



The next gen amorphous metal global platform

Pitchdeck

Series A – March 2023



Capsulorhexis clamps for optical surgery

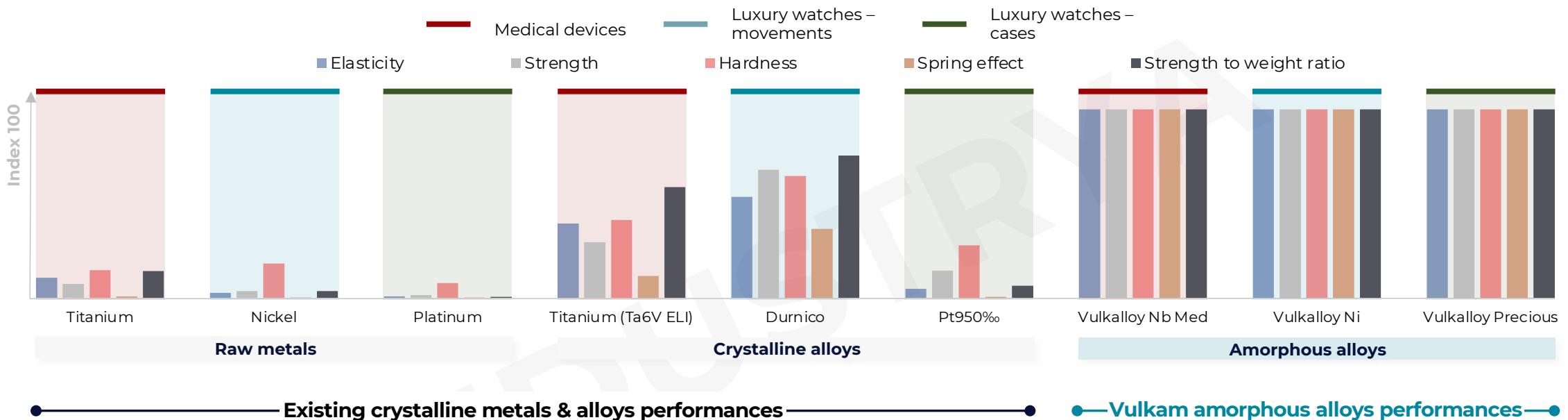
Summary



2x
smaller than
traditional
implants

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Vulkam is tackling the performance issues of existing alloys and metals...



Maintaining competitiveness

Industrials must ensure their competitiveness & are today constrained by the existing metals and alloys limited properties



Innovating for the future

Innovations will be limited because existing metals and alloys are not performant enough to meet future requirements

Vulkam higher-performance amorphous alloys¹

3x

More
resistant¹

2x

More
deformable¹

2x

Stronger &
lighter¹

...while **dividing by 3** the raw metals weight in parts price

Improving cost-efficiency is a major challenge for manufacturers

Raw metals represent a significant cost for industrials

30%

Raw metal costs share in the component final price

Raw metals prices are highly volatile

+7%

Copper¹

+57%

Nickel¹

+21%

Aluminium & Zinc¹

Vulkam decreases by 3 the raw metals cost share

1

Material innovations



Decrease the raw metals required quantity in the component...



...for **increased properties & performances**

2

Process innovations



10%

Raw metals cost share in the product final price with


80%

Less raw metals required thanks to **close-to-the-core manufacturing**

2x

Less machining and finishing steps on average via the Vulkam process²

Vulkam's amorphous alloys, a **sustainable material solution**

Fundamental shift between Vulkam technology and traditional machining processes



30%

Less CO₂
emitted⁽¹⁾



97%

Less scrap metal
generated
by machining



80%

Metal saved
in the process



Dividing by 5

the loss and waste of resources

Key players already **identified amorphous alloys potential...**

- 
- 2011 - **SWATCH GROUP**
Creating Omega watch cases in amorphous alloys through partnerships
 - 2014 -  **Creating iPhone cases in amorphous alloys through a co-patent**
 - 2018 - **HITACHI**
Inspire the Next
Developing high-efficiency electric motor, through internal R&D investments
 - 2022 - **Lenovo**
Developing electronic apparatus in which amorphous metal is considered as a top-class material for the frame
 - 2022 -  **Rolls-Royce**
Developing a hybrid rotor for an axial flux electrical machine made primarily from amorphous metal

What is currently being done?

