



Additive Manufacturing

Your systems, made better

Maximise your production & profitability



Put the power back in your hands, go to market faster and be more profitable with our complementary additive manufacturing systems.

Leveraging our patented Titomic Kinetic Fusion (TKF) technology, we work with you to integrate our custom in-line manufacturing solutions into your production line.

Our systems are specifically designed to your needs and engineered to reduce lead times, maximise uptime, cut material costs and enhance performance. So you can add greater efficiency to your operations and unlock new material possibilities – to maximise production and profitability.

- ✓ Machines
- ✓ Materials
- ✓ Software
- ✓ Training
- ✓ Support

From prototyping to R&D, small-run production and on-demand manufacturing, our fully customisable Titomic Kinetic Fusion Additive Manufacturing (TKF AM) systems bring the limitless possibilities of high-pressure cold spray technology and more to your factory floor – without making your existing equipment obsolete.



Faster output



Less waste



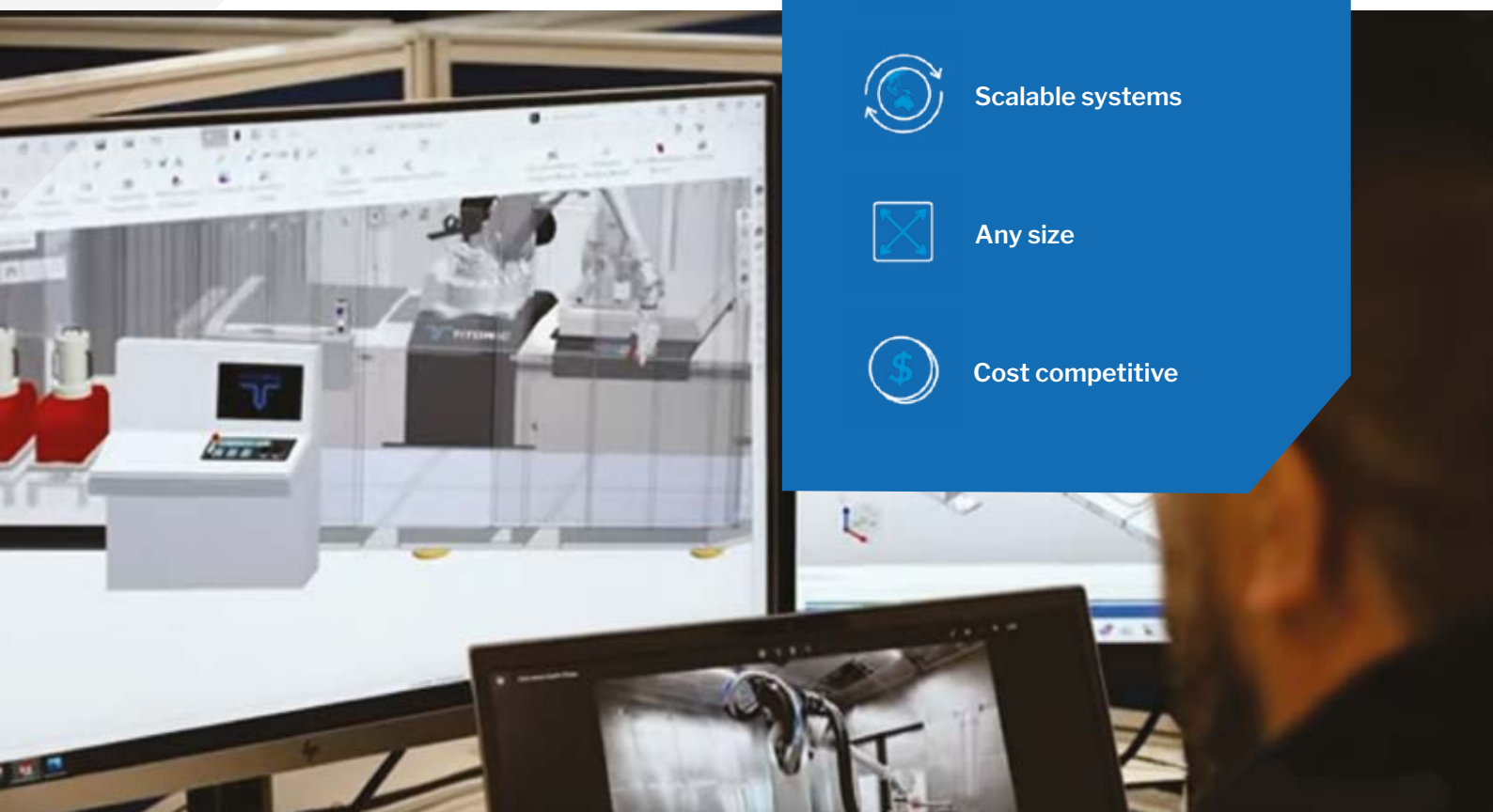
Scalable systems



Any size



Cost competitive





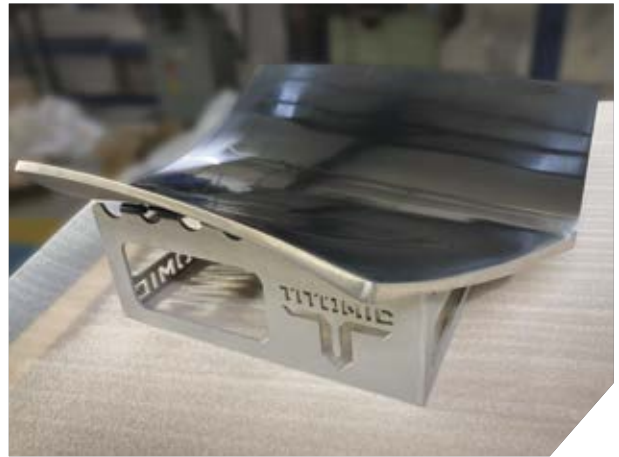
Common applications

Titomic's turnkey TKF AM systems harness cold spray technologies together with machines, materials, software and robotics (backed by training and support) to produce better-performing parts for a variety of applications in high-pressure environments:



BARRELS

Produce large multi-metal or single-metal barrels that are lighter and offer better corrosion and erosion performance than traditional techniques.



TOOLING

Produce stronger, lighter, thinner and corrosion-resistant near-net shape faceplates – with reduced welding, assembly and lead times.



BALLISTICS SHIELDING

