Driving Product Variation with Platform Thinking

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REIMAGINE YOUR POSSIBILITIES
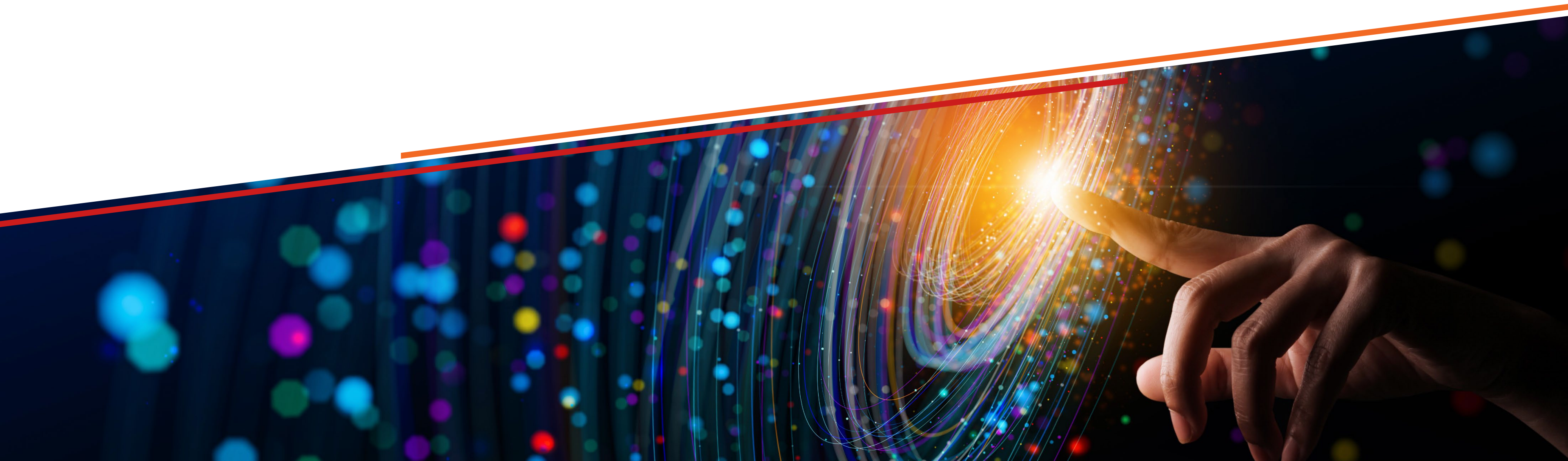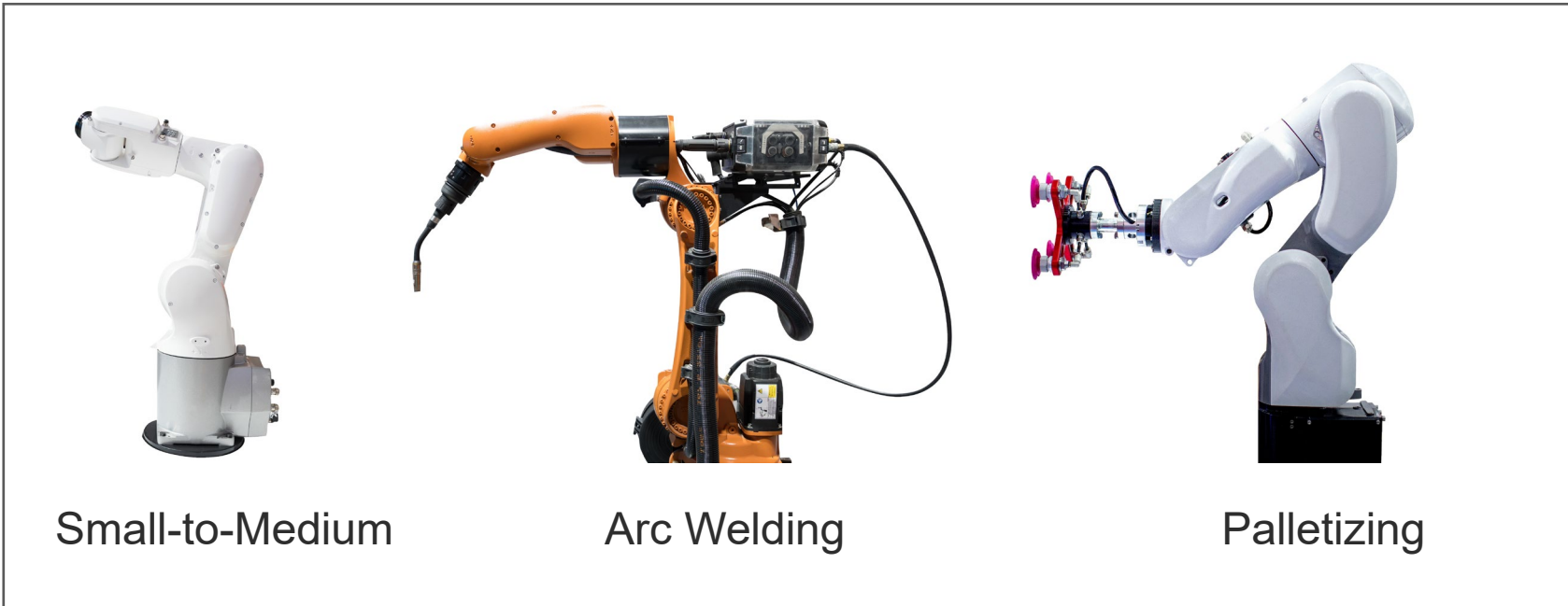
Product Variation

