



ACCELERATION HANDBOOK

Intelligent and Streamlined Development for **Electric, Software-Defined, and Autonomous Vehicles**

21 36 67 98

```
0001D5BD: BD 02 03 lda RawPPUtransferBuf
0001D5C0: 8D 07 20 sta $2007
0001D5C3: E8 inx
0001D5C4: C6 5E dec RawPPUtransferSize
0001D5C6: D0 F5 bne -
0001D5EA: F0 13 beq +
```

67 . 2 4 2
48 . 0 2 1

C2 MODEL 0042.A
SYSTEM: AUTO
FREQ: 12104 Mghz

RETRIEVING DATA

```
0001D5BD: BD 02 03 lda RawPPUtransferB
0001D5C0: 8D 07 20 sta $2007
0001D5C3: E8 inx
0001D5C4: C6 5E dec RawPPUtransfer
0001D5C6: D0 F5 bne -
0001D5EA: F0 13 beq +
```



FAST-PACED CHANGE IS DRIVING AUTOMOTIVE INNOVATION

Global competitors are bringing advanced products to market at an aggressive speed. The industry's focus is shifting from mechanical to software-defined products, and the rise of **electric**, **software-defined**, and **autonomous vehicles** complicates development. The reality for traditional carmakers is clear: keep up or get left behind. But you don't just want to adapt—you need to benefit from new revenue streams and stand at the forefront of innovation. Of course, this transformation comes with inherent quality, compliance, regulatory, and cybersecurity risks.

This Acceleration Handbook provides practical guidance for implementing **Application Lifecycle Management (ALM)** and **Product Lifecycle Management (PLM)** solutions as part of your digital transformation strategy to manage development complexity, improve efficiency, maintain quality, and comply with evolving regulatory requirements. When implemented together, these solutions help automakers shorten development time, accelerate speed to market, and drive innovation for a competitive edge—maximizing revenue while minimizing risk.



```
0001C00: 05 08 1da 0000
MotorFing
0001C00: A0 00 1da #500
0001C00: 05 07 00a 0000000000000000
0001C00: A2 02 1da #502
0001C00: 28 03 C1 jar SetObjects
0001C00: A1 05 1da #500
0001C00: 05 07 1da 0000000000000000
0001C00: CA dex
0001C00: 18 FB bpl
```

```
0001D5BD: BD 02 00 1da RawPPU
0001D5C0: BD 07 20 sta $2007
0001D5C3: E8 inx
0001D5C4: C6 5E dec RawPP
0001D5C6: D0 F5 bne -
0001D5EA: F0 13 beq +
```

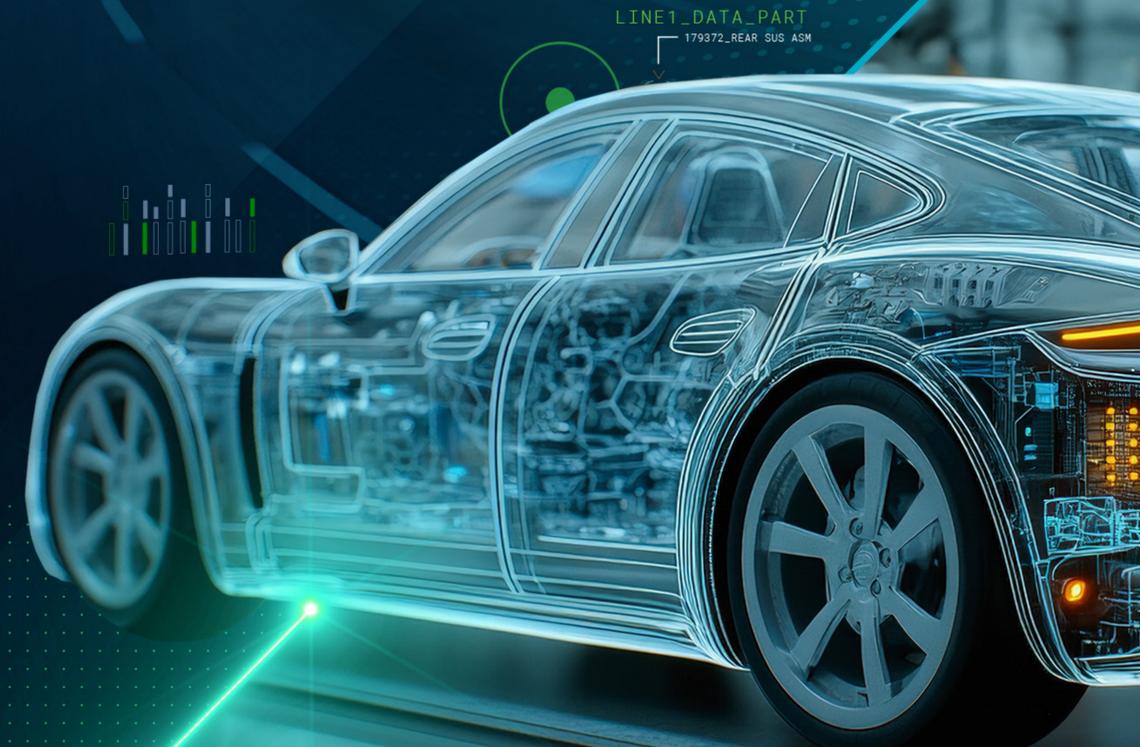




HOW TO ACCELERATE COMPLEX DEVELOPMENT



- Development speed is the new currency for staying ahead of the competition. However, as vehicles become more complex, new requirements and changes across hardware and software constantly emerge. **43% of respondents** to a [Tech-Clarity survey](#) identified “increasing product complexity” as a top engineering challenge for products with hardware and software. In the same survey, **40% identified** “increasing software requirements” as a top challenge. To meet these challenges with an innovative approach, leading automakers leverage **ALM and PLM solutions**, which are designed to facilitate this transition toward **software-defined vehicles**. Use the checklist on the following page to help guide your strategy for accelerating automotive development.