Amorphous alloys have been **produced and sold in ribbon for years now** for their unique magnetic properties ...

- ▶ Amorphous alloys in ribbons **are already widely used**
- ▶ **Applications and manufacturing processes** are however **limited to thin ribbons**

Main players in cutting-edge industries **are investing in amorphous alloys** to reach **higher performance**

1. Higher performance

R&D processes focused on the development of alloys, to **increase performance of their products**

2. Decrease the amount of raw materials used

These investments try to improve their portfolio **cost efficiency** by decreasing the amount of **raw materials used**

...but all are still facing technical limits to reach the **industrial scale**

Amorphous alloys answer current and future industrial needs to reach high performance
but **existing players still have technical limits to reach the industrial scale**

1

Scaling production capacity

Inability to satisfy industrials demand
on volume & on specific-sector needs in properties

2

High production costs

Non-optimised processes and resources use leading to **high production costs**

Difficulties in reaching mass markets...

...which is **an obstacle to the large-scale popularisation of amorphous alloys**

Vulkam knows how to tackle these challenges and lead the **amorphous alloys scale**

- 1  **Integrated technology platform**
A **platform enabling a cross-sector approach**, without additional cost
- 2  **Cost-effectiveness**
An optimized production process and **components miniaturisation**, reducing production costs
- 3  **Large alloys range**
Targeting markets with key properties **addressing specific unsatisfied industry needs**

Providing both **material innovations** & **process innovations**

Industrials already trust Vulkam's integrated platform, **and are only waiting Vulkam's industrial scale up**

Vulkam achieved key milestones for industrial & sales deployment

Strong demand from customers¹

Vulkam has conducted more than **35 test projects**, of which some can lead to industrial-scale orders



Ready-to-scale production platform

To address customers demand,
Vulkam must today scale its existing pre-industrial tool

- ▶ **100% proprietary machinery**
- ▶ **A proven production capacity**, with between 1-10 components moulded per 1.3 minute
- ▶ **A ready-to-scale platform**, easily replicable at an industrial level

80%

of the 10 top Swiss Luxury Watches brand working with Vulkam

9

Clients ready-to-scale their demand

4

LOI already signed with major clients

T1-21

Launch of the new gen machinery

78k²

Components production capacity per year

7

Patent families for Vulkam's process know-how

Accelerating Vulkam development **through its series A**

Raising €12m to ...

① Reach new markets



Leveraging on current demand

Increasing revenue from the luxury watches segment



Certifying product properties on key regulated markets



Going further the ISO standard and the internal trials through co-certification with partners



Reaching new industries¹ & consolidating its position on primary market

Accelerating recruitment to reach Vulkam's sales full potential

② Scale the production capacity



Launch of the first industrial site in France

Moving from the industrial qualification phase to the industrial production phase and industrial deployment of the finishing stages