- All commerce: Business-to-Business, Business-to-Consumer

- All industries: Automotive, Heavy Machinery, Consumer and Hi-Tech Electronics, Renewable Energy, etc.

Sedan
Sedan Long Range
SUV
SUV Performance

Small-to-Medium   Arc Welding   Palletizing

32GB RAM
1TB SSD
Graphite
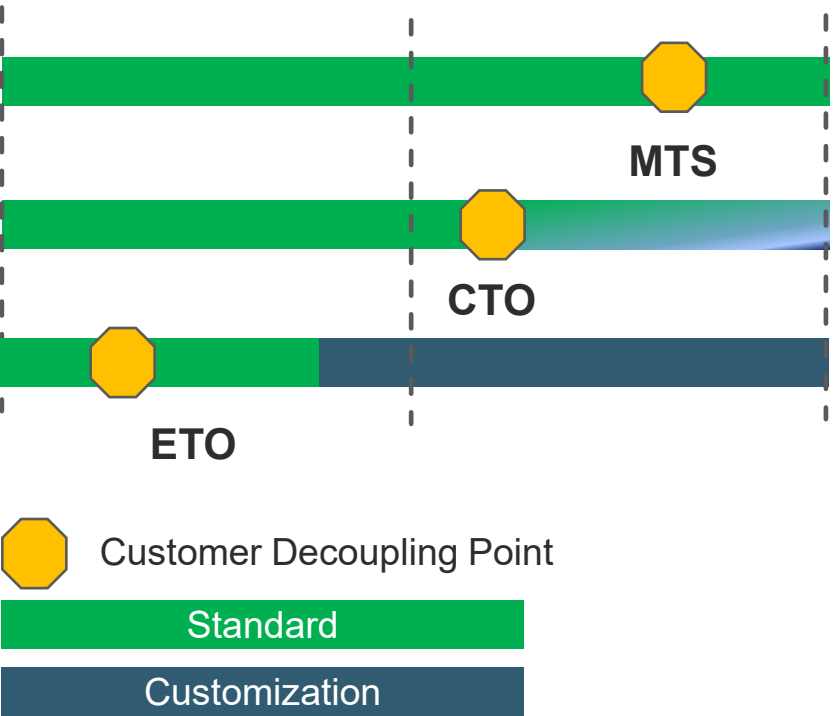
16GB RAM
256GB SSD
Platinum

