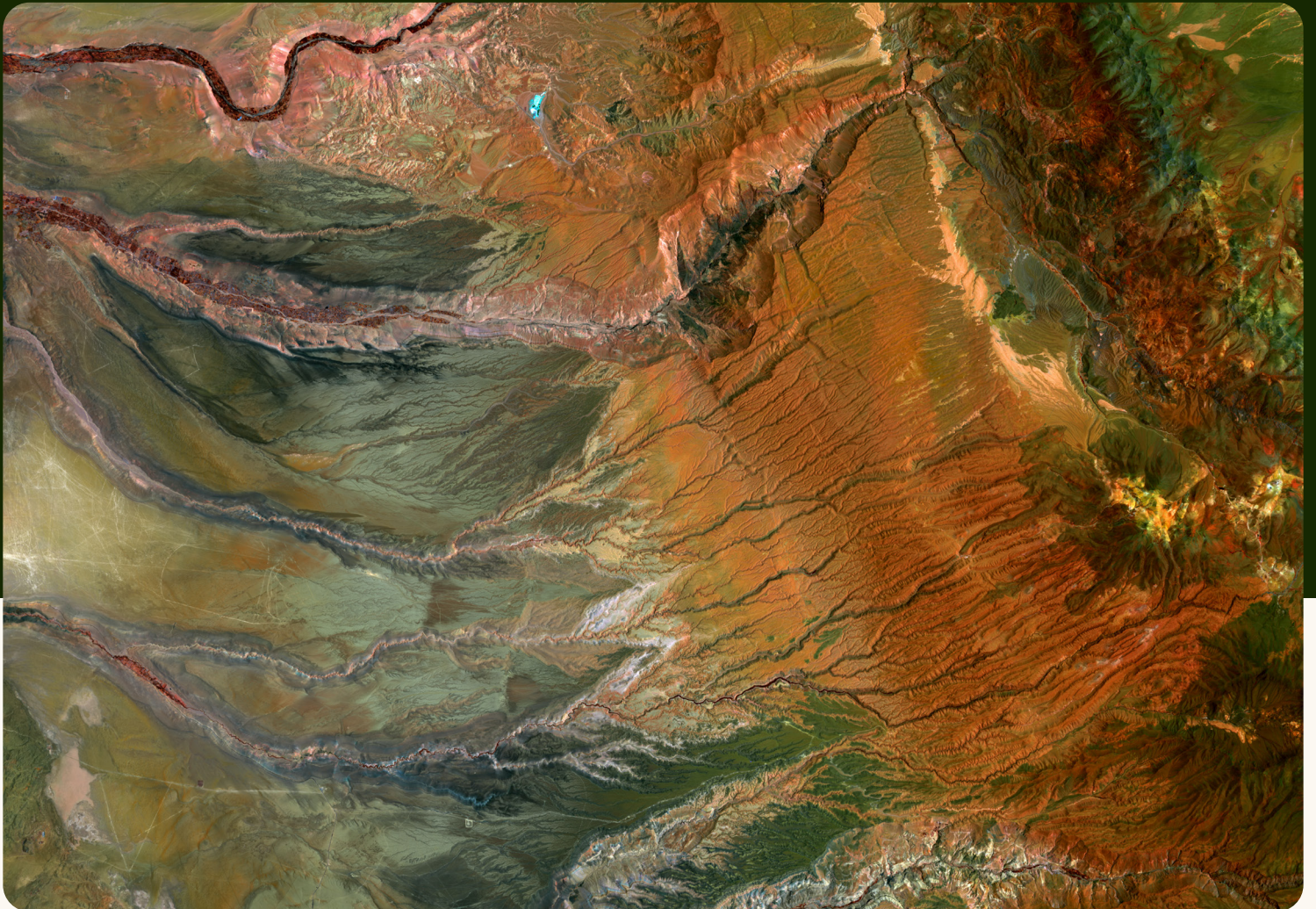


Cloud, CO₂ and collaboration: The future of cost engineering

How digital solutions are revolutionising cost
management in the manufacturing industry



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Editorial

Global megatrends in a dynamic economic context are presenting the manufacturing industry with considerable challenges. Ever-changing customer needs require shorter product development cycles and technical innovations from manufacturers. Take the electrification of the automotive industry as an example. It's opening up new markets by creating numerous new components and manufacturing processes. But this also means changing competitive structures. And the EU's Carbon Border Adjustment Mechanism (CBAM) will introduce even stricter carbon emission regulations as early as this October, which will become an additional cost factor in 2026. Some analysts also predict new global economic upheavals.

