BRINGING 48V TO PRODUCTION



REAL-WORLD INSIGHTS FOR A SUCCESSFUL 48V TRANSITION

48 VOLT READY

TE CONNECTIVITY 48V. FURTHER. SOONER.



THEORY VS. IMPLEMENTATION

For the automotive industry, 48V architecture is redefining what is possible and represents significant opportunities:

- Higher voltage supports greater electrical efficiency
- Smaller conductors can help reduce vehicle weight
- Vehicle architectures can be simplified
- New approaches to zonal design become possible

WHY 48V MATTERS

75%

Reduction in current required when compared with traditional 12V systems.

But now, the conversation is shifting from why 48V matters to how it can be successfully implemented.

TE Connectivity collaborated with an OEM on an early 48V vehicle architecture program, gaining first-hand insight into the practical realities of bringing this solution into production.

Through this experience, we gained a clearer understanding of the decisions, trade-offs and ways of working that can influence the success of a 48V program.

Collectively, these learnings highlight factors that may help support the transition from concept development to implementation. Not only from a technical perspective, but also in terms of development processes, cross-functional collaboration and supplier relationships.

This guide explores the key implementation considerations TE has identified through real-world 48V deployment experience and outlines what OEMs should consider when planning the transition to production.

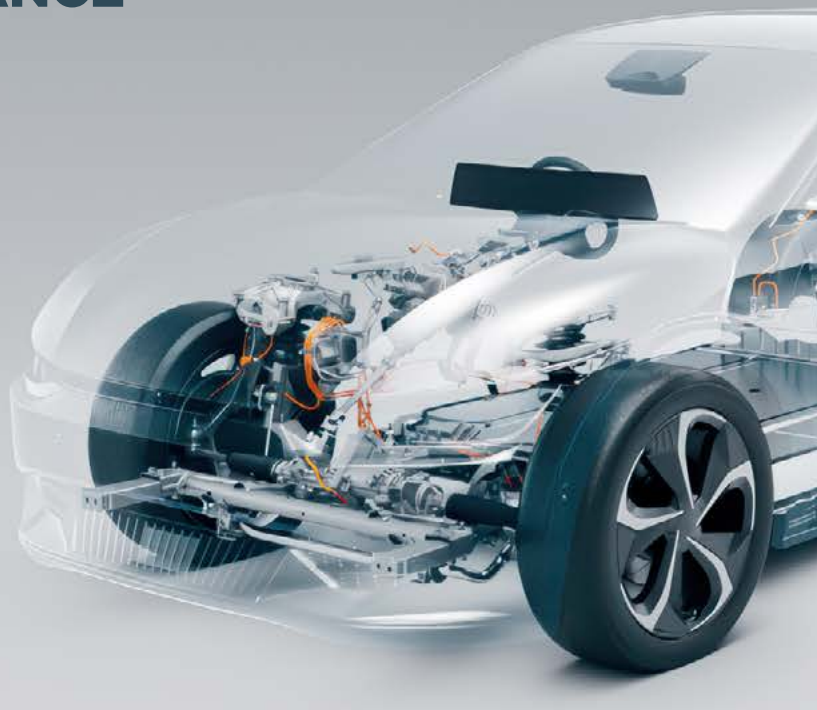
KEY INSIGHTS AT A GLANCE

A new development mindset
48V changes more than vehicle architecture.

Build for flexibility
Prepare to adapt to evolving requirements.

Learn through real-world experience
Valuable insights surface in the field.

Co-create for success
Partnerships matter as much as the tech.