Launch of the line on a partner's Swiss site

Creating synergies, while subcontracting part of the volume production



Launch of new lines on the existing site and strengthening the production teams

Increasing production capacity to meet growing customer order volumes

Becoming the amorphous alloys cross-vertical **global leader**

A management **with key experiences** for Vulkam's growth



**Sébastien
Gravier**
Co-founder
CEO & Sales director

Metallurgy
PhD

Core skills

*Business development,
sales negotiation, R&D
& growth strategy*

Today mission

**Corporate
development leader**
and general manager



**Alexis
Lenain**
Co-founder
Scientific director

Metallurgy
& process PhD

Core skills

*Prototyping projects
coordination, R&D
management*

Today mission

Scientific & material
division manager,
prototyping team
manager



**Xavier
Cerutti**
CTO

Mechanics and
process PhD

Core skills

*Industrial organisation
and development,
process innovation
management*

Today mission

**Technical team
manager and lead
the process
team**



**Tiphaine
Guittat**
A&F division
Manager

*Master in Business
& Administration*

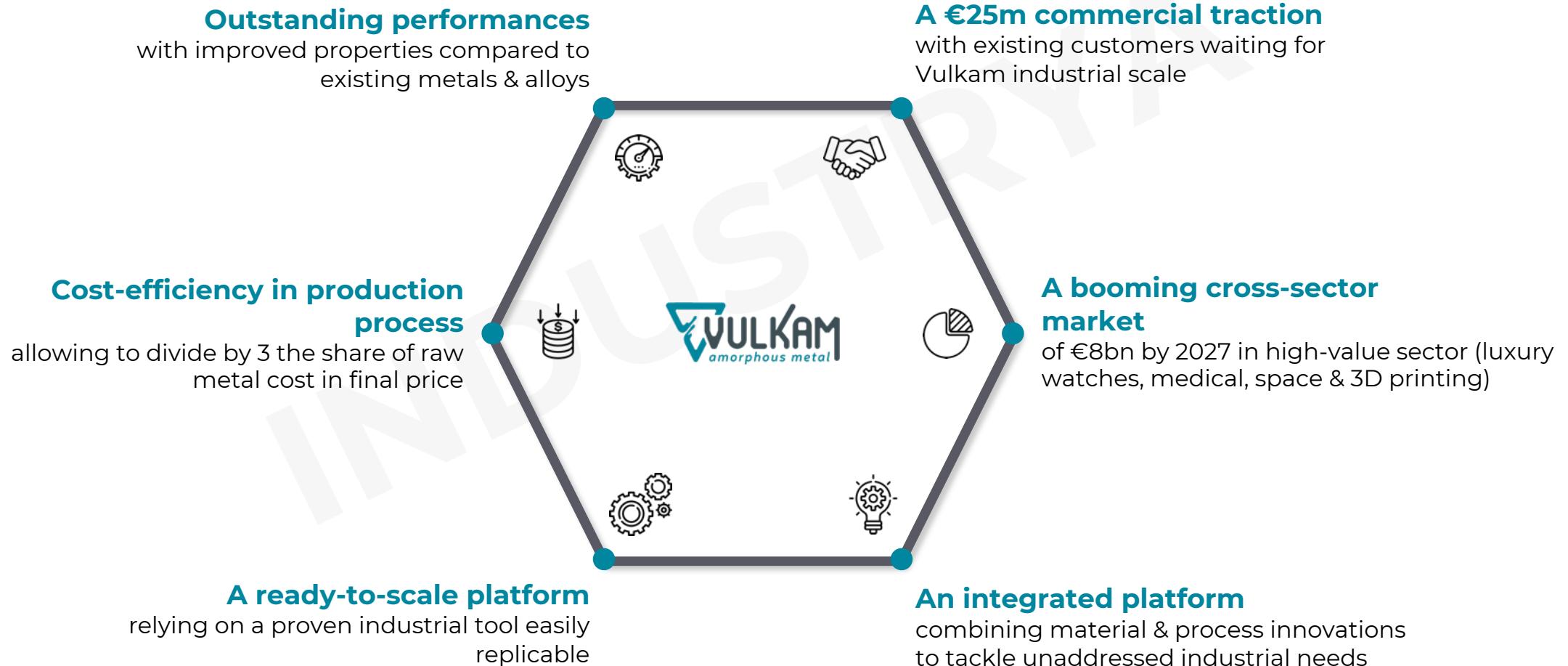
Core skills

*10+ y. business & admin.
management,
innovative projects
financial engineering*

Today mission

**Leading innovation &
funding projects,**
managing partners' pool
& adm. operations

Vulkam, the **leading integrated platform** for amorphous alloys



Vulkam's amorphous alloys **for cutting-edge industries**



Material and properties innovations

Process innovations

Stronger than titanium alloys, **more corrosion resistant** than stainless steels

Suitable for aggressive environments (saline, gaz, etc)

Certified **biocompatible** alloys

Adapted to medical applications

Increase in mechanical strength to miniaturize the final product

Developing components which size are not existing on markets

Lower density **reducing component weight**

Reduces energy needs (space, aeronautic, etc)