Create complex, freeform ballistics protection from multiple metals or titanium to produce larger, lighter, more versatile armour.



STRUCTURES

Replace complex and costly welded assemblies with single-piece structures.

System category

Our standard systems are tailored for straightforward, repeatable tasks, while our robotic line excels in versatility, necessary for complex additive manufacturing. The low-pressure option is perfect for coatings and repairs, whereas the high-pressure system is designed to handle harder materials and demanding additive manufacturing for aerospace, defence, and beyond.

Standard **S**

An efficient, cost-effective system with the fundamental features and reliability needed for straightforward, repeatable tasks.

Professional **P**

An innovative system with the advanced features and enhanced performance needed for high-end manufacturing applications.

Linear **L**

Used for 'back and forth' coating or manufacturing operations, this relates to the robotics' axes of motion (X, Y).

Robotic **R**

Used for enhanced robotic head manipulation and suitable for additive manufacturing and complex coatings, this relates to the robotics' axes of motion (X, Y, Z).

Pressure type

Low-pressure (LPCS)

Low-pressure cold spray is portable, allowing for on-site application of nickel, aluminum, tin, and bronze on heat-sensitive surfaces. Ideal for versatile repair and coatings.

Medium-pressure (MPCS)

Medium-pressure cold spray delivers durable steel and titanium coatings. While still portable, these systems offer a solution for damage repair and hard wearing coatings.

High-pressure (HPCS)

High-pressure cold spray facilitates robotic additive manufacturing with desirable metals such as titanium and Inconel, producing high-performance parts for aerospace, defence, and beyond.