Onshore wind   Offshore wind

Product Variation Complexity Dimensions

Nature of the Business
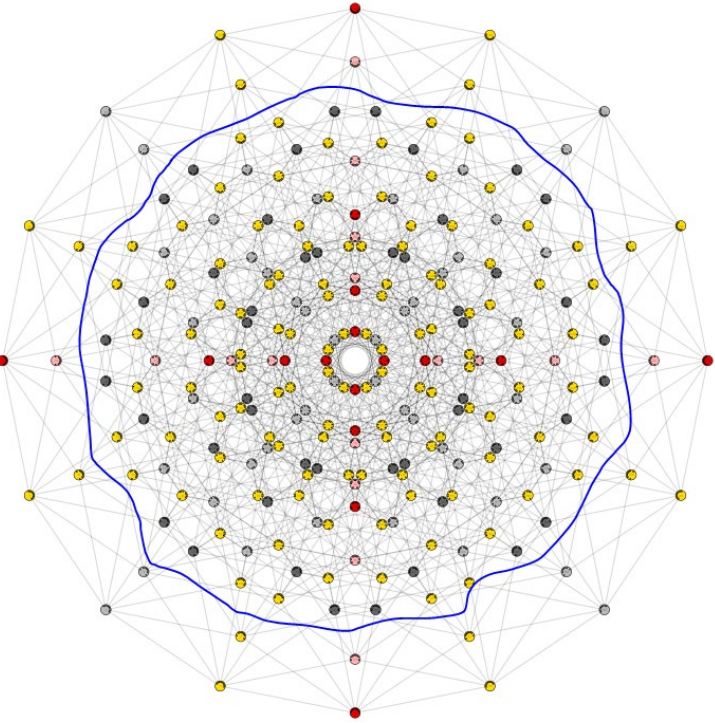
- Make-to-Stock
- Configure-to-Order
- Engineer-to-Order

Complexity of Solution Space

- Number of Feature/Options
- Discrete vs. Calculated Choices
- Number of Allowed Configurations
- Frequency of Changes

Complexity of the Product

- Size and Depth of Structure
- Frequency of Changes

MTS

CTO

ETO

Customer Decoupling Point

Standard

Customization

Allowed Configuration Space

Modular Product Platform

Product Family: **Family of similar products with variations in features and functions**

Modular Platform Architecture

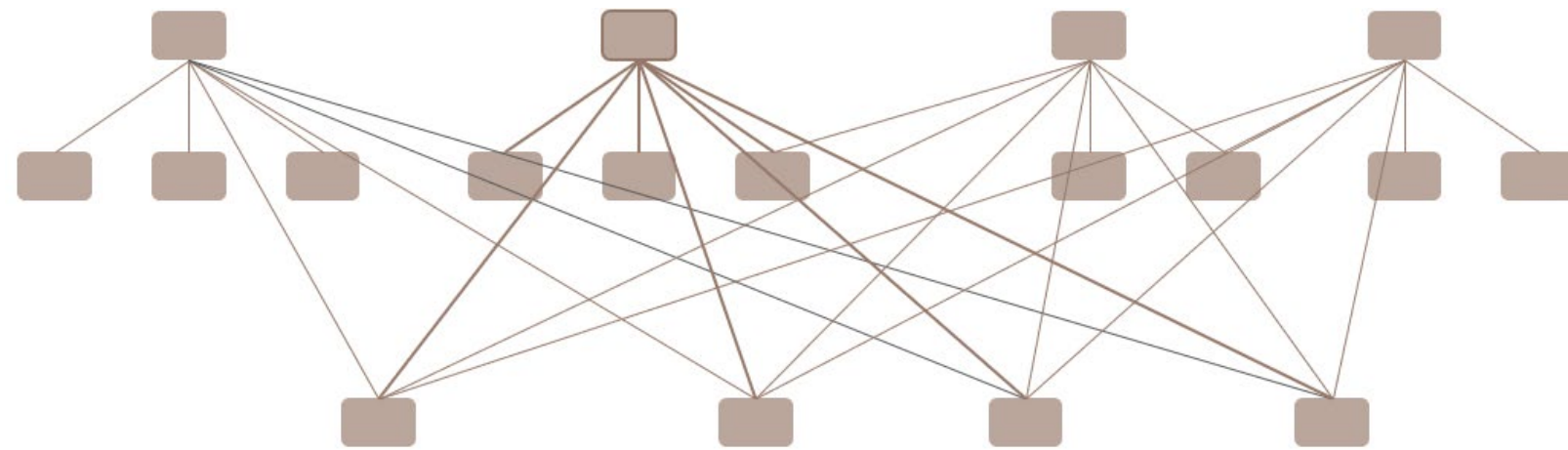Definition of product modules and their interfaces