BUILDING THE ARCHITECTURE WHILE DEFINING IT

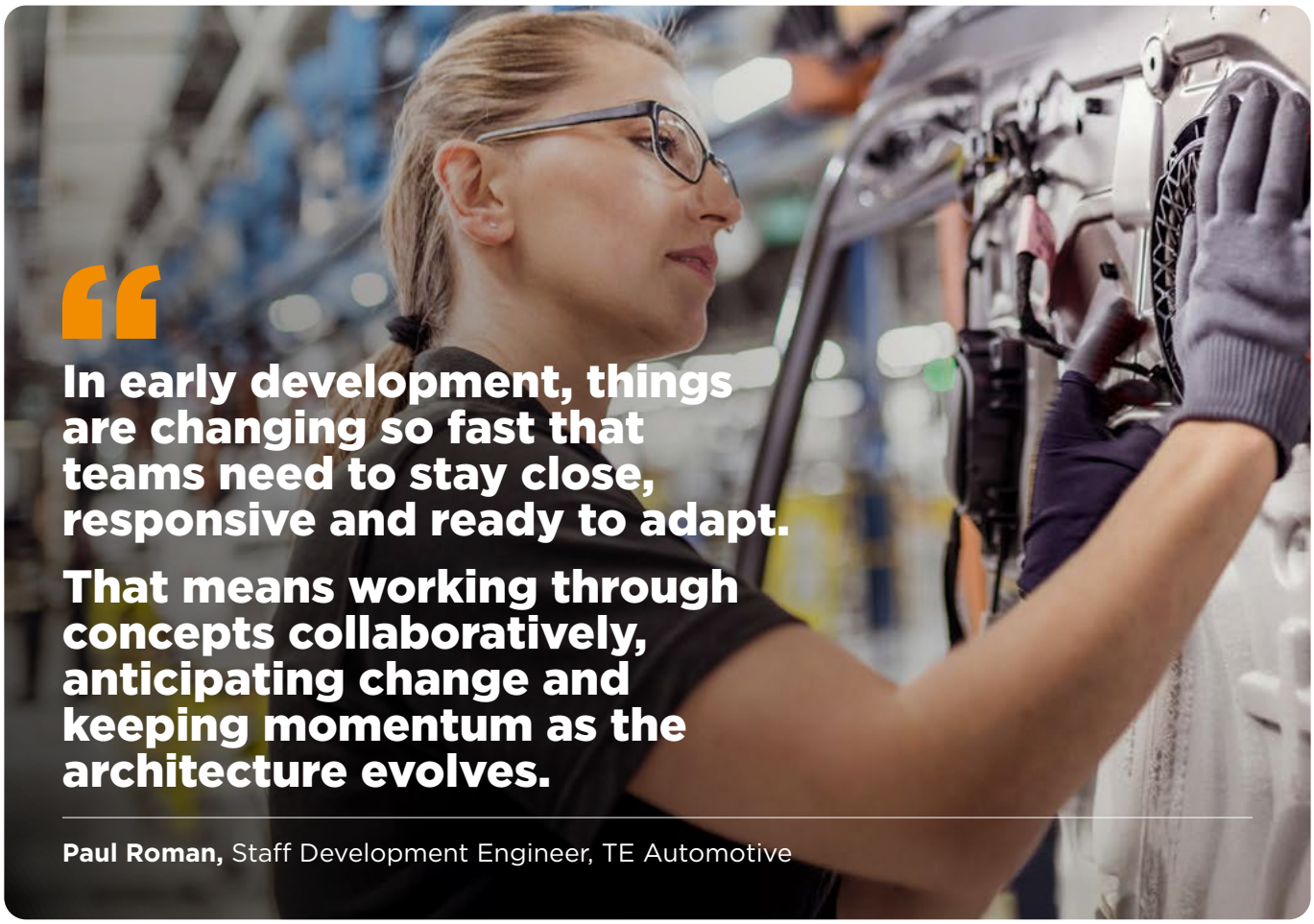
Most vehicle assembly projects follow a relatively standard process:



48V implementation introduces a different dynamic

As vehicle architectures evolve, multiple engineering disciplines become involved simultaneously. Electrical, connectivity, software and mechanical teams all influence how the architecture ultimately performs. Customers should be aware that decisions made in one area can have implications elsewhere, creating a more interconnected development environment.

At the same time, requirements may continue to mature throughout the program. New information, testing results and system-level considerations can shape design decisions long after traditional development processes would expect them to be finalized.