- ○ ○ ○ ○ ○

YOUR **DEVELOPMENT ACCELERATION** CHECKLIST



Implement open, modular architectures: Managing complex integrations of mechanical, electronics, and software is critical to maximize efficiency. Adopting open, modular architectures with ALM and PLM enables parallel development and helps remove time-wasting bottlenecks.



Integrate product line engineering: Integrating product line engineering and streamlining configuration management across functions helps master complexity challenges between domains and support cohesive, timely product development of new vehicle technologies.



Adopt modern development methodologies: Robust requirements and variant management, strategic reuse, and agile practices shorten iteration cycles, optimize processes, and accelerate development velocity.



HOW TO MITIGATE SAFETY, COMPLIANCE & CYBERSECURITY RISKS

- Accelerating development helps you stay competitive. But your ability to maintain high quality and ensure compliance has the power to make or break your brand reputation. **37% of respondents** to a [Tech-Clarity survey](#) identified “increasing regulations” as a top challenge. With robust compliance features and integrated requirements, **ALM** and **PLM** can help you mitigate these risks. Start with the checklist on the following page to develop reliable safety, compliance, and cybersecurity strategies.



YOUR RISK MITIGATION CHECKLIST



Build compliance frameworks and leverage pre-built templates: Streamline validation, reduce manual efforts, and ensure compliance with evolving regulatory and safety standards—like ASPICE and ISO 26262.



Ensure end-to-end traceability: Integrated ALM and PLM provide end-to-end traceability across hardware, software, and compliance.



Leverage AI-driven solutions: AI solutions for intelligent requirements authoring and validation help boost productivity and manage compliance complexity.



Integrate compliance and change tracking: Deploy ALM and PLM early in the development process to improve quality and avoid costly late-stage redesigns and delays.



HOW TO IMPROVE COLLABORATION & EFFICIENCY

67.242
48.021

RETRIEVING DATA



□ A team that has the information and resources they need to work efficiently together will get new vehicles to market faster. However, **26% of respondents** to a [Tech-Clarity survey](#) identified an “inability to collaborate across disciplines/overcome silos” as a top engineering challenge. Leveraging **ALM** and **PLM** to improve collaboration and efficiency ensures seamless workflows with minimal delays. Get started with the checklist on the next page.



- ○ ○ ○ ○ ○

YOUR **COLLABORATION & EFFICIENCY** CHECKLIST



Eliminate Data Silos: Providing centralized access to design decisions, engineering changes, and testing feedback through a digital thread of data reduces delays and prevents costly redesigns.



Provide the right access to tools: Granting remote access to tools secures your sensitive data while improving collaboration between cross-functional teams and outside suppliers.



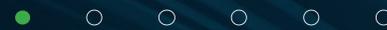
Enable real-time collaboration: Data sharing and task automation support faster cross-functional decision-making.





HOW TO FIND THE RIGHT ALM & PLM SOLUTIONS

- Accelerating **speed to market** doesn't just improve competitive advantage—it helps meet growing customer demands, build brand credibility, and increase revenue and profitability. To join the race against your competition, you'll first need to find the right **ALM and PLM solutions**—and integrate them for optimal outcomes.



SPEED WINS. SLOW LOSES. IT'S THAT SIMPLE.



Integrating ALM and PLM to create a digital thread of data provides several business benefits. Respondents to a **Tech-Clarity survey** reported improvements in the following areas after leveraging the digital thread:

Percentage of Respondents Reporting Improvements and their corresponding **Area of Improvement**. Source: Integrating ALM & PLM Buyers Guide, Tech-Clarity



PRODUCT QUALITY



TIME TO MARKET



ENGINEERING EFFICIENCY



PRODUCT INNOVATION



COMPLIANCE

Implementing ALM and PLM to maximize these benefits is easier with a knowledgeable technology partner. **PTC's Codebeamer ALM and Windchill PLM solutions** help leading automakers accelerate complex development and improve collaboration while mitigating safety, quality, and cybersecurity risks.





START ACCELERATING AUTOMOTIVE INNOVATION TODAY



- Are you ready to speak to a PTC expert about open, scalable, and integrated **Codebeamer** and **Windchill**?

[Contact Us >](#)

- + Now that you have a dedicated checklist for accelerating **speed to market**, it's time to evaluate the products that will help you check every box. To explore more benefits of **ALM-PLM integration**—and get detailed guidance on adoption, implementation, and vendor considerations—download Tech-Clarity's *Integrating ALM and PLM Buyer's Guide*.

[Get the Buyer's Guide >](#)



121 SEAPORT BLVD. | BOSTON, MA 02210



COMPANIES THAT MAKE THE PRODUCTS THE WORLD RELIES ON,

RELY ON PTC

© 2025, PTC Inc. All rights reserved. PTC, the PTC logo, and all other PTC product names and logos are trademarks or registered trademarks of PTC and /or its subsidiaries in the United States and other countries.

```

10 BASE = 32768 + 32
20 READ BYTE
30 IF BYTE = -1 THEN BASE = BASE -1 : GOTO 999
40 POKE BASE, BYTE
50 BASE = BASE + 1
60 GOTO 20
999 IF BASE = (50 + 32768) THEN SYS(32768 + 32) : END
1000 DATA 120
1010 DATA 169, 128
1020 DATA 141, 21, 3
1030 DATA 169, 45
1040 DATA 141, 20, 3
1050 DATA 88
1060 DATA 96
1070 DATA 238, 32, 208
1080 DATA 76, 49, 234
1100 DATA -1

```

21 36 67 98