Identification of shared (common) and variant assets

Modular Product Platform

Comparison:

Clone and Own

+ Easy to work with individual variant
- Less reuse
- Duplication complications

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Modular Product Platform

Comparison:

Clone and Own

+ Easy to work with individual variant
- Less reuse
- Duplication complications

Platform "150%"

Modules
Assets
V variant

Configure

F1	☐	☑	☐	☐	☐
F2	☑	☐	☐		
F3	☐	☐	☑	☐	
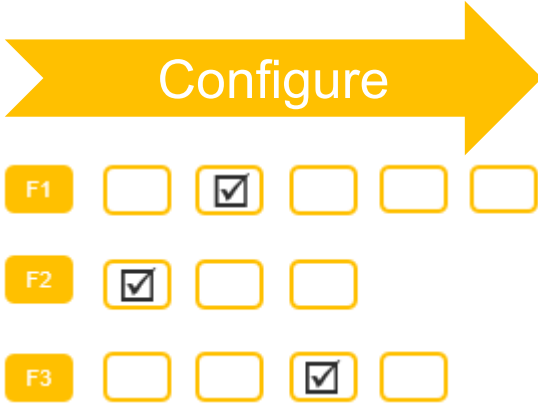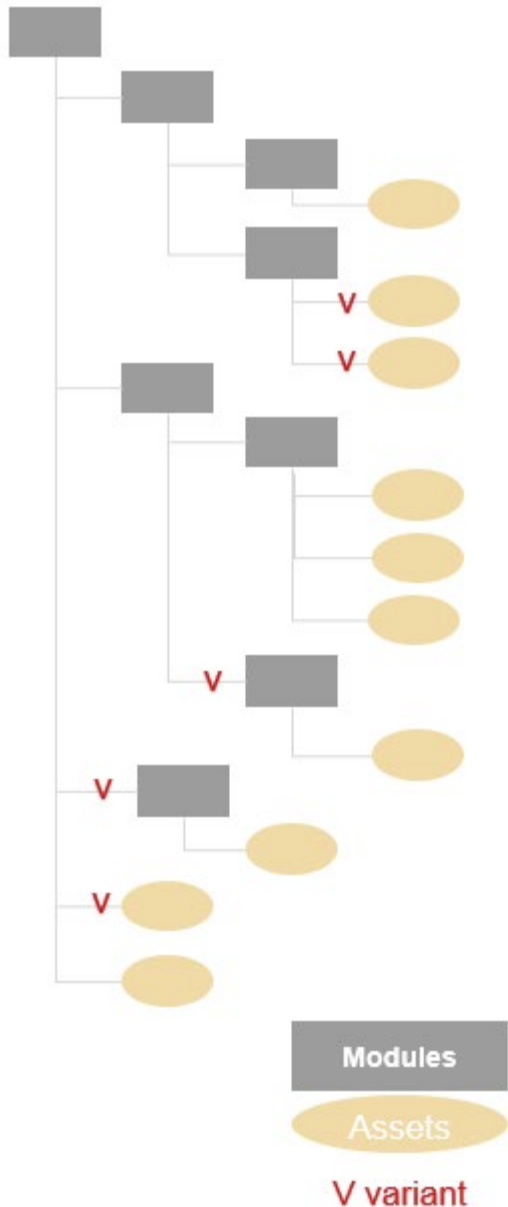
Configured Variant
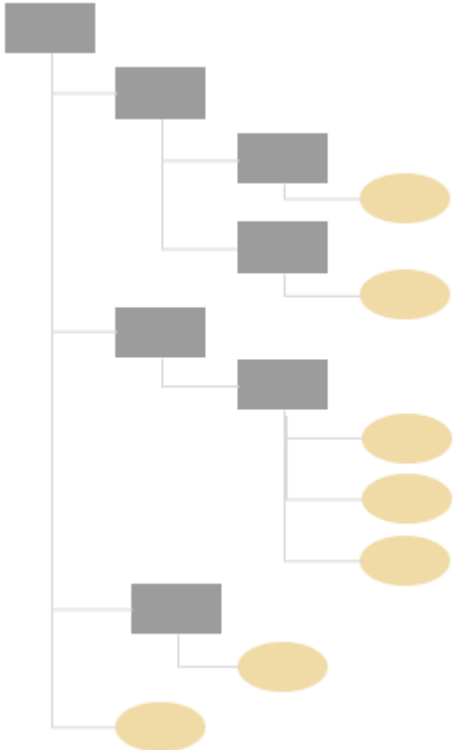
- Platform and systems thinking
- Complex configurations
+ Maximized reuse / reduced cost
+ Focus on right products
+ Shorter time to deliver

