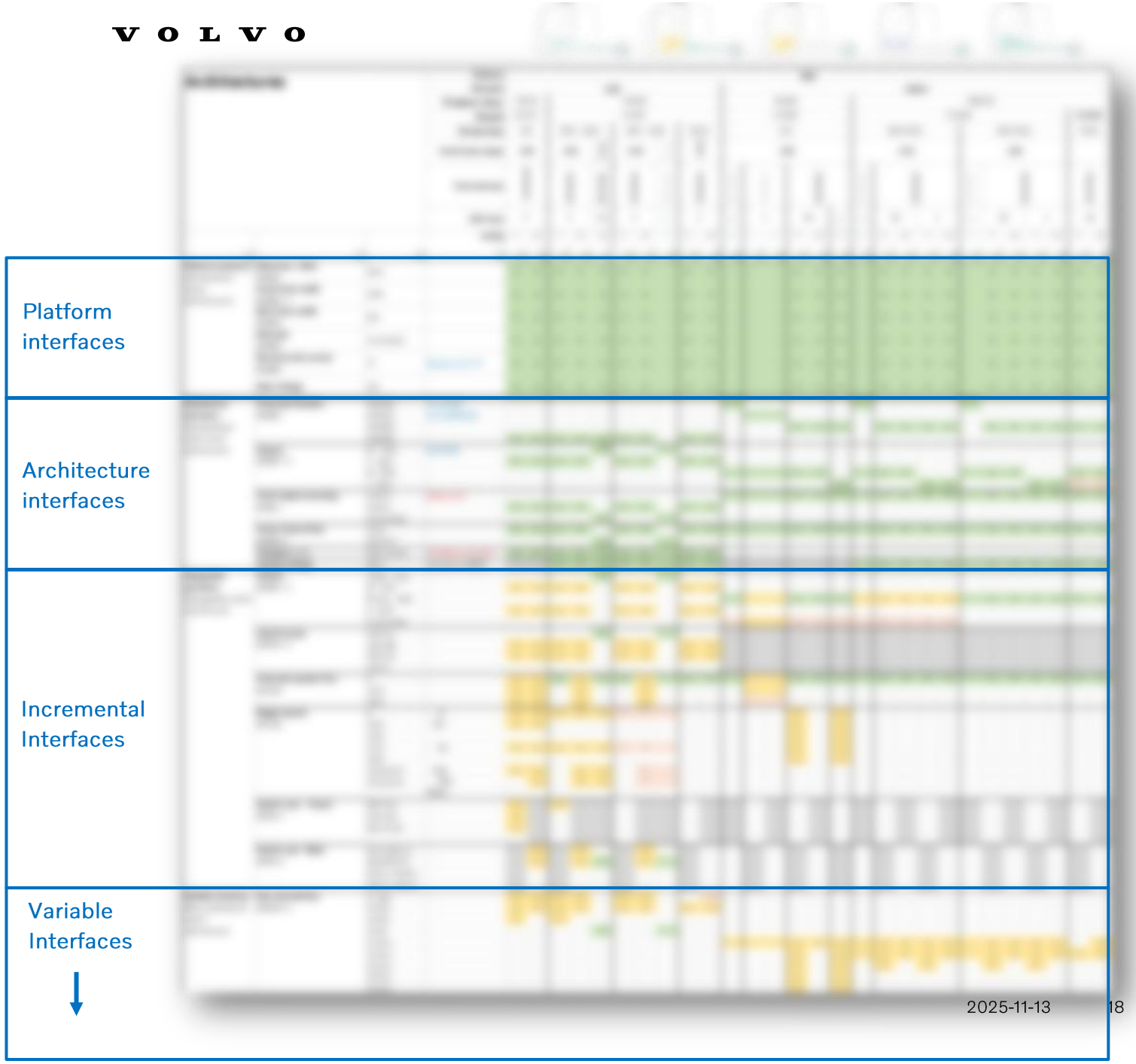
Architectures

- Platform interfaces
  - Standardized interfaces across architectures
  - *Such as: Holes grid / Main volage / Frame dim.*
- Architecture interface
  - Fixed interfaces per architecture
  - *Such as: Front axle position*
- Incremental interfaces
  - Selectable interfaces in a few discrete steps within an architecture
  - *Such as: Cab position*
- Variable interfaces
  - Scalable interfaces in many step and a large range within an architecture
  - *Such as: Rear axle position*



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Questions to reflect upon based on what is presented during the two days.

1. How can organizations effectively finance modular platform projects while **balancing short-term** ROI with **long-term** strategic value?

2. What practical strategies can teams use to actively **manage complexity in modular systems**—across architecture, governance, and operations?

3. How can a modular platform support **multiple brands** without compromising brand identity, customer experience, or operational efficiency?

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