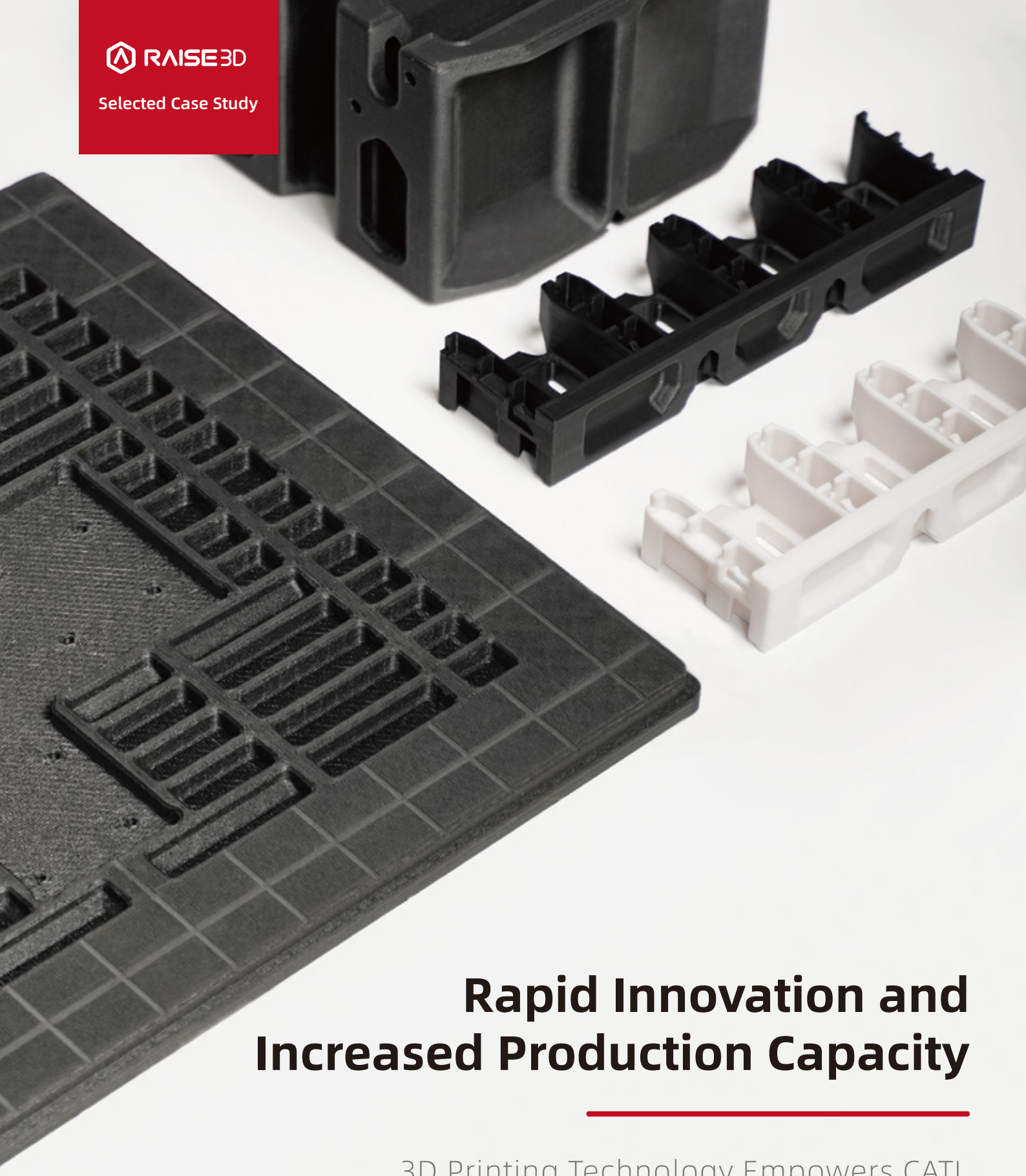
RAISE3D

Selected Case Study



Rapid Innovation and Increased Production Capacity

3D Printing Technology Empowers CATL to Achieve Innovation and Intelligent Manufacturing of Battery Cell Fixtures

CATL | RAISE3D®

CATL

Founded in 2011, Contemporary Amperex Technology Co., Limited (CATL) is a world-leading new energy innovation technology company dedicated to providing first-class solutions and services for global new energy applications. As of 2024, CATL has achieved "**No.1 worldwide in battery usage volume for eight consecutive years**" and "**No.1 globally in BESS battery shipment for four consecutive years**".