Example – Robot Modularization
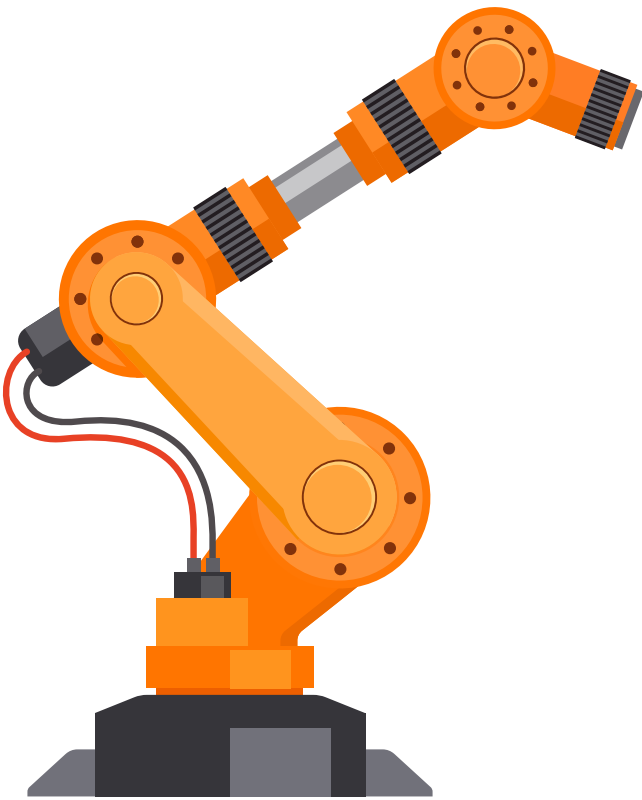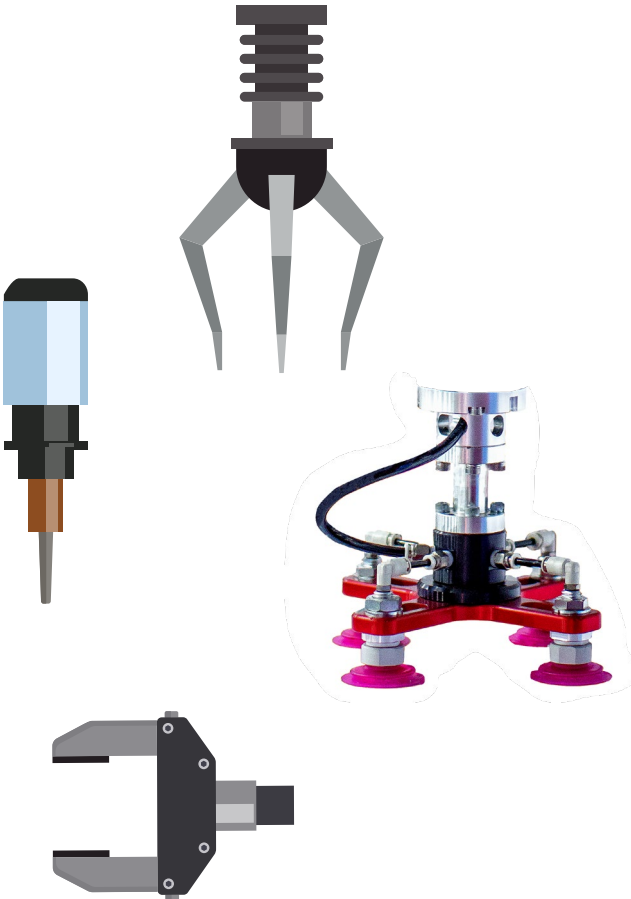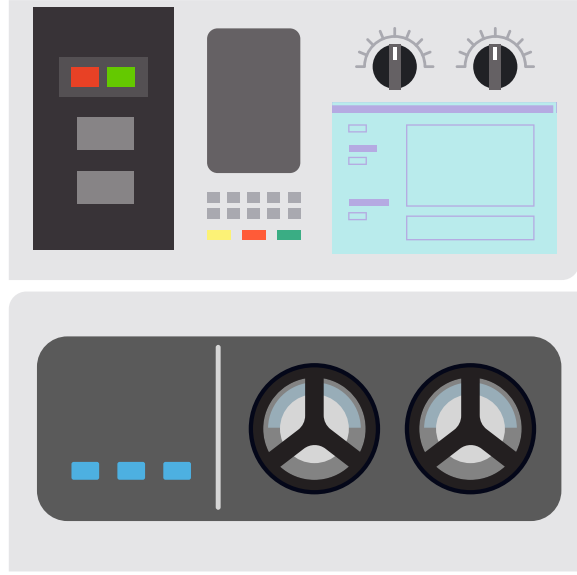
Arm + End Effector + Controller + Software & Robot Programming