To remain competitive amid all these challenges, businesses need agile, forward-looking cost management that encompasses the whole supply chain. This has become an almost impossible ask for many stakeholders using existing methods and processes. But there is an alternative to conventional cost engineering in the form of standardised, highly automated digital solutions that can quickly generate cost and carbon simulations on the basis of predefined cost models and comprehensive data libraries.

This white paper explains how businesses can adapt to changing conditions and benefit from new technical opportunities. It is directed mainly at decision-makers and experts who are involved in product development, procurement, cost management and controlling in the manufacturing industry, from original equipment manufacturers (OEMs) to indirect suppliers. It examines the latest economic dynamics and trends from a cost engineering point of view, and offers solutions for forward-looking cost management. Finally, it shows how standardised digital solutions can create added value inside a company's value chain, from procurement through production to sales, and in the supply chain as a whole.

Enjoy reading!



Andreas Tsetinis
Managing Director and
Co-founder of Tset

Challenges and trends in cost engineering

Cost engineering has become an inescapable element of the manufacturing industry. Increasingly complex industrial products require ever-shorter product development times. Professional cost engineering combines engineering knowledge with the systematic analysis of cost factors to make production processes as economical and efficient as possible. Eco-friendliness and sustainability in production are also increasingly important factors, especially with regard to the carbon emissions variable. A wide range of different departments are involved whenever a business develops a product, and they utilise cost and carbon calculations. But human resources are growing scarce, as too is the technical expertise needed to implement processes throughout whole organisations. The shortage of skilled workers alone is making it more and more difficult to find qualified personnel. This is where professional cost engineering using digital solutions comes in.

What are the benefits of professional cost engineering?

Forward looking, well-conceived cost engineering can bring numerous benefits and opportunities relating to different corporate processes and phases along the entire product life cycle.

- **Cost control:** efficient cost control ensures that a business remains profitable. Cost engineering helps to identify, minimise and avoid unnecessary outlay.
- **Competitiveness:** being in a global market environment means creating competitive products. Cost engineering identifies cost-effective manufacturing methods without compromising quality.
- **Decision-making:** for a business to succeed, it needs well-informed decisions based on sound cost and carbon analyses. Cost engineering delivers the necessary data.
- **Risk management:** cost engineering helps minimise financial uncertainties by identifying potential cost risks and facilitating countermeasures.
- **Sustainability:** cost engineering helps make production processes sustainable in the long term by incorporating ecological aspects into calculations, such as the carbon emissions produced when making a product.
- **Resource optimisation:** cost engineering involves carefully planning which materials, machines and techniques are going to be used in a production process. This means utilising existing resources in the best possible way.
- **Project management:** cost engineering is an essential element of project management. It helps businesses to set realistic targets and complete projects efficiently.
- **Customer value:** thoughtful cost and carbon management helps maximise the value of a product for customers by ensuring the right balance between product quality and price.

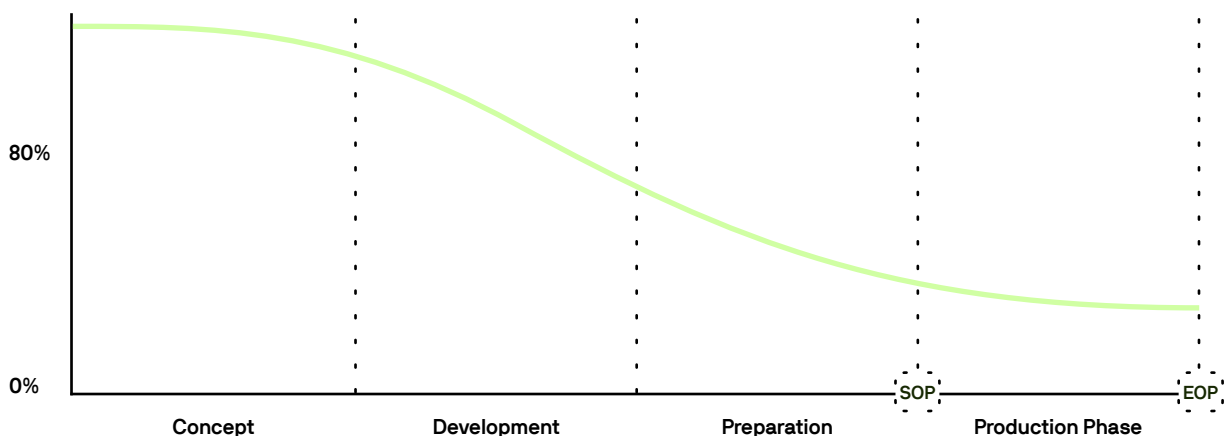
How does conventional cost engineering work?