(Source: CATL official website)

More than 100,000

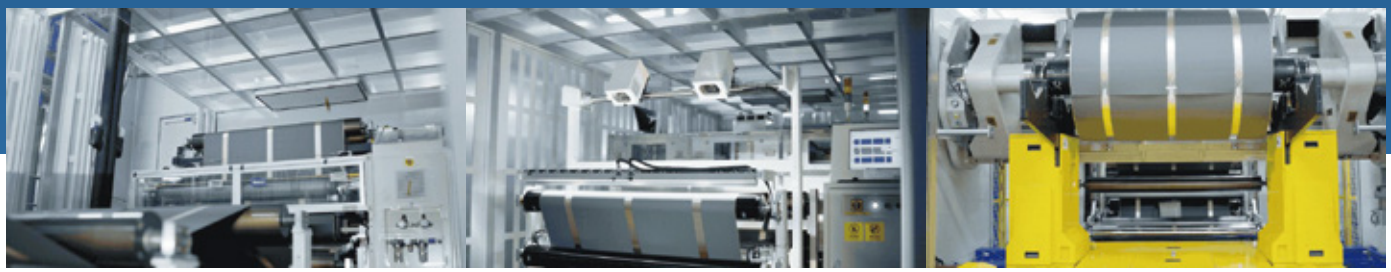
China

New Energy

Jigs and Fixtures, Prototyping, Production

Traditional Manufacturing Methods Bring Innovative Challenges

As one of the world's largest power battery manufacturers and an innovative pioneer in the field of new energy batteries, CATL has always been committed to technological breakthroughs in power batteries and energy storage systems.



CATL production scene, highly automated PACK wire drawing
(source: https://www.catl.com/news/6733.html)

Although CATL has a lot of innovation needs, in the battery cell assembly process, the traditional tooling and prototype verification production model cannot save costs while ensuring large-scale and rapid innovation iterations.
The traditional manufacturing model has the following limitations in terms of innovation in the battery cell production line:

Slow response speed

Traditional CNC processing has a long delivery cycle, usually requiring 2-4 weeks to deliver, which seriously restricts the speed of product iteration.

Limited design innovation

Manufacturing complex structures through traditional methods often involves many difficulties, such as tool customization and material limitations.

Insufficient flexible production capacity

It is difficult to respond quickly to demands for multiple varieties and small batches.

Long technology verification cycle

low efficiency of fixture adaptation during new product development.

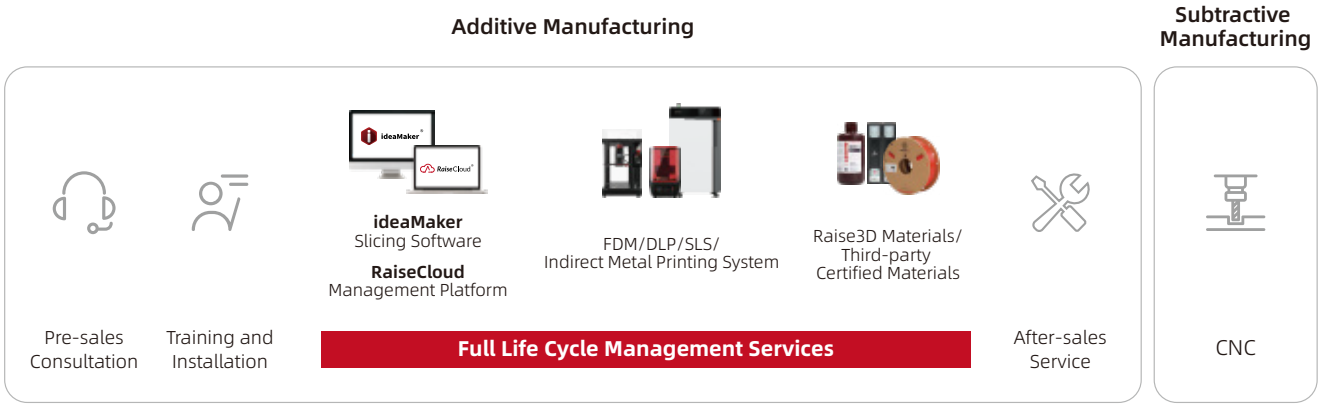
This model can no longer meet CATL's rapid innovation needs. Therefore, how to break through the manufacturing bottleneck, optimize the manufacturing of fixtures and prototypes, and build a more flexible production system, has become a key issue for CATL's technology upgrade.
Faced with these challenges, CATL urgently needs to establish an agile tooling and prototype manufacturing system that can support continuous innovation.