Systems by industry application

Industry	Challenge	Cold Spray Solution	Titomic System
Defence	Long lead times for critical equipment	Barrels, ballistics shielding, armaments, titanium components.	TKF 1000 Custom TKF Systems
	Heavy ballistics protection, highly reliant on steel	Develop composite armor by integrating titanium and ceramics using Titomic Kinetic Fusion technology. This process utilizes cold spray techniques to adjust parameters, forming hard exterior plates that shatter projectiles and incorporating softer, ductile titanium layers within the same component to absorb impacts effectively.	TKF 1000 Custom TKF Systems
	Heavy and steel-based armaments	Utilize Titomic Kinetic Fusion to enhance artillery barrel construction by integrating titanium and copper. This innovation streamlines logistics and optimizes heat dissipation, enabling a higher rate of fire. The incorporation of hard-wearing metals also ensures durability, preventing premature wear and extending the barrel's operational lifespan.	TKF 1000 Custom TKF Systems
	Lengthening armaments effective range	Employ Titomic Kinetic Fusion technology to fabricate lightweight, freeform titanium components for missiles and hypersonic projectiles. This advanced manufacturing process significantly reduces part weight, thereby extending range capabilities and maximizing payload capacity for enhanced mission effectiveness.	TKF 1000 Custom TKF Systems
Aerospace	Sourcing cost-effective, high performance parts	Titomic uses cost-effective metal powders, such as titanium, to rapidly create near-net 3D parts. This means lightweight, strong parts can be made with minimal costs with short lead times.	TKF 1000 Custom TKF Systems
	Long lead times in tooling production	Create large-scale tooling for composites manufacturing from Invar36. Cold spray creates denser, longer-lasting tooling without the lead times.	TKF 1000 Custom TKF Systems
Industry Agnostic Capabilities	Higher performing components	Cold spray technology facilitates the production of large-scale components with superior material characteristics, such as improved wear resistance and mechanical strength, without the detrimental effects of high-temperature processes.	TKF 1000 Custom TKF Systems
	Design flexibility and innovation	The cold spray process allows for greater design versatility, enabling the creation of complex geometries and the integration of multiple materials into a single component, which is often not feasible with traditional manufacturing methods.	TKF 1000 Custom TKF Systems
	Cost-effectiveness	Traditional manufacturing often means removing material from a billet to create the needed part. With Titomic's additive manufacturing technology, we add material to manufacture near-net parts. This means material costs can be reduced by up to 90%. Additionally, Titomic Kinetic Fusion can utilise lesser refined powder feedstocks due to the absence of heat, enabling further cost efficiencies.	TKF 1000 Custom TKF Systems

Our systems

TKF SYSTEMS

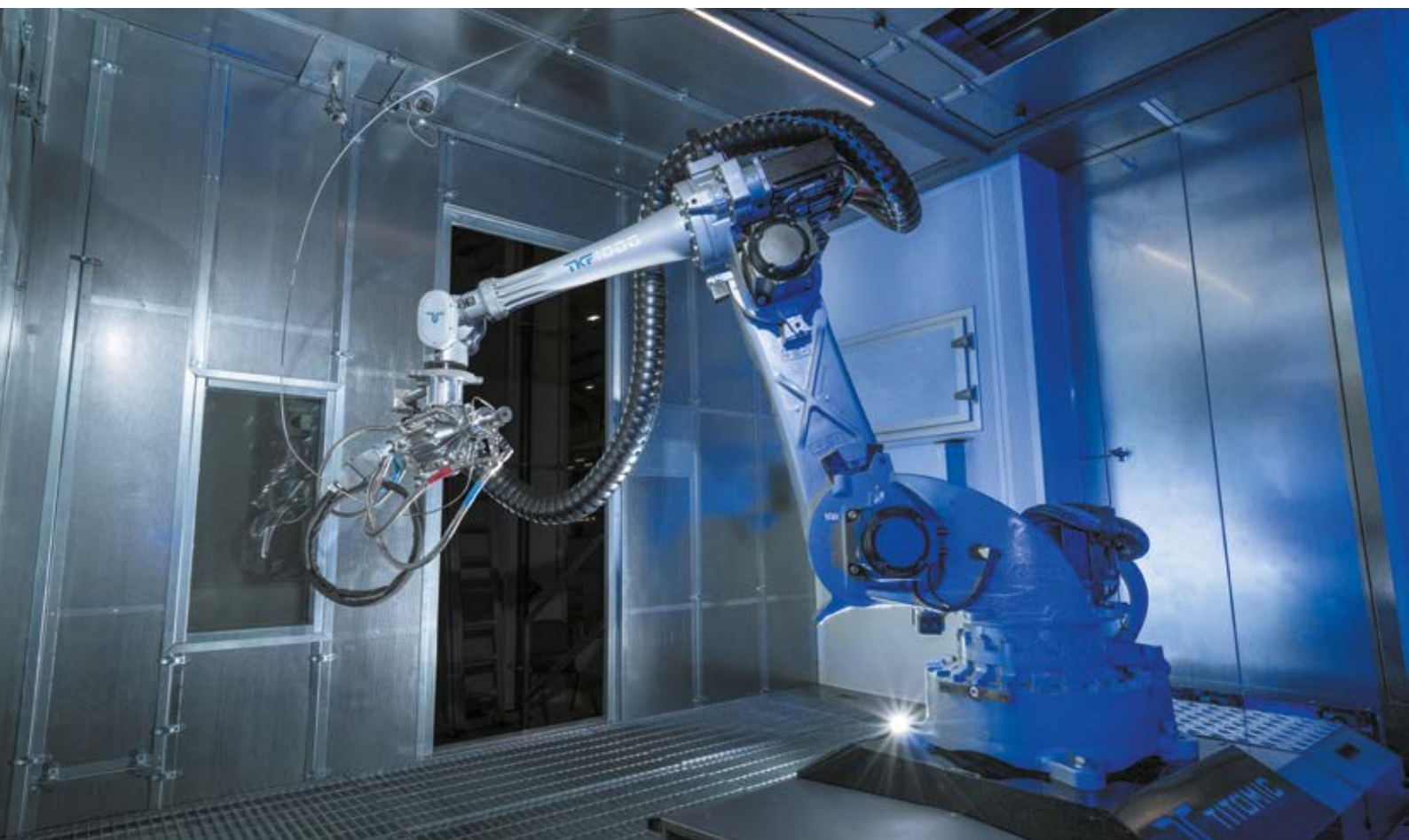
Ideal for low to mid-size production applications, our modular system offers rapid and agile manufacturing, prototyping, custom parts and pilot runs before mass production.