Higher elasticity, impact and temperature resistance

Suitable for extreme temperature or pressure

An infinite number of alloys

Alloys with optimum properties for each end-product requirements

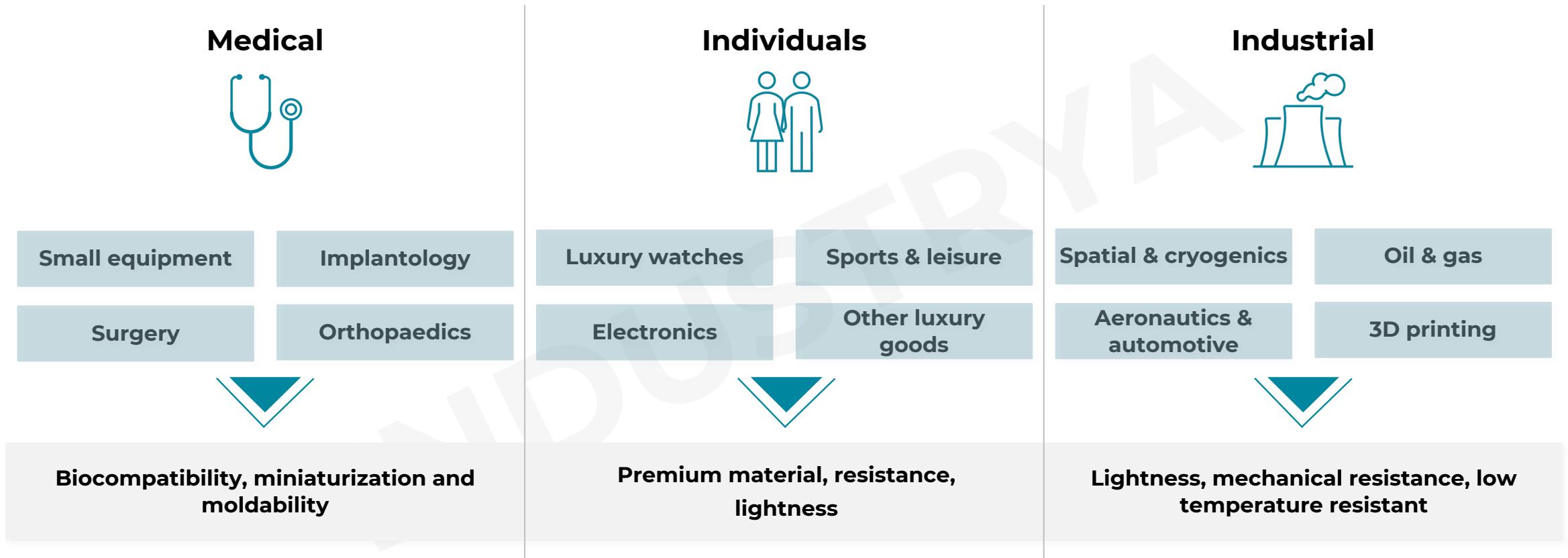
Decrease in **the raw metals used**

Cost reduction reflected in margins and final price

As easy to mould as plastic

Energy & time saver in the industrial process

Primary addressable industries with Vulkam's offer

