

Critical CAD Geometry Challenges for Business Leaders: Why They Matter and How to Address Them

How To Solve Tough Geometry Challenges with CADfix

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Business leaders in engineering enterprises often do not realize that many of the challenges they face at the business level stem from underlying geometric challenges. In this PoV, we explore the link between geometry challenges and business performance and examine how these challenges can be addressed through specialized platforms such as CADfix to enable successful business outcomes.

Business Challenges Emerge from CAD Geometry Challenges

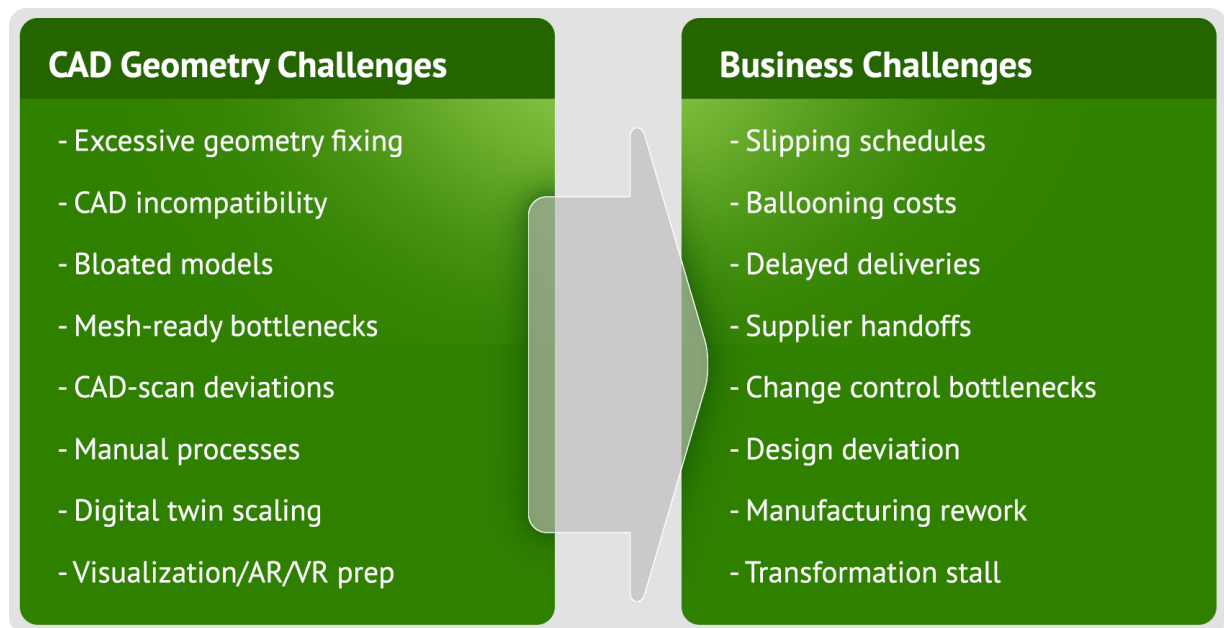
As a business leader in an engineering-driven organization, do you face one or more of these challenges?

- Slipping program schedules
- Ballooning engineering costs
- Delayed customer deliveries
- Risky supplier handoffs
- Engineering change controls that become bottlenecks
- Design deviation
- Manufacturing rework
- Digital transformation initiatives that fail to scale

If your answer is yes, then please read further.

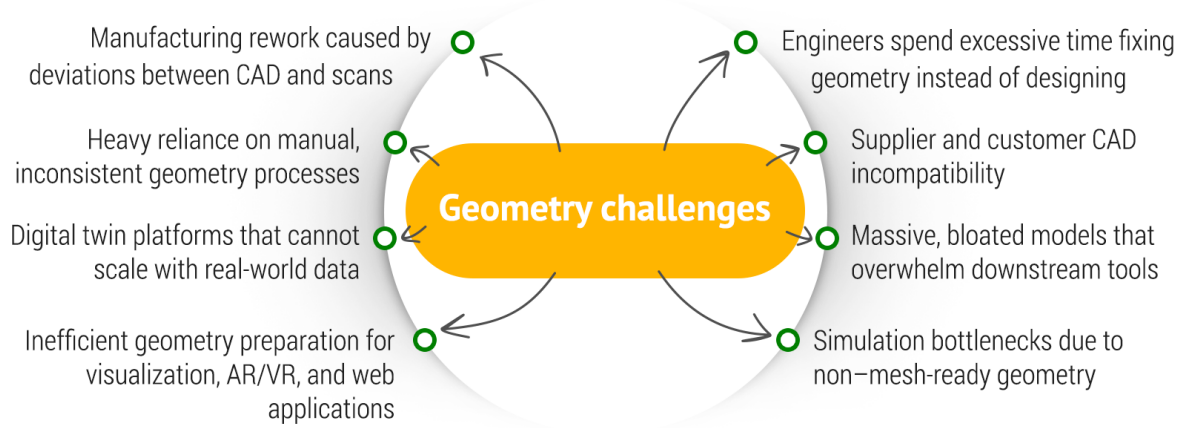
These business challenges often share common root causes, namely CAD geometric challenges, as shown in the exhibit below.