Can be used with a wide variety of metals and alloys including titanium, steel, copper, and nickel alloys.

COMPLETE CUSTOMISATION

Titomic creates custom systems to fit your exact part, production volume and speed needs – while also being optimised for your environment and easy to integrate into your production line.

Rather than being an alternative solution, our systems elevate and add value to your existing systems, enhancing your existing manufacturing activity.



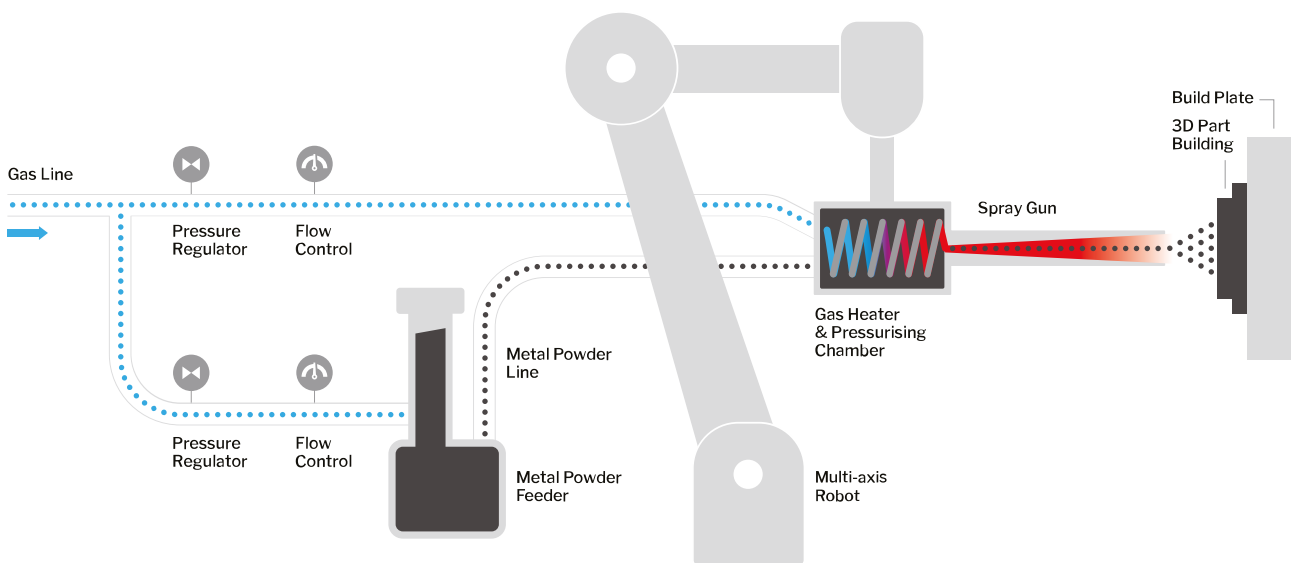


How it works

Cold spray technology makes it quicker, easier, safer and more sustainable to produce multi-metal, high-performance parts on demand – saving time, costs and waste while reducing risk.