Cost engineering is based on experience, historical data, mathematical models and engineering knowledge. It comprises a series of steps and methods that build on each other, such as cost estimation and structuring, and the development of cost reduction activities. Software solutions such as Excel and stand-alone applications are often used for calculations. These require additional configurations which businesses usually define themselves to meet their own needs. Data from past projects and production runs are analysed to derive information for future projects and develop best practices. When new products are developed, costs are taken into account from the outset and the product design itself is done with a view to optimising cost.

The early product development phase is crucial when it comes to preparing balanced cost and carbon management. This is where around 80 to 90 percent of a product's future characteristics are determined. It is there that all of the parameters can be steered and products can be cost-optimised even before they are produced.

However, growing demands in cost engineering are revealing the vulnerabilities of conventional solutions. Most data management is done locally, using models designed by individuals. This reduces transparency and means new users need a lot of time to familiarise themselves with each tool. A lack of access to standardised historical data means recompiling calculations, hence slowing down the analysis. Rigid, outdated, predominantly server-based software generally adapts poorly and is not very compatible with other companies' systems and data. Isolated systems are also expensive and require high maintenance. That is why businesses are looking for more flexible and innovative solutions for their current and future needs.

Cost & CO₂ reduction potential during lifecycle.



What are the latest trends in the world of cost engineering?

In order to meet growing challenges, the latest IT solutions leverage a series of trends that favour more effective cost engineering.