We found that success depends less on following a predefined process and more on responding effectively as the project evolves.

This does not mean abandoning engineering discipline. It means adapting – creating processes that facilitate learning, collaboration and iteration while maintaining performance.

TE INSIGHT

Implementing a 48V architecture isn't simply an engineering challenge. It may benefit development and manufacturing teams to work with suppliers in a more adaptive delivery model where change is expected and actively managed.



FLEXIBILITY MATTERS MORE THAN PERFECTION

In traditional automotive programs, there is a strong incentive to move toward production readiness as quickly as possible. Designs are finalized, tooling investments are made and manufacturing processes are optimized for long-term efficiency.

One of the key learnings we took from 48V implementation was that the boundaries between design, validation and industrialization can become less distinct:

- Requirements evolved throughout development
- Design freeze did not mean the end of design changes
- Multiple concepts were explored simultaneously
- Manufacturing plans had to adapt alongside engineering decisions

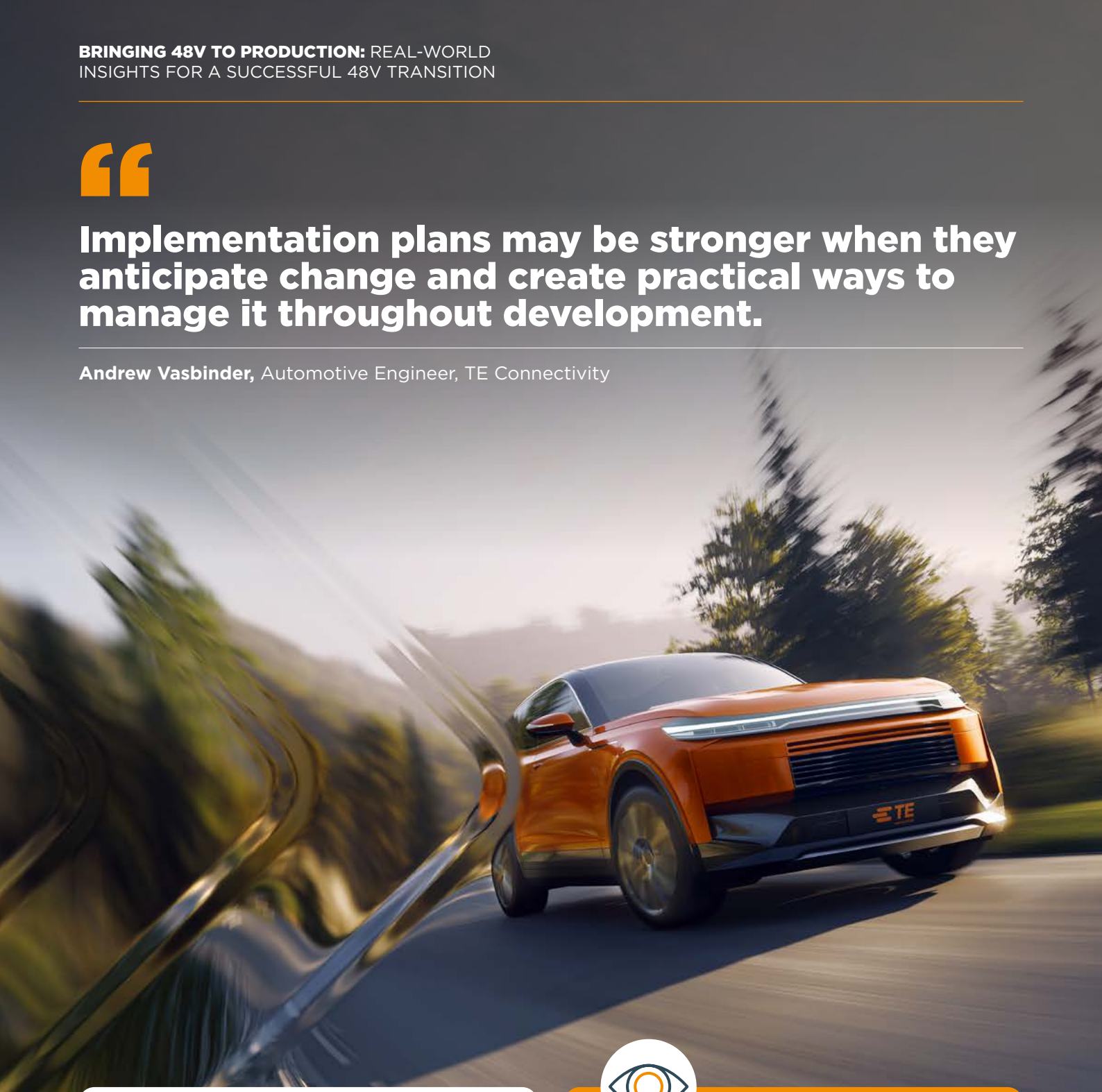


Depending on program requirements, some teams may choose a phased tooling strategy, including lower-cavitation or manual assembly approaches during early development, to preserve flexibility before larger investments are finalized.

Andrew Vasbinder, Automotive Engineer, TE Connectivity

Implementation plans may be stronger when they anticipate change and create practical ways to manage it throughout development.