Exhibit 1: CAD Geometry Challenges and Business Challenges in Engineering Enterprises



Source: EIIRTrend, ITI

These eight geometry challenges are often cause of business challenges eroding program performance:



These eight challenges represent the diagnostic framework for business leaders for understanding whether CAD data is limiting operational throughput, engineering efficiency, and digital maturity, and ultimately, business outcomes.

How To Solve Geometry Challenges?

Once the link between geometry and business performance is established, leaders can evaluate the underlying causes of geometry challenges and identify solutions to address them.

It all comes down to CAD data and geometry. Broken, bloated, incompatible, or incomplete CAD data quietly undermines engineering workflows across the entire product lifecycle. Simulation, manufacturing, additive processes, visualization, quoting, PLM, and digital twins all depend on clean, compatible, mesh-ready geometry. When geometry is flawed, workflows slow down or fail entirely, and margins suffer. When the engineering data foundation is weak, even the most advanced digital initiatives eventually collapse under real-world constraints. Geometry is often the silent factor that distinguishes successful transformations from failed ones.

Why does the current approach fail? The reason is that most engineering organizations rely on a patchwork of tools and workarounds to address CAD data and geometry issues. A more effective strategy is to leverage a dedicated platform that systematically resolves CAD data and geometry challenges at scale.

Solving Geometry and Business Challenges with CADfix to Drive Business Outcomes

CADfix is a flagship solution of ITI, a subsidiary of Wipro Limited.

CADfix is an industry-leading software solution for CAD model translation, repair, healing, defeaturing, and simplification. CADfix is the go-to choice for professionals seeking to overcome challenges in 3D model data exchange and re-use between diverse engineering applications.

CADfix is purpose-built to eliminate geometry challenges discussed earlier. Below is how CADfix converts each category of geometry challenge into measurable business value.

Exhibit 2: CADfix Solution to Eight Geometry Challenges

Geometry Challenge:	Business Impact Without CADfix:	CADfix Outcome:	Result:
Engineers spending excessive time fixing geometry instead of designing	- Engineering capacity consumed by non-value work - Programs require more headcount to maintain schedules - Design cycles stretch unpredictably	- Automated translation, healing, and simplification reduce geometry prep from days to minutes - Engineering teams reclaim 20–40% of their time for innovation and problem-solving - Programs move faster without increasing headcount	- Shorter design cycles - Higher engineering throughput - Lower labor cost per program
Supplier and customer CAD incompatibility	- Delays caused by unusable or incomplete supplier data - Costly back-and-forth engineering loops - Increased risk of late-stage quality escapes	- Reliable multi-CAD interoperability with preserved structure and metadata - Consistent geometry quality across suppliers and partners - Fewer redesign loops and faster supplier onboarding	- More predictable program schedules - Reduced supplier friction - Lower risk of downstream rework
Massive, bloated models overwhelming downstream tools	- Digital twin initiatives stall - Visualization, AR/VR, and cloud platforms fail under real-world data - IT investments underperform	- Automated simplification, shrink-wrapping, and decimation 90–95% reduction in model complexity without loss of intent - Lightweight models ready for web, cloud, and immersive platforms	- Digital initiatives scale across the enterprise - No need for costly hardware upgrades - Higher ROI on digital investments