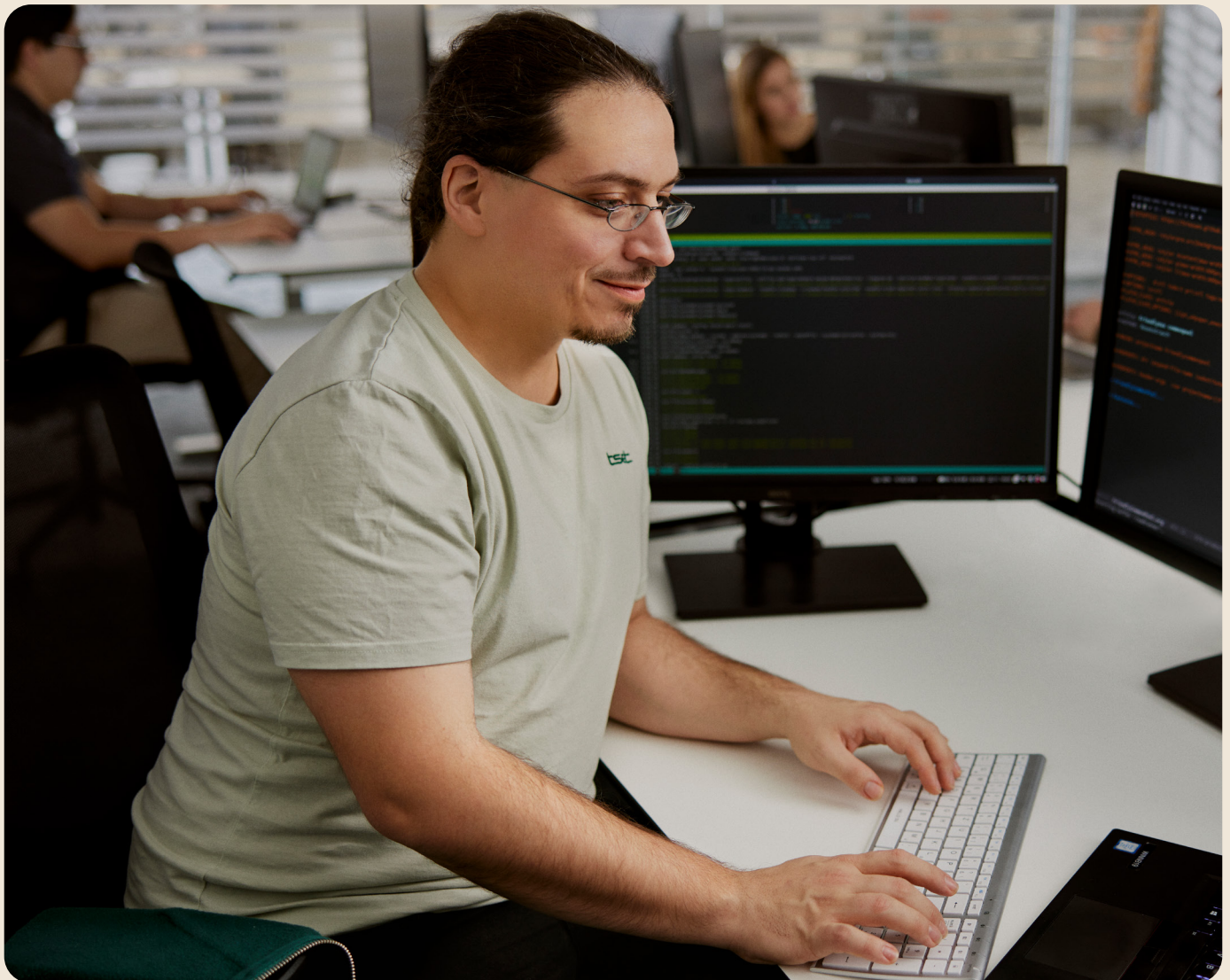
- **Cost transparency in supply chains:** proliferating legislation is forcing businesses to look more carefully at how they analyse the costs and risks in their supply chains. This helps to identify inefficient processes.
- **Digitalisation and automation:** integrating digital technologies such as artificial intelligence and machine learning makes costing, analysis and forecasting more accurate. Automating data collection and processing can significantly increase speed and efficiency, mainly because error rates are lower.
- **Integrated software solutions:** integrated platforms cover different aspects of cost management because they can access databases belonging to different software and tools, thereby helping teams and departments to collaborate.
- **Cloud-based solutions and collaboration:** cloud technologies enable easy access to cost engineering tools and encourage collaboration within and between businesses.
- **Sustainability:** it is becoming increasingly important for cost analyses to take environmental impacts and sustainability factors into account. By developing eco-friendly production processes, they reduce carbon emissions and impacts on resources.
- **Rising energy prices and inflation:** simulations and scenario analyses allow businesses to run through different scenarios, such as changes to energy and raw material prices, production countries and currencies. These scenarios can help them understand the effects of changes on their cost structures.

Using the latest data algorithms in cost engineering

Traditional cost engineering relies on empirically established data, expert knowledge and estimates. The IT-driven integration of large quantities of the latest data and the simplified inclusion of external data sources make calculations much more precise these days. This is made possible by ad-hoc cost analyses that deliver data and facts within minutes – work that sometimes used to take cost analysts several weeks to complete. The basis of this is a knowledge database and industry benchmark data which is continuously collected, processed and analysed using standardised procedures and methods, thereby enabling managers to respond quickly to changes.

Another aspect of data processing in modern cost engineering is what is known as a 'single source of truth'. This refers to a unique, dependable, centralised source of data or cost-reducing information that is relevant to the awarding of contracts and also impacts the supply chain. This means everyone involved in a project accesses the same data and everything is in a single place. It has a number of advantages:

- **Consistency:** because everyone is drawing on the same data, everyone knows the same things and uses the same information.
- **Reliability and data quality:** the single source of truth means a single trustworthy source that is regularly updated and checked for accuracy.
- **Efficiency:** in the long run, inefficient collaboration leads to lower returns. Using a uniform data source eliminates redundancies and duplicated work, saving both time and resources.
- **Avoiding conflict:** different versions of data in different areas of an organisation can give rise to high error rates and a lack of transparency. A single source of truth minimises this risk.
- **Better decision-making:** reliable and consistent data allows people to make informed decisions at every level of an organisation.



Constantly reviewing data is essential when it comes to validating it quickly and keeping it up to date. Automated systems make this possible by constantly refreshing calculations, thereby ensuring that if a certain piece of commercial information changes, the system quickly and automatically identifies this, thus relegating outdated information to the past.


When a business decides to launch a new software solution, existing data has to be transferred. However, this often isn't possible at all due to different file formats, which is why businesses need an open solution that is able to interact with different systems, such as product lifecycle management (PLM), enterprise resource planning systems (ERP), procurement portals and beyond.