Andrew Vasbinder, Automotive Engineer, TE Connectivity



We found that, rather than committing immediately to large-scale automation and production tooling, it can be valuable to maintain flexibility for longer.

A phased approach creates room for learning before major investments are locked in.

TE INSIGHT

Structure development plans around the expectation that change will happen. Not because programs are failing, but because innovation rarely stands still.

The pressure to accelerate development is real. But moving quickly and locking decisions too early are not the same thing.

CONTINUOUS REFINEMENT DRIVES STRONGER OUTCOMES

Important insights often emerge when systems are evaluated under real operating conditions. What surprised us is that even with extensive simulation and pre-production testing, the reality of a 48V architecture often only becomes fully visible once components are deployed.

OEMs should prepare for the fact that some important design refinements may be driven by early field use and production feedback.

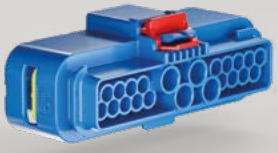
During validation builds and early production planning, teams may identify practical integration considerations, including:

- Connector orientation
- Tolerance related fit
- Controller interface variation
- Assembly process improvements

> **Real-world deployment creates valuable learning opportunities. As test evidence builds, feedback from build teams helps drive change.**
>
> **Andrew Vasbinder,** Automotive Engineer, TE Connectivity

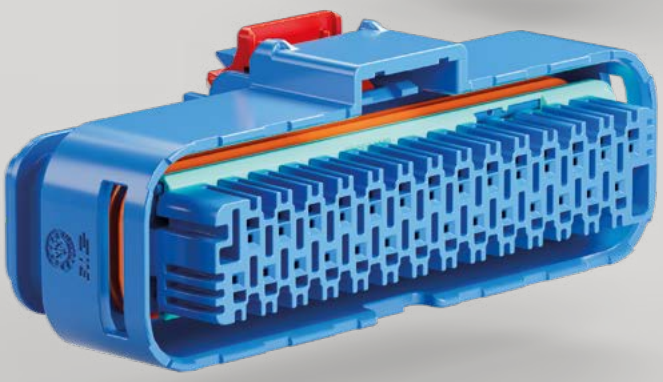


We found that, rather than treating production as an endpoint, it is more accurate to view it as the start of continuous refinement.