This revolutionary process rapidly deposits strong metals, alloys and other specialty materials at low temperatures. So they retain their intrinsic properties without needing to be melted.

By integrating this advanced technology into your existing systems, you can produce new parts with maximum uptime.



- 1 Metal particles are injected into a gas jetstream.
- 2 The particles accelerate at supersonic speeds.
- 3 The particles exit the spray nozzle.
- 4 The particles collide with the surface and deform, sticking to the surface and to each other.
- 5 The particles build up, developing into near-net-shape metal parts.

Some key advantages include:

- ✓ Low thermal load on materials (typically: scaffold 50-250°C, spray material 50-900°C) allowing the ability to work with thermally sensitive materials as well as dissimilar materials
- ✓ Deposition results can be in compressive residual stress for better as-built mechanical properties of many geometries
- ✓ Deposition rate typically 1-8kg/h, up to 15kg/h of material making it fit for production speeds/volumes
- ✓ Mechanical properties similar to highly deformed bulk material
- ✓ Absence of a heat affected zone (HAZ), ensuring a quality bond without changing the microstructure (and thus, structural characteristics) of the scaffold

Bringing a new age of automated manufacturing to your factory floor

Product comparison

Product	Category	Pressure	Applications	Materials	Accessories
D523	S	Low	<ul style="list-style-type: none"> Coatings & Repairs 	Reference existing data (AM / High Perf. Alloys).	<ul style="list-style-type: none"> Steel nozzle for manual repair applications Steel nozzle for larger flat-coating surfaces Ceramic wear-resistant nozzle for automated processes Water-cooled nozzle set for low-melting point metal and plastic feedstock. Adaptor set for 45° and 90° angles
D623	S	Low to medium	<ul style="list-style-type: none"> Coatings & Repairs 	Aluminium, Zinc Copper, Tin, Nickel Babbit, Gold, Silver Platinum, Inconel 625 (He), Titanium. Refer to materials datachart	<ul style="list-style-type: none"> Steel nozzle for manual repair applications Steel nozzle for larger flat-coating surfaces Ceramic wear-resistant nozzle for automated processes Water-cooled nozzle set for low-melting point metal and plastic feedstock. Adaptor set for 45° and 90° angles Intelligent Robotic Path Software Particle Velocity Camera
ISB	R	Low to high	<ul style="list-style-type: none"> Coatings & Repairs 	Aluminium, Zinc Copper, Tin, Nickel Babbit, Gold, Silver Platinum, Inconel 625 (He), Titanium. Refer to materials datachart	<p>Broad range of customisation and accessories available.</p> <ul style="list-style-type: none"> Steel nozzle for larger flat-coating surfaces Ceramic wear-resistant nozzle for automated processes Water-cooled nozzle set for low-melting
TKF 1000	S	High	<ul style="list-style-type: none"> Coatings & Repairs Additive Manufacturing 	AISI 4300 UNS J24045, Stainless Steel 304L, Inconel 718, Commercially Pure Titanium CP-Ti), Invar36	<ul style="list-style-type: none"> 1L, 3L or 15L High Rate Powder Feeding Glass and Extra Long Life Nozzles Internal Coating and 45° Nozzle Single or Dual Axis Part Rotation Unit Intelligent Robotic Path Software Particle Velocity Camera Custom Acoustic Enclosure & Airflow
TKF 1000	P	High	<ul style="list-style-type: none"> Coatings & Repairs Additive Manufacturing High Volume Production Environment 	AISI 4300 UNS J24045, Stainless Steel 304L, Inconel 718, Commercially Pure Titanium CP-Ti), Invar36	<ul style="list-style-type: none"> Single, Dual or Quad 3.7L Powder Feeding High Speed, Precise CNC Motion Control "EasyTKF" Robotic Path Program Wizard Industry 4.0 NAS Database for Weight, Cameras, Sensors and Path Logging RunMyVirtual Machine - Digital Twin Cyber Secure Remote Support System



Materials

In creating heterogeneous alloys, we can combine materials that typically don't go together (such as blending titanium with ceramic, or coating copper with stainless steel without needing to melt it) to reap the intrinsic benefits of each – such as combating corrosion, wear and any other issues impacting your operations.