Example – Arm Modularization

Modular Breakdown

Base
  +
Arms
  +
Joints
  +
Actuators
  +
Encoders
  +
Reduction Gears
  +
Transmission
  +
more

Variable Features

Payload
  +
Arm Reach
  +
Position Repeatability
  +
Safety Compliance
  +
Installation Method
  +
Power
  +
more

Example – Robot Variability

Variability of Robot Arms ✚ **Variability of End Effectors** ✚ **Variability of Controllers** ✚ **Variability of SW and PRG**

Max Payload
20kg or less
21-50kg
51-100kg

Max Reach
1000 mm or less
1,001-1,500mm
1,500-2,000mm

Installation Method
Ground
Ceiling

Power
2.0kVA
5.6kVA
7.5kVA

Application
Assembling
Arc Welding
Palletizing

Gripper Type
Vacuum Gripper
2-Finger Gripper
3-Finger Gripper

Max Payload
20kg or less
21-50kg
51-100kg

Power
2.0kVA
5.6kVA
7.5kVA

No. of LAN Slots
None
3-slots

Required Software
Standard SW
Arc Welding SW
Palletizing SW

2D Vision Add-on
Yes
No

3D Vision Add-on
Yes
No

Automated Programming
Yes
No

Example – Robot Variability Rules

Variability of Robot Arms ➕ **Variability of End Effectors** ➕ **Variability of Controllers** ➕ **Variability of SW and PRG**

Max Payload
20kg or less
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No. of Slots
None
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2D Vision Add-on
Yes
No

Installation Method
Ground
Ceiling

Max Payload
20kg or less
21-50kg
51-100kg

3D Vision Add-on
Yes
No

Power
2.0kVA
5.6kVA
7.5kVA

Automated Programming
Yes
No

If Max Payload is 51-100kg, Installation Method must be Ground

Example – Robot Variability Rules

Variability of Robot Arms ✚ **Variability of End Effectors** ✚ **Variability of Controllers** ✚ **Variability of SW and PRG**