Tset Cloud

Overview of software types

PLM


SOLIDLINE

 arena

ORACLE

ERP


SAP

Sage

 weclapp


Data Lake

 Microsoft Azure

CLOUDERA

Purchasing Portals

 **GEP SMART**

 procurify

*This list is for illustrative purposes only.

Brose is the fourth largest family-owned automotive parts supplier. Its intelligent vehicle access and interior solutions deliver greater comfort and flexibility. Brose is working closely with Vienna-based scaleup “Tset” to develop uniform modules for its standardised cost engineering software. This allows the carbon footprint of components and products to be evaluated in detail in the design phase, and the product cost to be calculated efficiently.

Carbon as a cost factor

Sustainability is an increasingly important factor in cost management. To generate realistic figures pertaining to carbon footprints in the manufacturing industry, businesses need to be able to look at the entire supply chain. That is why more and more buyers are asking for carbon breakdowns from their suppliers in the bidding process. With the Carbon Border Adjustment Mechanism (CBAM), European legislators are planning a carbon border tax on the import of certain goods manufactured outside the EU, combined with a documentation requirement for businesses that import those goods. The documentation requirement applies to all emissions created in the upstream and downstream supply chain, as these account for around 80 percent of emissions in an OEM's value chain.

CBAM: a summary

- + CBAM affects all Europe-based companies in high-emission industries (primarily this means producers of iron, steel, aluminium, electricity, cement and fertilisers) that import goods from outside the EU. Companies can determine if an item of goods falls under CBAM by checking whether the customs tariff number used is listed in Annex I of the CBAM Regulation.
- + Beginning on 1st October 2023, these companies will be obliged to document any direct and, in some cases, indirect carbon emissions generated within their supply chains. A quarterly report has to be submitted to this end. This will contain information on the type and quantity of imported goods, their direct emissions, and the price of carbon offsetting in their country of origin.
- + Beginning on 1st January 2026, only companies that are 'authorised declarants' will be allowed to import goods into the EU.
- + An annual CBAM declaration will have to be prepared and submitted by 31st May of each calendar year. The data this contains will have to be validated by an accredited testing authority.
- + From that point onwards, a carbon border adjustment will have to be paid on the import of the aforementioned goods. To do this, companies must purchase CBAM certificates to compensate for greenhouse gas emissions that haven't been offset.
- + The price of a CBAM certificate will be based on the average weekly price of EU emission allowances.

CBAM regulation, timetable

EU decision

Regulation enters into force

Start of the implementation phase

10th May 2023

1st October 2023

1st January 2026

This means that by the time CBAM arrives (if not before), carbon will become an additional cost factor that has to be included in professional cost management. A standardised method of collecting carbon figures is essential to achieving as much cost transparency as possible in calculations. Current top-down approaches like the cost-per-kilo method can be very inaccurate, as actual carbon emissions are estimated only on the basis of fixed price assumptions and material quantities.

Meanwhile, modern cost engineering software that uses real-time data allows businesses to determine a product's predicted carbon footprint (bottom-up) with greater accuracy – even before production begins. This places them in a position to evaluate and compare different suppliers in terms of their sustainability efforts before contracts are awarded.



Stabilus is a world-leading supplier of motion control systems and solutions specialising in the production of gas springs, shock absorbers and electromechanical drives. Its products are used in various industries such as automotives, furniture, mechanical engineering and medical equipment. Stabilus places a lot of emphasis on sustainability during product development. But the challenge was getting sustainability data from suppliers, especially the carbon emissions they were responsible for. That is why Stabilus decided to implement Tset's software solution, which includes a default carbon calculation model and extensive carbon master data. Implementation was swift. It took just one and a half years and a team of just two to three people, backed up continuously by Tset, for Stabilus to evaluate the majority of its product portfolio using carbon analyses.

The future is cooperative: collaboration as the key to success

Efficient cost management is only possible if all the relevant departments in a business are involved, e.g. from procurement, development, sales and controlling. Enacting agile product development processes in a meaningful way means collaborating more closely and coordinating quickly between departments. However, conventional manual costing processes and software are not really able to meet these demands. For reasons of time and capacity, businesses are often only able to perform a complete calculation of a product in bottom-up quality during the production process. This is because manual costing processes involve long coordination periods, unless everyone involved has access to the latest information. This makes calculations lengthy and inefficient. To compensate for this, many cost analysts opt for a lower penetration level in their calculations by reducing the scope of data collection and focusing on the essentials. That can, however, often mean error-prone calculations of lesser quality. So what can be done?