Next generation materials

With problem solving in our DNA, we can recommend the right materials for the best possible outcome. Together with our technology, the possibilities are limitless.



Near net shape
manufacture



3D freeform
components



Multi-metal
composite parts



Functional
coatings



Joining dissimilar
metals

With problem solving in our
DNA, we can recommend the
right materials for the best
possible outcome.

High performance alloys

AISI 4330 UNS J24045

Characteristics

- Fine-grained, medium carbon, chromium-nickel-molybdenum alloy steel
- Superior strength, toughness, hardenability and low temperature impact properties

Applications

- High-performance applications that need toughness and wear resistance
- Aerospace, defence, oil and gas

Mechanical Properties ¹	TKF CSAM	
	Heat Treatment 1	Heat Treatment 2
Hardness Rockwell C	38 HRC	28 HRC
Ultimate Tensile Strength (UTS)	1300MPa (188ksi)	950MPa (138ksi)
Yield Tensile Strength (YTS)	1180MPa (171ksi)	860MPa (124ksi)
Elongation (%)	8	12

1. TM E8 Standard Test Methods for Tension Testing of Metallic Materials

Stainless Steel 304L

Characteristics

- Stainless Steel 304 is a commonly used class of stainless steel. It is an austenitic, corrosion-resistant steel with excellent strength, toughness, fabrication characteristics and weldability.

Applications

- Used in the aerospace industry where parts require high-strength, corrosion, and temperature resistance.
- Typical applications are for aerospace and defence structures, chemical tanks, railing and trim in marine environments as well as piping, tubing and heat exchanger applications where corrosion resistance is key.

Mechanical Properties	TKF CSAM Heat Treated
Hardness Rockwell B	94 HRB
Ultimate Tensile Strength (UTS)	645MPa (93ksi)
Yield Tensile Strength (YTS)	348MPa (50ksi)
Elongation (%)	32 (typ.)

Inconel 718

Characteristics

- Inconel 718 is a nickel-based super alloy that is well suited for applications requiring high strength in temperature ranges from cryogenic up to 760°C (1400°F)

Applications

- This alloy provides high strength and excellent corrosion resistance in seawater.
- Outside of aerospace, the largest single market for Inconel 718 is in assorted Oil & Gas applications. Common applications included fasteners, valve gates, seats, stems and trim.

Mechanical Properties	TKF CSAM	
	Heat Treatment 1	Heat Treatment 2
Hardness Rockwell C	33 HRC	20 HRC
Ultimate Tensile Strength (UTS)	1145MPa (166ksi)	1080MPa (157ksi)
Yield Tensile Strength (YTS)	977MPa (141ksi)	680MPa (99ksi)
Elongation (%)	8	28



Commercially Pure Titanium (CP-Ti)

Characteristics

- Commercially Pure Titanium powder may be manufactured using the hydrogenation-dehydrogenation (HDH) process, which provides cost-effective irregular morphology powders that are uniquely processable with the TKF CSAM (Titomic Kinetic Fusion Cold Spray Additive Manufacturing) process.

Applications

- Superior specific strength (strength to weight ratio), ductility, and corrosion resistance is required.
- Aerospace structures, corrosion resistant parts, tanks, pressure vessels, piping components (tubes/valves/flanges), heat exchangers and many more industrial components.

Mechanical Properties ^{1,2,3}	TKF CSAM (Recipe 1)	TKF CSAM (Recipe 2)	TKF CSAM (Recipe 3)
Ultimate Tensile Strength (UTS)	727MPa (105.5ksi)	830MPa (120.4ksi)	792MPa (114.9ksi)
Yield Tensile Strength (YTS)	619MPa (89.7ksi)	784MPa (113.7ksi)	707MPa (102.5ksi)
Elongation at Break (%)	10	10	13
Post Processing	Heat Treated	Heat Treated + HIP	Heat Treated + HIP
Density	~98%	>99.9%	>99.9%

1. Various grades and/or chemical compositions of TKF CP-Ti parts can be tailored. Contact Titomic for further information

2. Rotationally fabricated coupon stock produced on Titomic TKF1000 system

3. ASTM E8 Standard Test Methods for Tension Testing of Metallic Materials

Invar36

Characteristics

- Invar36® is a 36% nickel-iron alloy possessing a near zero rate of thermal expansion from around -100oC (-148oF) up to 200oC (392oF) that is around a tenth of the expansion rate of carbon steels.