Max Payload
20kg or less
21-50kg
51-100kg

Max Reach
1000 mm or less
1,001-1,500mm
1,500-2,000mm

Installation Method
Ground
Ceiling

Power
2.0kVA
5.6kVA
7.5kVA

Application
Assembling
Arc Welding
Palletizing

Gripper Type
Vacuum Gripper
2-Finger Gripper
3-Finger Gripper

Max Payload
20kg or less
21-50kg
51-100kg

Power
2.0kVA
5.6kVA
7.5kVA

No. of Slots
None
3-slots

Required Software
Standard SW
Arc Welding SW
Palletizing SW

2D Vision Add-on
Yes
No

3D Vision Add-on
Yes
No

Automated Programming
Yes
No

If Application is Assembling, Required Software is Standard SW

Example – Robot Variability – Solution Space

"The WHAT"

Allowed Configurations:

| Application ↑ 1	Maximum Payl... ↑ 2	Maximum Reach ↑ 3	Gripper Type ↑ 4
Assembling	20kg or less	1,000 mm or less	2-Finger
Assembling	20kg or less	1,000 mm or less	3-Finger
Assembling	20kg or less	1,001-1,500mm	2-Finger
Assembling	20kg or less	1,001-1,500mm	3-Finger
Assembling	20kg or less	1,500-2,000mm	2-Finger
Assembling	20kg or less	1,500-2,000mm	3-Finger
Assembling	21-50Kg	1,000 mm or less	2-Finger
Assembling	21-50Kg	1,000 mm or less	3-Finger
Assembling	21-50Kg	1,001-1,500mm	2-Finger
Assembling	21-50Kg	1,001-1,500mm	3-Finger
Assembling	21-50Kg	1,500-2,000mm	2-Finger
Assembling	21-50Kg	1,500-2,000mm	3-Finger
Assembling	51-100Kg	1,000 mm or less	Vacuum
Assembling	51-100Kg	1,001-1,500mm	Vacuum
Assembling	51-100Kg	1,500-2,000mm	Vacuum

Example – Robot Grippers

"The HOW"
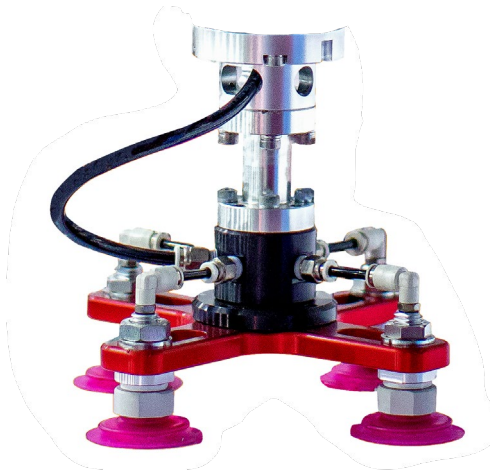
PRT-GRP-VCM-100

Usage Condition:

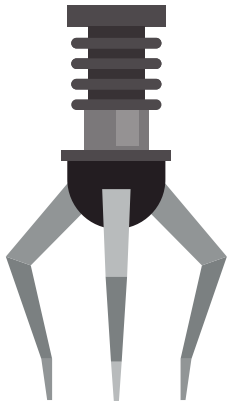Gripper Type = Vacuum

Max Payload = 51-100kg
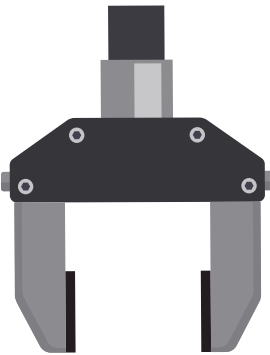
PRT-GRP-2FG-20

Usage Condition:

Gripper Type = 2-Finger

Max Payload = 20kg or less

PRT-GRP-3FG-50

Usage Condition:

Gripper Type = 3-Finger

Max Payload = 21-50kg

Variability in Technical Documentation

RS, RW, RP Series

Product Families built on same platform

Small-to-Medium   Arc Welding   Palletizing

- How can I generate a documentation specific to a series?
  - Exclude info that doesn't pertain to the selected series

- What are country/region specific instructions?
  - Due to different safety compliance and regulations

- How do I install application-specific end-of-arm attachments?
  - Arc Welding vs. Palletizing vs. Assembly