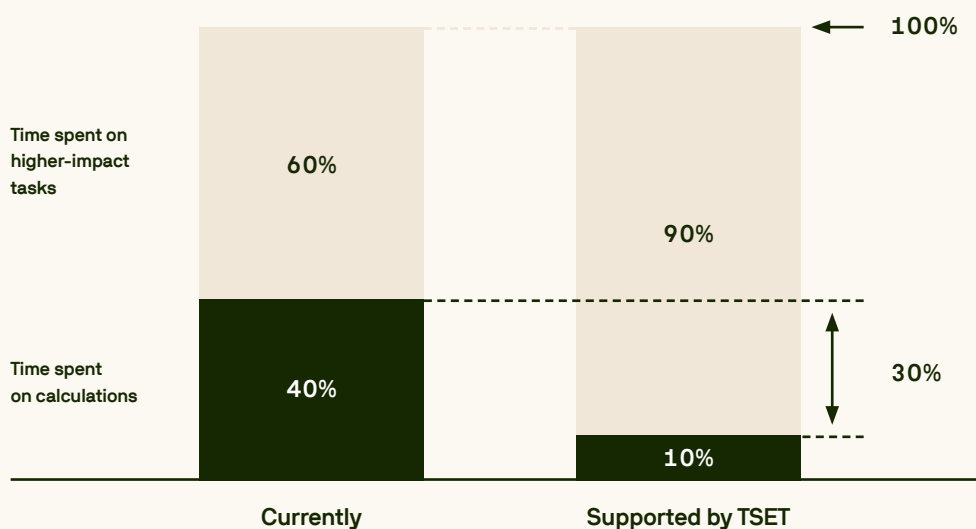
The benefits of collaborating in cost engineering

Modern digital solutions offer much more scope for collaboration than traditional cost engineering models. Here are some of the benefits:



- Modern software solutions dramatically reduce coordination time by enabling quick decisions and quick agreements between the various departments.
- Changes and updates can be seen immediately by everyone involved in the project. Modern software is easy to understand and you can view the entire change history. This eliminates redundancies, delays and misunderstandings.
- A uniform calculation methodology and sources like the single source of truth promote collaboration – and not just within a business. They can also bridge what is often a large gap between companies within supply chains, by enabling export in customised RFQ formats.
- Based on collaborative models, teams can work together to produce joint cost targets, allocate resources, and run through scenarios within a calculation. This means the impact of different decisions on costs and carbon can be easily understood at all times.
- Clear representations of the cost structure of a project or product enable departments to understand the impact of their decisions on overall budgets.
- Costs and carbon are calculated together rather than separately.

Improved workflows to achieve cost targets.



Innovative cost engineering: cloud-based software makes all the difference

Cloud technologies are becoming increasingly important in today's manufacturing industry. Businesses are realising the benefits of the cloud, which include flexibility, scalability and more efficiency. It is a model that offers numerous benefits, especially in cost engineering.

With software as a service (SaaS) solutions:

- businesses can eliminate all of the tasks and costs typically associated with acquiring hardware and infrastructure, as well those related to security measures, installation and maintenance for a conventional, non-cloud-based IT solution;
- businesses usually only need internet access and user access to the software, as the application's interface can be accessed using any web browser;
- businesses can easily integrate their own suppliers and customers using their own access credentials;
- data is more secure in a professional, IT-run cloud than on a company's own servers;
- exchanging data becomes steadily easier as more companies use the solution;
- businesses can concentrate fully on their core competencies.

For these reasons, SaaS solutions are suitable for almost all businesses, from OEMs to suppliers. By moving production data, processes and analytics to the cloud, manufacturers are greatly optimising their operational procedures. This is enabling them to respond more quickly to market demands, integrate innovative technologies like artificial intelligence, and ultimately maintain their competitiveness.



SWOT Analysis

Strengths

1. **Accessibility:** easy access to the software (browser)
2. **Data security**
3. **Higher cost efficiency:** no need for IT maintenance, licences, or on-premises infrastructure
4. **Optimising processes:** businesses have more resources to focus on core strengths and optimise operations

Weaknesses

1. **Dependence on connectivity** (a stable internet connection is required)
2. **Data privacy concerns:** storing sensitive cost data in the cloud can cause concerns about data privacy and compliance with industry regulations.
3. **Greater dependence on providers** (particularly problems with outages or service interruptions, or if providers go bust).