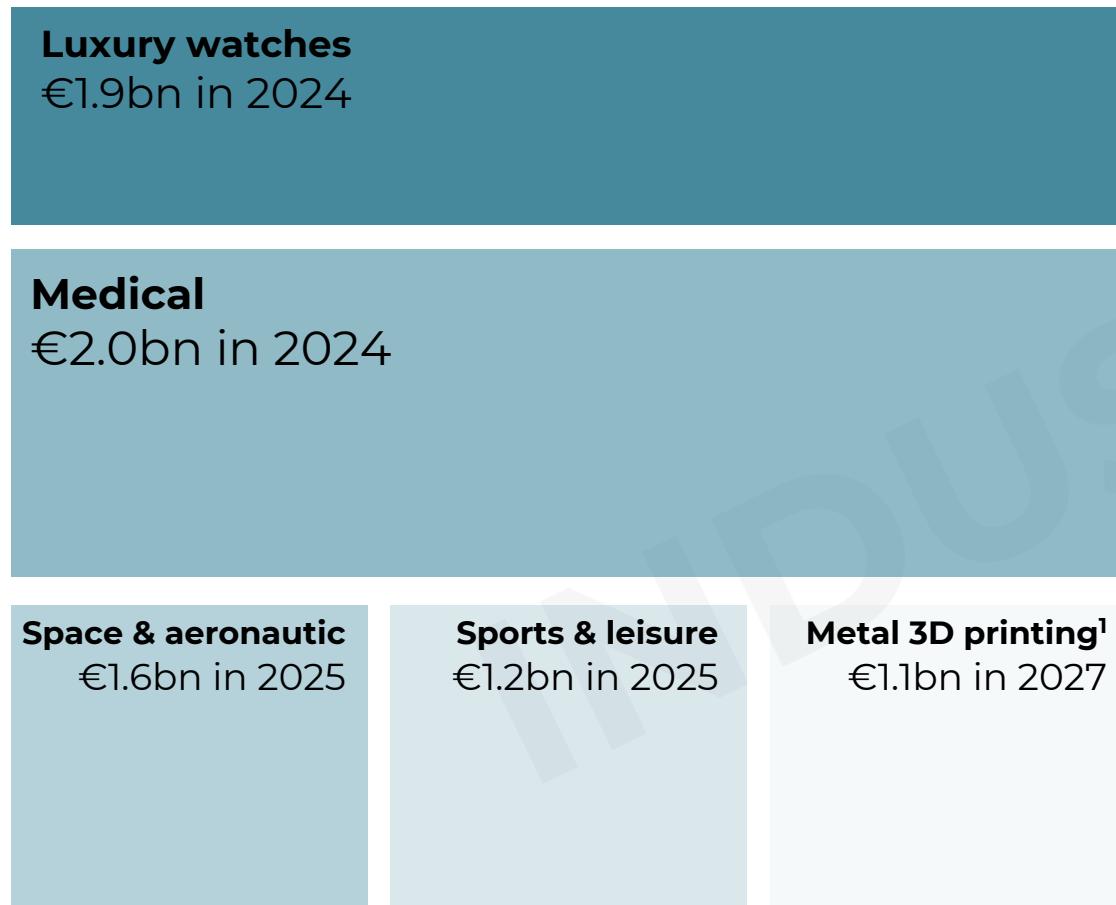


MIM¹ and additive manufacturing industry developed themselves over the last two decades **in cross-sectoral industries**

Amorphous alloys follows the same path, and will revolutionize a multitude of industries

€8bn valued addressable markets in the next 5 years

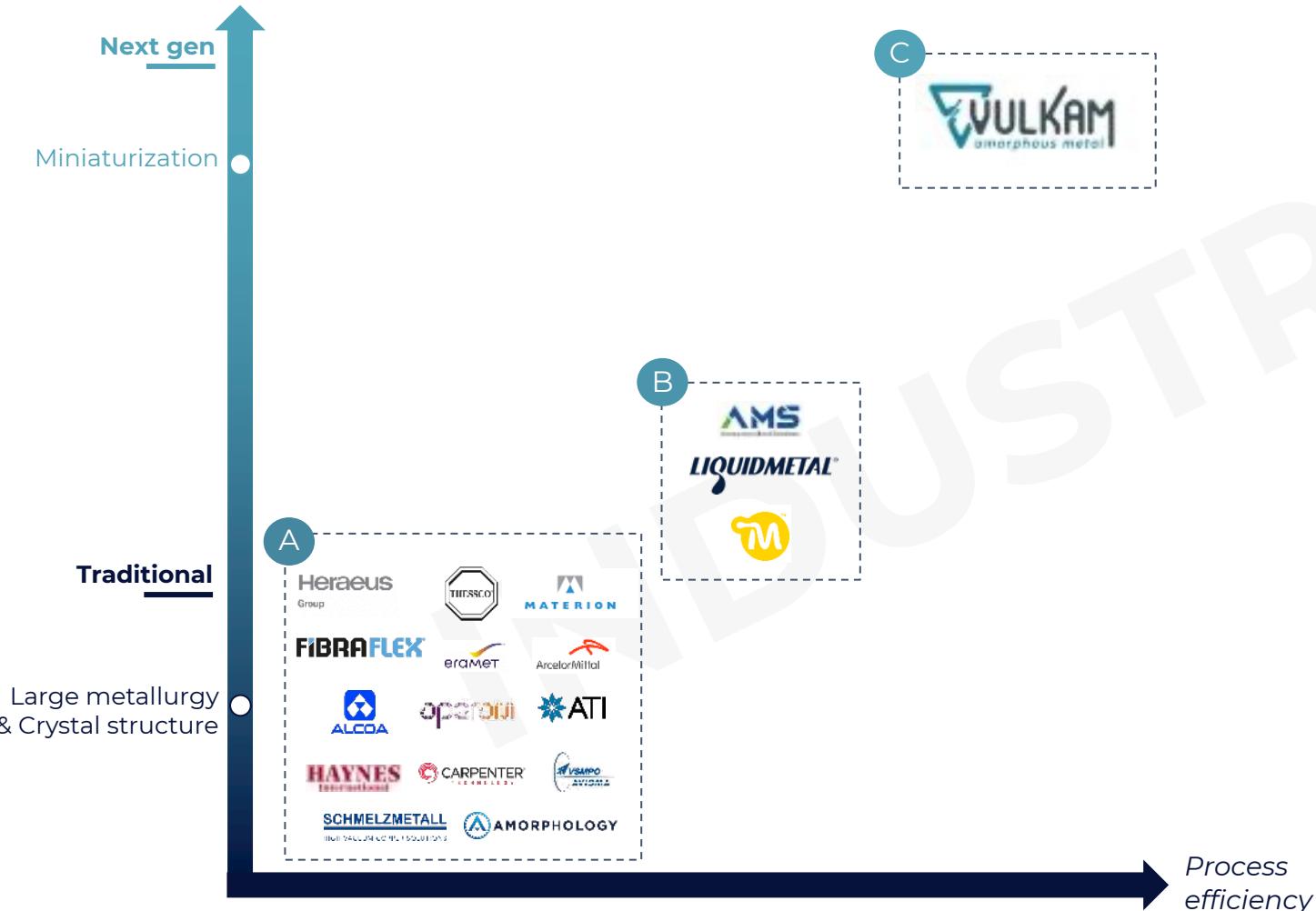
Split of Vulkam's total addressable market per industry