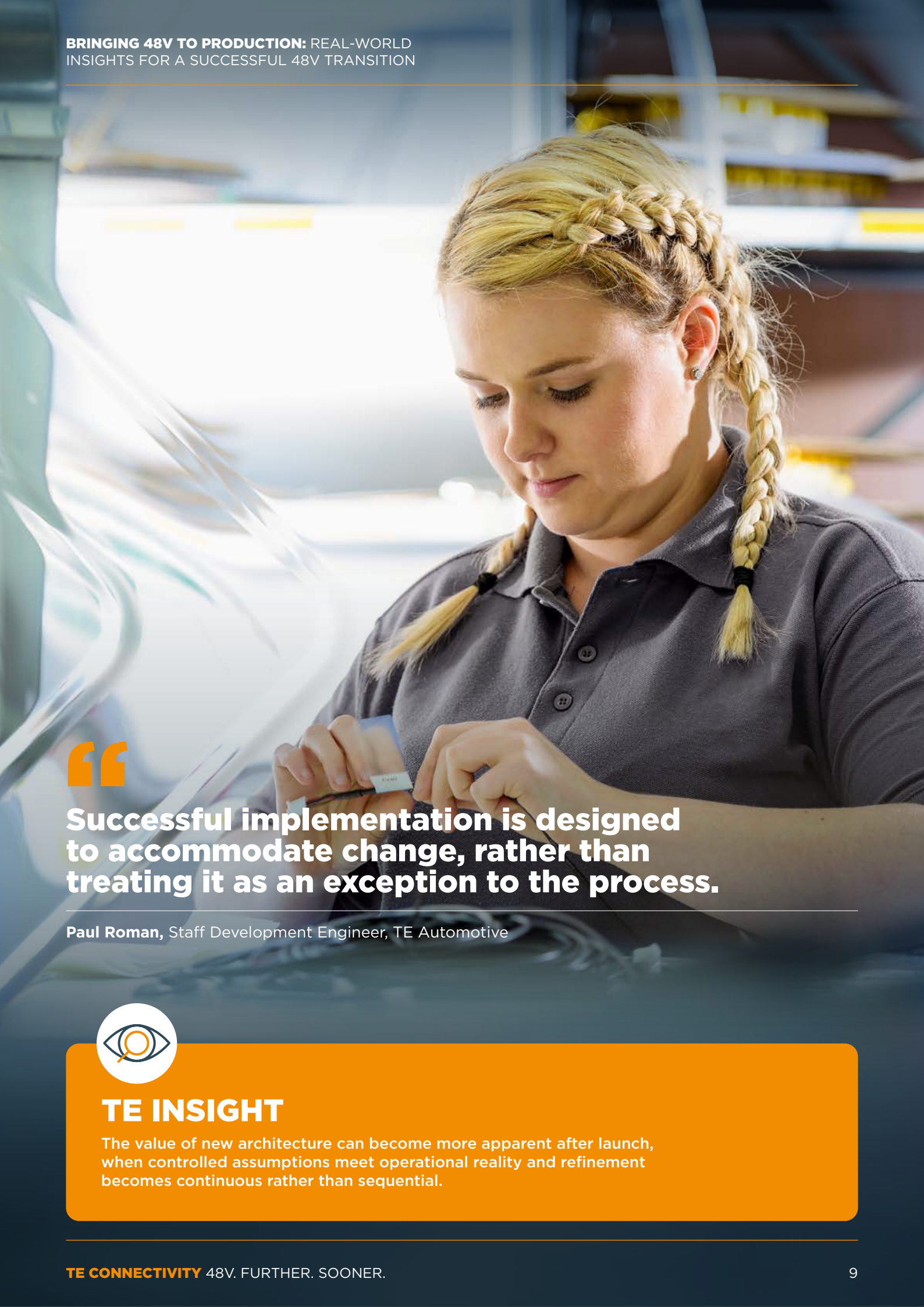




At TE, this involves the development of connector family updates, incorporating:



- Improved usability and identification
- Refinement driven by assembly feedback
- Enhanced visual keying concepts



Successful implementation is designed to accommodate change, rather than treating it as an exception to the process.

Paul Roman, Staff Development Engineer, TE Automotive

TE INSIGHT

The value of new architecture can become more apparent after launch, when controlled assumptions meet operational reality and refinement becomes continuous rather than sequential.

RETHINKING THE OEM-SUPPLIER RELATIONSHIP

What makes a good partnership more than just a generic supplier relationship?