Simulation bottlenecks due to unprepared geometry	• Analysis teams wait days for usable geometry • Fewer design iterations • Decisions made with incomplete insight	• Automated mesh-ready geometry preparation • Direct generation of tetrahedral, hexahedral, and hybrid meshes • Faster solver convergence and fewer failures	• Faster analysis turnaround • More iterations, better designs • Reduced risk of late-stage surprises
Manufacturing rework caused by deviations between CAD and scans	• Late detection of manufacturing defects • High rework, scrap, and inspection costs • Slower production ramp-up	• Automated scan reduction, registration, and CAD-to-scan comparison • Warpage compensation and wear analysis driven directly from scan data • Faster inspection cycles and higher accuracy	• Dramatically reduced rework • Faster time from production to delivery • Improved product quality and yield
Heavy reliance on manual, inconsistent geometry processes	• Geometry handling does not scale with product complexity • Bottlenecks form around key individuals • Digital thread initiatives break at handoffs	• Fully automatable workflows • Batch execution, command-line operation, and REST API integration • Geometry becomes a repeatable enterprise service	• Higher throughput without added headcount • Lower operational risk • A scalable, reliable digital thread
Digital twin platforms that cannot scale with real-world data	• Digital twin initiatives stall after pilot phases • Real-world assemblies are too large or complex to load, synchronize, or update • High infrastructure costs due to excessive storage requirements • Inability to maintain alignment between as-designed, as-built, and as-operated states • Leadership loses confidence in digital twin ROI	• Automated simplification, shrink-wrapping, and abstraction of CAD and scan data • Consistent reduction of model complexity while preserving functional and spatial intent • Preparation of geometry optimized for continuous synchronization and lifecycle updates • Lightweight, structured geometry suitable for cloud-based digital twin platforms	• Digital twins scale beyond pilots into enterprise deployment • Lower infrastructure and maintenance costs • Reliable, continuously updated digital representations • Improved asset performance monitoring and lifecycle decision-making

Inefficient geometry preparation for visualization, AR/VR, and web applications

- Visualization and immersive experiences require extensive manual rework
- AR/VR initiatives fail due to poor performance or unusable models
- Web-based configurators and sales tools suffer from long load times
- Engineering data cannot be reused effectively for customer-facing applications
- Missed opportunities to leverage digital assets across marketing, sales, and service
- Automated generation of lightweight, visualization-ready geometry
- Polygon reduction, defeaturing, and level-of-detail control optimized for real-time rendering
- Preservation of hierarchy, metadata, and visual fidelity
- One-click or batch preparation for AR, VR, and web platforms
- Smooth, high-performance AR/VR and visualization experiences
- Faster deployment of customer-facing digital tools
- Expanded reuse of engineering data beyond engineering teams
- Higher engagement and better customer understanding of products

By solving Geometry Challenges, CADfix also solves business challenges as discussed below:

- **Protects margins by eliminating engineering waste:** Teams shouldn't spend 20–40% of their time manually fixing geometry. CADfix reduces multi-day manual cleanup to minutes.
- **Strengthens supplier and customer collaboration:** Best-in-class interoperability ensures clean, compatible data moves across boundaries with structure, metadata, and design intent preserved.
- **Allows digital transformation to scale:** CADfix converts heavyweight assemblies, scans, and plant models into lightweight, downstream-ready versions for digital twins, AR/VR, web, cloud, AI, and MES integration.
- **Accelerates simulation and decision-making:** Mesh-ready geometry and automated meshing workflows dramatically reduce solver failures and shorten analysis cycles.
- **Reduces manufacturing errors and rework:** CADfix aligns scans with CAD, automates shrinkage/warp compensation, and improves inspection throughput.

- **Provides true enterprise automation**

Every function can run:

- Automatically
- In batch
- Through scripts
- As a REST API
- Integrated into enterprise digital pipelines

- **Future-Proofs Your Digital Engineering Ecosystem:** CADfix is compatible with today's CAD/PLM landscape and tomorrow's AI, cloud, and model-based enterprise architectures.

CADfix, by solving geometry and business challenges, creates real-world business outcomes. A few examples are discussed below.

- An aerospace OEM cut simulation prep from 3 days to 45 minutes, enabling more design iterations per program
- A global plant design team reduced import failures to their plant design system by 70%
- An automotive OEM shrink-wrapped supplier models and reduced review cycles by 50%
- A defense manufacturer simplified large assemblies by 90–95%, making enterprise digital twins operationally viable

These results substantiate claims and make benefits tangible for business leadership.

Bottom Line

Solving geometry challenges in product design is essential to delivering business outcomes. Platforms such as CADfix remove barriers across design, simulation, manufacturing, and visualization, thus ensuring models are accurate, lightweight, interoperable, and downstream-ready. Whether exchanging CAD data with suppliers, preparing models for CAE, simplifying plant layouts, exporting STL files for additive manufacturing, or enabling digital twins, CADfix helps maintain data fidelity and workflow continuity.

CADfix is not just another CAD tool; it is a strategic infrastructure capability that removes hidden engineering friction, protects margins, and enables digital transformation at scale. By allowing geometry to move cleanly across design, simulation, manufacturing, and visualization, it accelerates programs, reduces costs and risk, makes digital initiatives viable, frees engineers to innovate rather than fix, strengthens supplier collaboration, and improves profitability across the entire product lifecycle.

In a world where digital transformation depends on seamless data exchange, CADfix acts as the glue that holds the digital thread together and helps enterprises deliver measurable business outcomes.