3D Printing Technology Brings Flexible Manufacturing Solutions

After in-depth technical evaluation, CATL chose to enter into a strategic partnership with Raise3D, a leading industrial 3D printing company, to build an independent and controllable agile manufacturing system. This decision was based on the **three core values** of Raise3D:

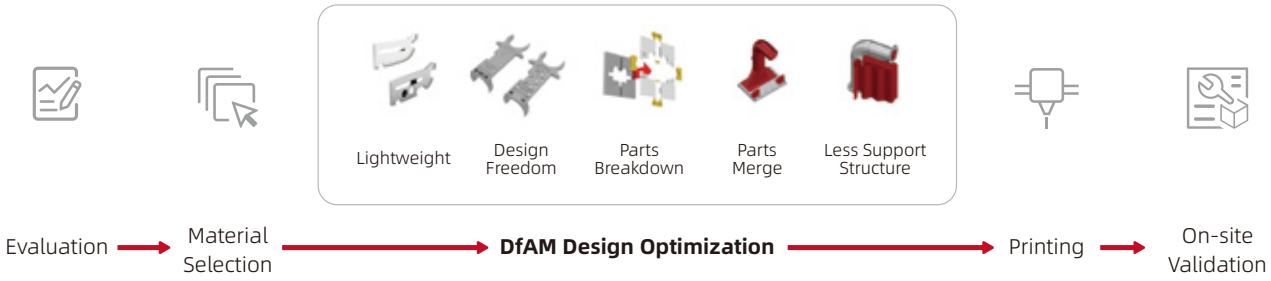
1 One-stop solution to meet diverse needs

Through the combination of additive and subtractive manufacturing, dual processes are used to ensure product quality. At the same time, from pre-sales consultation to after-sales service, a one-stop service system is provided.



2 DfAM service, in-depth cooperation from design to manufacturing

Through DfAM, based on the capabilities of additive manufacturing technology, design optimization is carried out to reduce the number of parts, simplify the assembly process, optimize the product structure, achieve cost reduction and improve product performance, and shorten the development cycle.

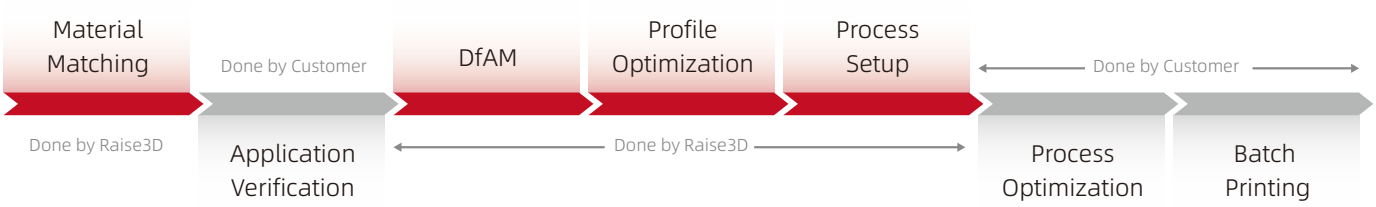


DfAM (Design for additive manufacturing): A method of maximizing product performance through systematic comprehensive design of shape, size, hierarchical structure, and material composition based on additive manufacturing technology capabilities.