As vehicle architectures become more sophisticated and development cycles accelerate, implementation increasingly depends on close collaboration between OEMs and technology partners.

Electrical architectures, connectivity strategies and manufacturing considerations are closely interconnected, meaning decisions benefit from teams working in synergy much earlier in the process.

Rather than simply providing components, experienced partners can contribute implementation knowledge, support architecture decisions and help identify potential implementation considerations earlier in the development process.

Many 48V programs may benefit from transparency and technical collaboration, moving beyond traditional supplier relationships to embrace a more integrated model of co-development.



Being a good partner isn't about saying yes to everything. It's about being open to other perspectives and helping guide the best path forward.

The most effective partnerships balance capability with expertise, confirming decisions are informed by both application knowledge and implementation experience.

Paul Roman, Staff Development Engineer, TE Automotive



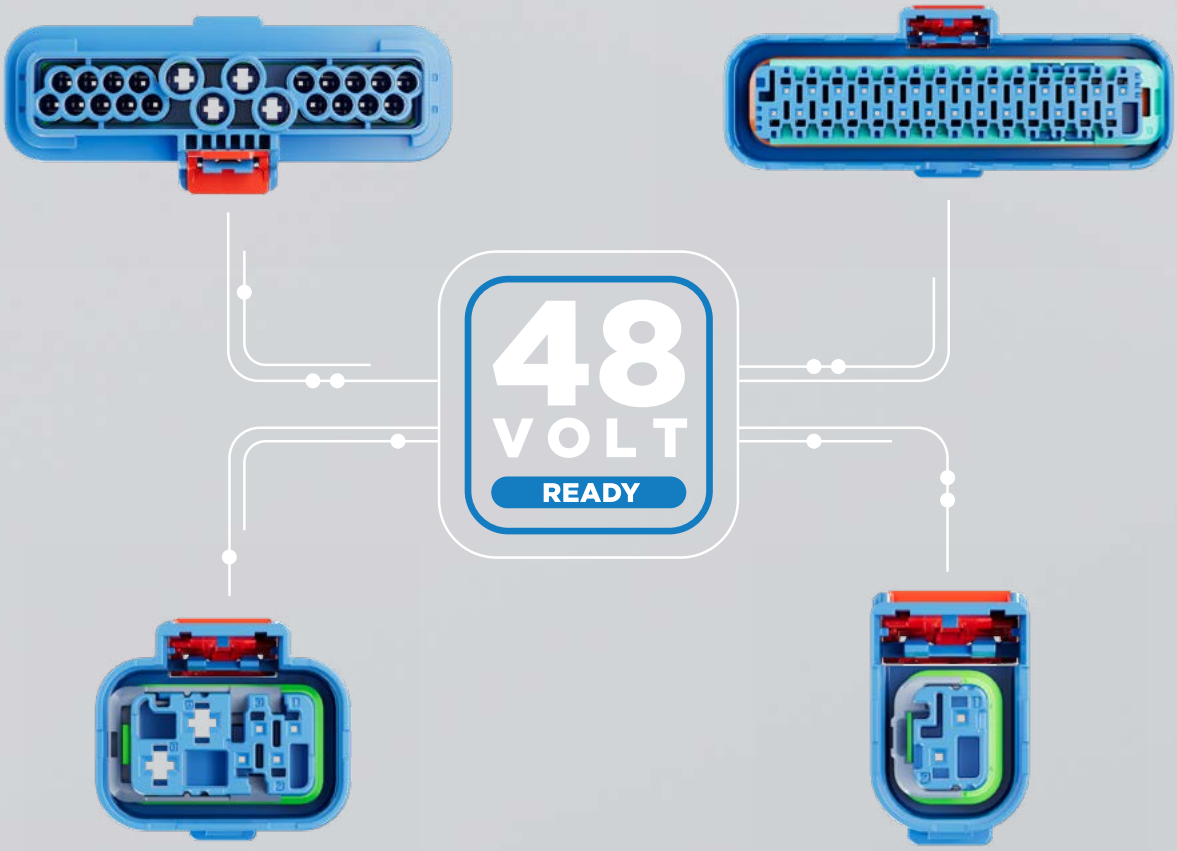
TE INSIGHT

Large-scale projects such as 48V rollout are shaped as much by how decisions are made as by the decisions themselves. Transparent, collaborative partnerships with experienced teams can help support effective implementation.