Opportunities

1. **Scalability and global collaboration:** cloud solutions enable collaboration between geographically disparate companies, which promotes global competitiveness.
2. **Cost reduction:** operating costs can be reduced through better cost simulation and optimisation
3. **Collaboration:** internal/external collaboration between teams is made more efficient
4. **Market advantage:** early adopters of cloud-based cost management solutions can gain a competitive edge by optimising costs and streamlining operations.

Threats

1. **The challenges of compliance:** ensuring compliance with industry regulations and data privacy laws can be challenging if you use cloud-based solutions.
2. **Provider dependence:** over-reliance on a single cloud provider can lead to long-term risks and limitations in terms of flexibility, stability and data security.

Chiron is one of the world's leading suppliers of machining centres and solutions, and indeed is active in every major market. Conventional cost engineering software was not an option, simply because of everything that its integration would have entailed. Tset's SaaS solution proved to be the ideal way of fully professionalising Chiron's cost engineering. The cloud-based system was quickly up and running, and Tset's greatest advantage was the precision of its calculation results. The software is now used in various phases of product life cycles, including product cost forecasting, price negotiations with suppliers, and optimising production. Fast cost estimates and precise data have given Chiron cost reductions, more productive manufacturing processes and shorter decision-making processes.

How Tset is revolutionising the cost engineering of the future

Tset's specially developed standardised software for holistic cost management in the manufacturing industry is a tool which enables detailed product cost and carbon simulations – right along the entire value chain and the complete product life cycle.

Things to know about the software

- An algorithm consisting of 2D and 3D data extraction methods, optimisation calculations and artificial intelligence quickly produces automated, accurate cost and carbon simulations.
- Even for detailed bottom-up calculations, the software only needs the user to make a few entries, since it already has access to different cost models and regional data libraries.
- Tset offers a unique link between costing and carbon calculations in a single computation.
- Tset ensures efficient data management by providing access to a central knowledge database and collaboration platform.
- The software is intuitive, making it suitable for all skill levels.
- Tset is SaaS and costs less to implement than traditional solutions.



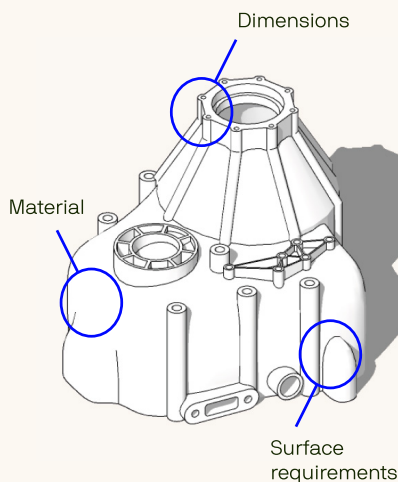
Comprehensive cost engineering advice

Tset also provides its customers with a service team of cost engineering experts. They help businesses to plan and implement new strategies in cost and carbon management. This includes the comprehensive analysis of existing structures, evaluating product concepts, and optimising production. To achieve cost and emission targets, Tset's own cost engineers develop action plans which are then used to improve design, manufacturing and cost structures. They also help customers to prepare and conduct cost and carbon negotiations within their supplier networks and their own production.

How does Tset work in Detail?

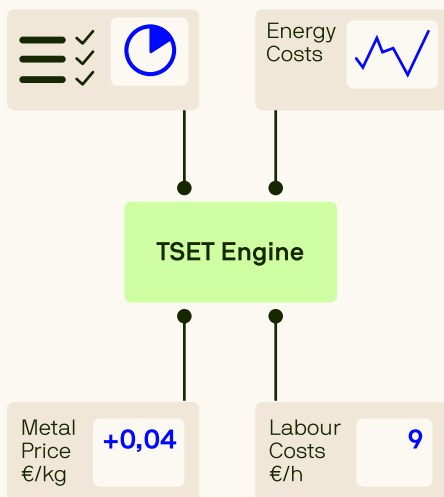
01 Define

Describe your components by entering just a few parameters and select a shape to create calculations within minutes by using automated algorithms or by uploading your own 3D model.