3 Large-scale production to ensure efficient delivery

Relying on the high printing accuracy and stability of Raise3D printers to ensure the consistency of mass-produced products. Through mass production, the unit production cost is reduced while ensuring fast delivery.

Raise3D tailored a set of fixture and prototype production models for CATL, based on its actual production characteristics. Raise3D's professional team worked with CATL to ensure fast and high-quality delivery of printed parts, starting from material matching, to design, templates, process optimization, and finally, batch printing.



In terms of printers, Raise3D, with its years of experience in 3D printing, has provided CATL with a variety of models using FFF, DLP, SLS and other processes, with a total of hundreds of devices deployed. Raise3D's equipment has always been known for its high precision and high stability. At the same time, with Raise3D's rich proprietary materials and OMP (Open Material Program) materials, it fully meets CATL's different production scenario requirements.

At the same time, Raise3D's self-developed RaiseCloud enterprise-level cloud platform, relying on its powerful features such as multi-task management, team printer management and remote monitoring, realizes the intelligent scheduling and remote monitoring of CATL's cross-regional equipment clusters, and builds a full-link digital flexible manufacturing system from equipment to management.

As a network-based 3D printing cloud platform, in CATL's actual production, RaiseCloud helps CATL reduce the number of equipment operators and release printing capacity with its reliable data security, flexible and personalized operation interface, and powerful remote management functions, thereby improving overall efficiency.

CATL's customized RaiseCloud interface
(for reference purpose only)

Innovation Breakthroughs and Capacity Improvement

By introducing 3D printing technology, Raise3D helped CATL accelerate its R&D cycle and greatly improved the speed from product to mass production.
According to statistics, in 2023, Raise3D's equipment has achieved the following cumulative production capacity breakthroughs:

100,000
Print Jobs

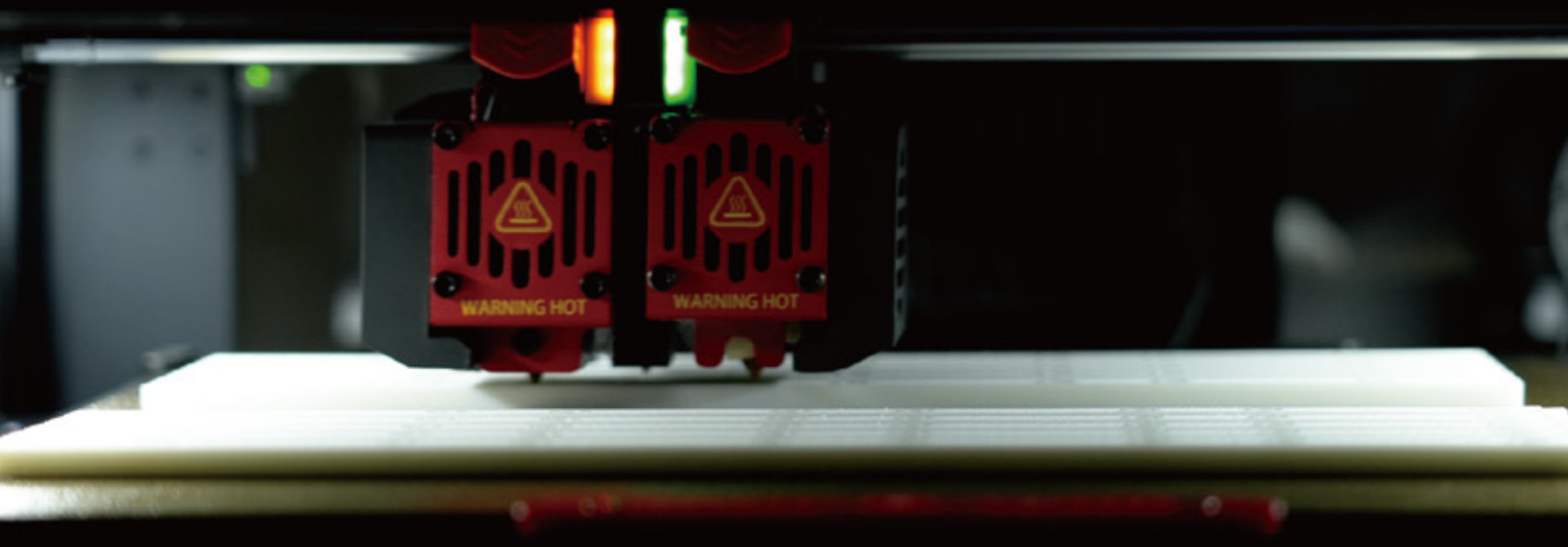
2.1%
Failure Rate

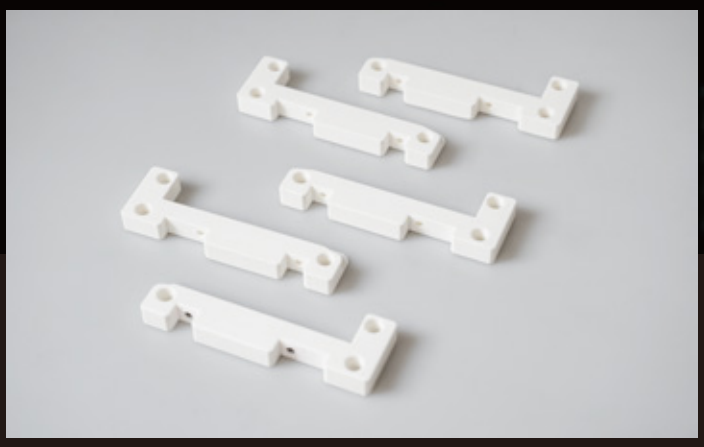
33.6 tons
Total Annual Consumable Consumption

98%
Total Equipment Utilization Rate

30%
Delivery Cycle Shortened

The introduction of 3D printing technology not only solved specific production problems, but also promoted the leap in CATL's overall innovation capabilities.

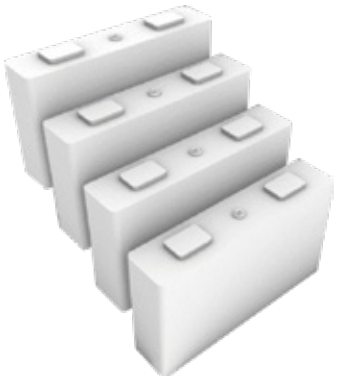




CATL uses Raise3D printers to manufacture parts

Example 1: Battery Cell Model

The 3D application development of a battery cell model, when using traditional manufacturing processes, requires a production cycle of up to 15 days. The weight of a single part exceeds 500 grams, and the cost is as high as 27.8 USD. However, the use of Raise3D's printing process has greatly shortened the production cycle to 8 hours, and the parts can be produced on the same day. The weight is reduced to about 150 grams and the cost is as low as 11.1 USD. Within 2 days, 4 times and 8 sets of sample iterations can be achieved, which greatly reduces costs and shortens the development cycle while optimizing the design.



	Traditional Manufacturing	After 3D Printing Introduction
Production Cycle	15 Days	**8 Hours**
Part Weight	≥ 500g	**≥ 150g**
Cost per Part	$27.8	**as low as $11.1**

4 times and **8 sets** of sample iterations within **2 days**!

Example 2: Flat Sheet

Take a single production equipment as an example. This equipment involves 10 to 20 kinds of flat sheets. These parts have complex structures. Through traditional processing methods, there are often many difficulties, such as tool customization and material restrictions. However, through 3D printing, they can be formed in one piece, and the production cycle and cost can be greatly reduced. The smallest flat sheet can be printed in just 20 minutes; and some key flat sheets with special structures can be printed at a cost as low as 5.7 USD through 3D printing.