WHAT'S NEXT FOR 48V?

While interest continues to grow, widespread adoption will depend on more than technical performance alone.

The broader ecosystem must continue to mature, from component availability and supply chain readiness through to industry-wide standards and manufacturing processes.



Early investment and collaboration in 48V development can contribute to validation learning, practical implementation approaches, and broader industry adoption.

As component availability improves and cost structures evolve, broader 48V implementation may become increasingly practical for certain vehicle programs.

Paul Roman, Staff Development Engineer, TE Automotive

No two 48V programs will follow the same path. Vehicle architectures, development models and organizational structures all vary between OEMs.

What stays the same are the themes for successful adoption.

Here are five considerations:

1

Align engineering teams early

The transition to 48V affects multiple areas of automotive engineering simultaneously. Electrical, software, connectivity and mechanical teams all influence how the architecture ultimately performs. Alignment early in development can help reduce downstream compromises, manage design trade-offs more effectively and may reduce the risk of later redesign activity.

2

Validate what matters most

Compressed timelines can create pressure to accelerate development. While speed is important, validation strategies need time to adapt to confirm critical performance requirements are met. Using technologies with relevant application history may help support development planning and risk assessment, while early builds can also uncover practical assembly and integration challenges that simulation alone may not reveal.

3

Build for evolution

Requirements are unlikely to remain static throughout development. Instead of treating change as an exception, successful programs may benefit from planning for it from the beginning. Flexible development processes can help teams adapt without losing momentum, particularly where creepage and clearance requirements influence connector selection, packaging and system design.

4

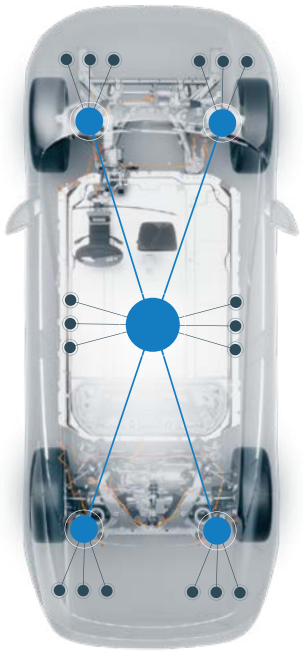
Consider the wider ecosystem

The benefits of 48V extend beyond individual components. Standardized approaches may help simplify vehicle architectures, support manufacturing efficiency and create long-term value across the wider supply chain ecosystem.

5

Choose a partner with relevant implementation experience

Many of the most important lessons emerge during deployment rather than design. Working with partners who have experience supporting real-world implementation may help teams identify practical considerations earlier, support informed decision-making, and plan implementation with greater clarity.



WHY TE CONNECTIVITY?

The transition to 48V architecture presents new opportunities for vehicle design. Successful implementation can benefit from reliable connectivity solutions, practical engineering expertise and a partner that understands the practical challenges of bringing new architectures into production.

TE Connectivity offers a broad portfolio of compact, lightweight, high-performance 48V-ready connectivity solutions designed to support evolving vehicle electrical architectures. Engineered and tested to meet applicable automotive performance and qualification requirements, these solutions help optimize space, reduce weight, improve electrical efficiency, and deliver reliable power and signal connectivity for demanding automotive applications.