Applications

- Advanced composite moulds for aerospace industry scientific instruments, thermostats and cryogenic instrumentation, magnetic shielding, small electrical transformers, metrology devices, precision condenser blades, electrical circuit breakers, radar and microwave cavity resonators, special electronic housings, seals, spacers, and specialised frames and high voltage transmission lines.

Mechanical Properties	TKF CSAM Heat Treated
Hardness Rockwell C	71 HRC
Ultimate Tensile Strength (UTS)	511MPa (74ksi)
Yield Tensile Strength (YTS)	367MPa (53ksi)
Elongation (%)	26

TKF1000-S

Faster, simpler on-demand

Ideal for low to mid-size production applications, our modular system offers rapid and agile manufacturing, prototyping, custom parts and pilot runs before mass production.

Because the TKF 1000 can fuse dissimilar metals, it can be used with a wide variety of metals and alloys including titanium, steel, copper, nickel and magnesium.

Key benefits



Manufacturing with advanced materials



Automated robotic production



Fuse dissimilar metals to create custom solutions



Additive manufacturing without distortion or oxidation

Pressure type

- High Pressure

Key features

- Large scale metal additive manufacturing
- Synchronised 6-Axis Robotics, Servo Positioning and TKF Controls
- Intuitive touch panel interface
- Protective sound-dampening booth
- System enclosure
- Downdraft extraction area
- Vacuum System
- Component positioning shuttle
- Rotary component positioning unit

Applications

- Repair metal surface defects like pitting, porosity, cracks and holes
- Geometric restoration of worn or damaged surfaces on engines, bearings, gearboxes and more
- Electrically conductive coatings
- Special coatings for wear, heat and corrosion resistance
- Corrosion protection and repair
- Hermetically sealed radiators and HVAC systems

Materials

- AISI 4300 UNS J24045
- Stainless Steel 304L
- Inconel 718
- Commercially Pure Titanium (CP-Ti)
- Invar36





Industries



Multiple powder feeders allow rapid manufacturing with dissimilar metals



Combine multiple materials in parts



Cost effective digital manufacturing



Industry leading build rates



Defence



Mining & Energy



Oil & Gas



Marine



Transportation



Aerospace

Accessories

TKF1000-S

- 1L, 3L or 15L high rate powder feeding
- Glass and extra-long-life nozzles
- Internal coating and 45° nozzle
- Single or dual axis part rotation unit
- Intelligent robotic path software
- Particle velocity camera
- Custom acoustic enclosure & airflow

TKF1000-P

- Single, dual or quad 3.7L powder feeding
- High speed, precise CNC motion control
- "EasyTKF" robotic path program wizard
- Industry 4.0 NAS database for weight, cameras, sensors and path logging
- RunMyVirtual machine - digital twin
- Cyber secure remote support system



Specifications

Build Envelope	1 x 1 x 0.75m
Footprint	6.3 x 4.1 x 3.6m
Shuttle Load	750kg

Control / Robotics / Industry 4.0

Controls Platform	Siemens
Interfacing	Profinet or flexible
Offline Robotic Simulation	Extensive path strategy options
Industry 4.0 Platform	Linux NAS server
Digital Dashboard	Custom data visualisation

Process parameter regulations

Gas flow	+/- 0.5% from set point
Chamber Temperature	+/- 3° C
Powder Output	+/- 0.5%

Operation

Max Temp. 1100°	15 minutes to heat, 10 to cool
Max Operating Pressure	60 - 75 bar
Powder Feeder Swap	60 seconds

General maintenance

Nozzle Change	Under 5 minutes
Integrated Downdraft Floor Extraction Area	10.0m ²

Powder feeder system

Operating Pressure	50 - 75 bar
Feed Ratio	10g/min - 330g/min (20kg/hr)
Powder Volume per Feeder	3.7 Litres

Together, we can make it possible.

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