Traditional Manufacturing	After 3D Printing Introduction
Metal flat sheets are **unable to directly contact the electrode sheet** Flat plastic sheets are prone to **deformation** **High processing cost**	**Significant Time Savings** Medium-sized flat sheets can be printed in **2 hours**, and the smallest ones take only **20 minutes** **Significant Cost Reduction** Some key flat sheets with special structures can be printed at a cost as low as **5.7 USD**

Example 3: Transfer Pallet

A certain transfer pallet was originally manufactured using traditional technology, with a production cycle of up to 40 days and a single piece weight of up to 8 kg, resulting in high power consumption and increased wear and tear on the logistics line, as well as certain safety risks. By introducing 3D printing technology, the production cycle is shortened to 10 days (a 75% reduction), the single piece weight is reduced to 2 kg (a 75% reduction), and costs are reduced. In addition, the significant reduction in pallet weight significantly reduces energy consumption and wear and tear on the logistics line, further improving safety.

	Traditional Manufacturing	After 3D Printing Introduction
Production Cycle	40 Days	**10 Days**
Part Weight	8000 g	**2000 g**
	High power consumption and **increased wear and tear** on the logistics line **Safety risks**	**Reduces energy consumption and wear and tear on the logistics line Further improving safety**

Example 4: Bushing Tooling

Take a bushing tooling as an example, both its inner and outer surfaces are positioning surfaces. Using traditional technology, it is impossible to achieve one-piece molding, and it can only be assembled after being made into loose blocks. Therefore, there are problems such as long processing cycle, complex installation, and difficulty in debugging, and the cost per piece is high.
By using 3D printing technology to directly print the entire solid cavity, the production cycle can be shortened by 50%, and the weight of a single piece can be reduced to 1 kg (a 70% reduction). At the same time, costs can be significantly reduced and the debugging process can be greatly simplified.

Traditional Manufacturing	After 3D Printing Introduction
Impossible to achieve one-piece molding Can only be assembled with loose blocks **Long processing cycle** **Complex installation** **Difficulty in debugging** **High cost per part**	**Significant Time Savings** Production cycle shortened by **50%** **Significantly Part Weight Reduction** Part weight reduced to **1 kg (70% reduction)**

Example 5: Buffer Barrier Assembly

A certain buffer barrier assembly was originally produced using traditional technology, which had problems such as long production cycle (40 days) and high cost, making it difficult to meet the needs of rapid cutting and pulling. After the introduction of 3D printing technology, the production cycle can be shortened to 10 days (a 75% reduction), and the weight is reduced by 40%, which not only significantly improves production efficiency, but also reduces overall costs, perfectly meeting the needs of rapid cutting and pulling.

Traditional Manufacturing	After 3D Printing Introduction
Long production cycle (40 days)	**Significant Time Savings** Production cycle shortened by **75%**
High cost per part	**Significantly Part Weight Reduction** Part weight reduced by **40%**
Difficult to meet the needs of rapid cutting and pulling	**Significant production efficiency Improvement** **Overall cost reduction** **Perfectly meeting the needs of rapid cutting and pulling**

One technical person in charge of CATL said:

> **3D printing technology, with its revolutionary manufacturing concept, has opened up unlimited possibilities for design innovation and production transformation. Raise3D's complete 3D printing solution has not only greatly improved CATL's innovation efficiency and shortened its product iteration cycle, but also significantly released CATL's production capacity potential through digital and intelligent production methods, demonstrating its irreplaceable strategic value in emergency delivery and flexible production.**

Conclusion

The practice of CATL shows that 3D printing technology is changing from "replacing traditional technologies" to "driving comprehensive innovation". This transformation not only improves manufacturing efficiency and production capacity, but more importantly, builds a technical foundation for continuous innovation. Today, with the rapid development of the new energy industry, the accumulation of such innovative capabilities will surely become the core competitive advantage of enterprises. Raise3D's one-stop solution will become the first choice for new energy enterprises to innovate and increase efficiency.

If you also have the need to introduce 3D printing solutions, please contact us at **inquiry@raise3d.com**. We will provide you with professional technical evaluation and full-process support.

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