Vulkam's technology **can address a multitude of industries** in which there are **countless applications**

- 1 Prototyping phases have been carried out, and **components that are replaceable by amorphous alloys have been identified**
- 2 **Vulkam is exploring all the possible applications**, and is currently working on industrial qualification
- 3 **Research and partnerships have started**, to define and expand the range of applications identified so far

Vulkam has a **unique standing** on the market



Traditional players

which are using **old methods**, and start to produce **low quality amorphous alloys**

Specialists

with patented and new industrial processes compatible with only **a limited range of alloys**

Molding processes are **not optimized** to minimize waste and costs

Vulkam

works with patented process allowing to produce **complex geometry** in a **reduced number of steps**

High-purity alloys allowing to recycle waste into new billets, optimizing **added value & reducing** fabrication costs

Vulkam amorphous alloys are a game changer

Vulkam		Material & properties improvement			Process improvement		Competition
Medical instruments	Zr med	3x More resistant	4x More elastic without brittleness	More precise miniaturized surgical instruments	1 Forming step for a complex 3D shape	Limiting manual operations in the process	316L SS
Medical implants	Nb Med	3x More strength	2x More fatigue resistant	Improved durability not yet available on the market	Miniaturization Of the implant	Higher comfort for patient and surgeon	Titanium alloys
Luxury & watch case	Zr Inox	2x Easier to polish	3x More scratch resistant	More durable product for a better aesthetic	5x Less raw metal used in the industrial process	A limited environmental impact with reduced cost	Stainless steel
Space	Ni	2x More deformable	2x Stronger and lighter	More durability and better low temperature resistance	Miniaturization Of the components	Lower total weight reducing energy requirements	15-5PH SS or TA6V

Vulkam is the **most advanced player** on the market

Company	 VULKAM amorphous metal	Heraeus ⁽¹⁾ 	 MATERION	 AMS ⁽¹⁾ 	 AMORPHOLOGY ⁽¹⁾ 	 LIQUIDMETAL ⁽¹⁾ 	 M ⁽¹⁾ 
Creation date	2017	1850	1931	2020	2014	1987	2010
End-markets to date	Cross-sector	3D impressions and injections	Primary alloys	Luxury and aerospace	Robotic and aerospace	Medical, aerospace and telephony	Medical, robotics, luxury
Products	Full range of amorphous components	Finished components	Amorphous preforms	Intermediate size parts in various alloys	Gears / Flexspine	Injected parts (>10g)	Amorphous components
Innovation type	Material & process	Material	Material	Process	Process	Process	Process