- What are different way to install the robot arm?
  - Ground vs. Ceiling

Demonstration

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Summary

Key Differentiators

- **Decoupled Variant Planning** supports variation across multiple domains

  - Not just for Parts and BOMs

- **Built-in Configurator** supports customizable business logic

  - Unprecedented flexibility working with the configurator

  - Customize different output views of the data based on who/how is consuming it

- Natively integrates <u>Variability</u> Definition and <u>Product</u> Definition on **the same platform**

  - Supports single platform digital thread

- Provides **relevant variability scope** at different levels of the product structure

  - Different users or groups can work on different product aspects without being overwhelmed

Roadmap

- Variant Management **Release 27 – May 2023**

  New features:

  - Selection Sets

  - Reusable Usage Conditions

  - Variant Matrix

- Next Steps

  - Managing variation in Requirements Engineering, Technical Documentation, MPP/MBOM

  - Visualizing resolved structures

  - Receive your feedback on the solution approaches

Thank You for Attending!

- Variant Management Training Session

  Today, 4:10 - 5:25 PM

- Upcoming Variant Management Demo Series
  - Wed, May 10 – Adventures in the PLM Multiverse: Mastering your Product Development Timelines
    - An approach for managing variation in Requirements
  - Thurs, May 18 – Driving Product Variation with Platform Thinking

Value to Your Business

Cause: Managing product variation outside of PLM (in CPQ, spreadsheets, etc.)

Pain Points:

- Reduced visibility into variation
- Time spent on interpreting and manually synchronizing data
- Time spent on building incorrect variants, and reaction to late findings
- Manual exploration of system variability

How Aras can help:

- Configurator built into the PLM platform
- Relevant variation available to all users
- Guided to valid configurations
- Variability is designed to be applied to any engineering data representation (e.g., requirements, documentation, design)

Cause: Lacking efficient traceability and change impact of variation

Pain Points:

- Manual traceability, synchronization and verification
- Delays in problem resolution and product releases
- More time needed to prove compliance in regulated markets

How Aras can help:

- Variability Definition and Product Definition linked and traceable
- Compatible with all PLM services: revision control, where-used, change management, collaboration, etc.
- Modeling and relating variability space and all digital assets via a tool agnostic digital thread and an open API

Cause: Increasing Complexity (connectivity, geopolitical, environmental, etc.)

Pain Points:

- Loss of market share from inability to scale up
- Longer lead times
- More complex mix-and-match
- Recalls & liability

How Aras can help:

- Manage product families with platform thinking
- Break down the complexity
- Manage and validate configuration rules
- Flexibility to match your needs

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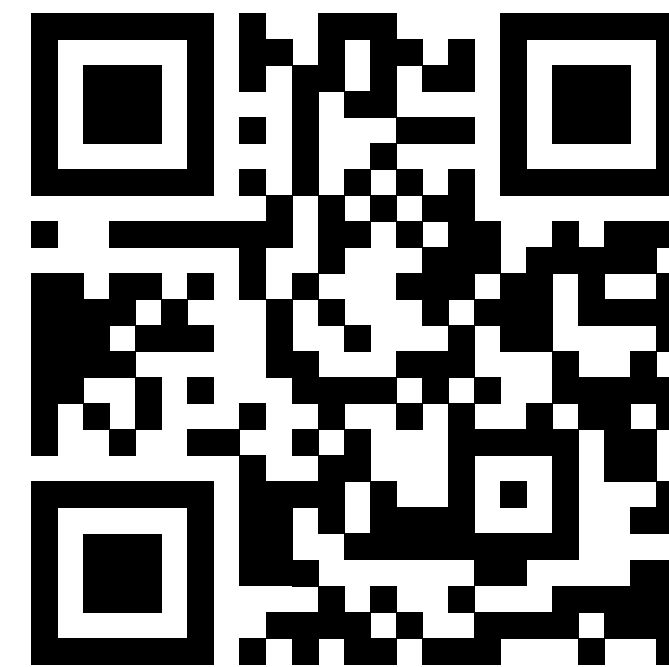
LEAVE A REVIEW!

Reach out to asinghal@aras.com with your questions and comments

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