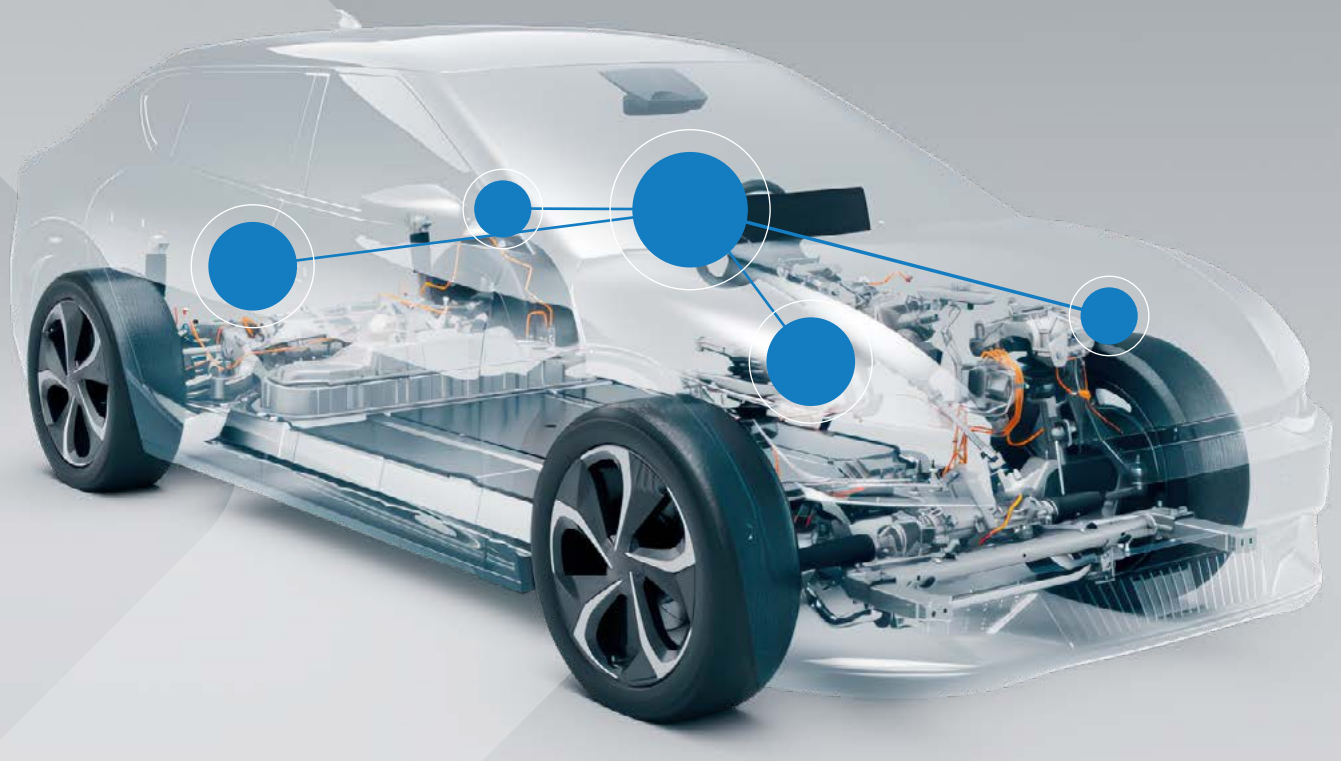
Terminals and connectors

TE Connectivity offers a broad portfolio of sealed, 48V-ready terminals and connectors designed to deliver safe, reliable power and signal connectivity for selected 48V automotive applications. Engineered with appropriate creepage and clearance distances in accordance with DIN EN 60664-1 guidelines, along with robust locking and environmental sealing, these solutions support demanding applications such as active suspension, braking, pumps, cooling fans, heating systems, and other higher-power vehicle functions.

Realizing the value of 48V

For OEMs evaluating the transition today, the opportunity may be less about adopting a new voltage architecture and more about developing the processes, partnerships and flexibility that support effective implementation.

The future of 48V won't be defined by technology alone. It will be shaped by the organizations that learn how to turn new architectures into production reality.



READY TO EXPLORE YOUR 48V ROADMAP?

Speak to our team to find out more.

TE Connectivity combines global engineering expertise with hands-on implementation experience to help OEMs navigate the practical realities of 48V adoption.

Contact us ›

te.com/48v

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