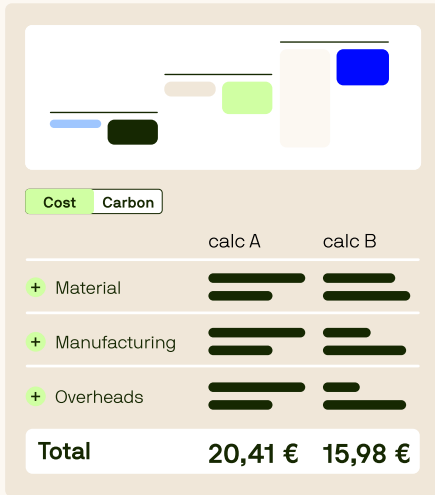
02 Create

An analysis of all cost & carbon drivers will be calculated based on AI algorithms and an internal knowledge base. Get a rough estimate for cost & carbon, or explore the fine details with just a click.



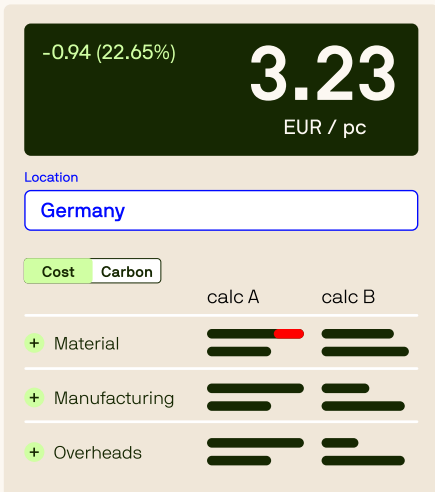
03 Analyze

Instant data-driven calculations give you a detailed analysis of all cost & carbon drivers, helping you understand the dynamics between technical requirements, commercial constraints and sustainability targets over your entire product range.



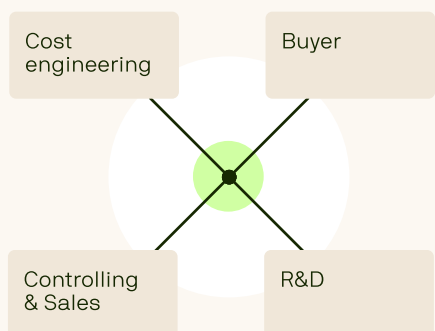
04 Adjust

Gain greater transparency and identify potentials by creating scenarios and comparing results with ease, e.g. comparison of supplier breakdown, currency changes, quantity units etc.



05 Collaborate

The central knowledge base for Cost and CO₂ information aids in uncovering optimization opportunities among various departments, allowing simple action through direct communication via the tool.



Summary

Standardised digital solutions based on automated calculations, real-time data and new collaborative possibilities will produce competitive advantages in tomorrow's cost management. Businesses are advised to lay the foundation for successful cost and carbon management in the early phase of developing a product. Cloud technologies and creating a single source of truth are revolutionising the way businesses use and share data. Carbon is becoming an increasingly important cost factor, especially in view of the EU's Carbon Border Adjustment Mechanism. That is why businesses need comprehensive solutions that document and reduce the environmental impact of developing and manufacturing products.

Standardised, automated software like Tset's enables accurate cost and carbon simulations along the entire value chain. It opens up new dimensions in cost management by combining extensive data libraries, powerful algorithms and cloud computing. Equipped with solutions like these, businesses don't just overcome the latest challenges, they also create a solid foundation for their sustainable success.

About Tset

Tsetinis Software GmbH – Tset for short – is a leading expert in product cost and carbon analysis. Based in Vienna and Kuchl, the scaleup was founded by Andreas Tsetinis and Sasan Hashemi in 2018. Tset's holistic cost management software enables the manufacturing industry to maximise cost and carbon efficiency when developing, manufacturing and procuring products. Since costs and carbon emissions are always calculated together, customers can very specifically demonstrate the benefit of their particular products and carbon avoidance strategies.

Unlike conventional blanket assessments, Tset's software can produce highly comprehensive and precise analyses based on large amounts of existing secondary data and given only a small amount of additional primary data. Our solution is also cloud-based and available as an SaaS product, so the system is ready to use and doesn't incur any internal IT costs for customers. It is used by decision-makers in the white goods, yellow goods, automotive, medical technology and electrical engineering sectors – and more. Seventy mathematicians, software developers and manufacturing experts are currently working at Tset's Kuchl and Vienna sites to constantly expand and optimise our product range.





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