Key differentiators

	Mat.						
Wide alloys range with improved properties & purity	✓	✗	✗	✗	✗	✗	✓
Innovative processes for the highest components quality	✓	✗	✗	✗	✗	✓	✓
Strong IP throughout the industrial value chain	✓	✗	✗	✗	✓	✗	✗
Proprietary machines for high entry barriers	✓	✗	✗	✓	✗	✗	✓
Internalizing all high-value production steps	✓	✓	✗	✓	✗	✗	✗
Optimized shaping process lowering production costs	✓	✗	✗	✗	✗	✓	✗
Sprue-cutting recycling lowering production costs	✓	✓	✓	✓	✗	✗	✗

Vulkam's success leans on **unique key features**



offers **high-quality components** made from **amorphous alloys**, answering the **unaddressed issues of high-value industries**



Patented platform

Patented process and alloys, with proprietary machines



Market reach

Improved agility in R&D and production process to address numerous verticals



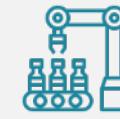
Competitiveness

Low fabrication costs for competitive price and high margins



Market approval

Partnerships enabling the elaboration of products meeting the industries expectations



Efficiency

Optimized process to reduce waste in fabrication

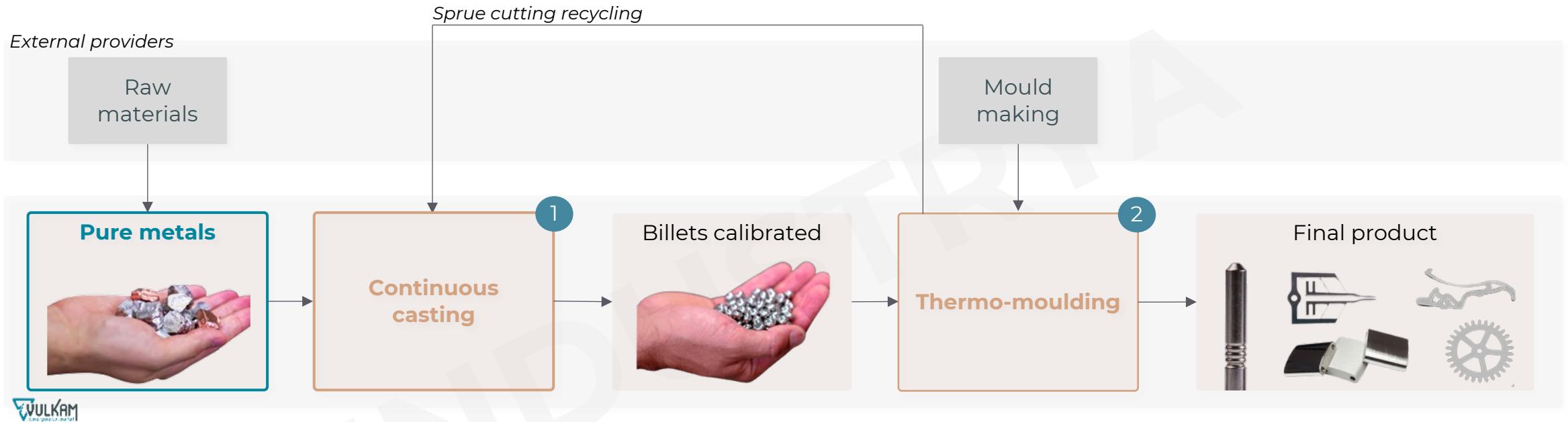


Range of alloys

Wide range of alloys to address the needs of each use case requirements

Material and process innovation

An integrated industrial platform



Vulkam's industrial capacity will lean on...

- ▶ New high-performance proprietary machines, protected by unique know-how & patents ◀
- ▶ An integrated platform with sub-processes fitting all end-markets requirements without additional cost ◀

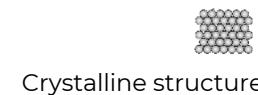


[Click here to discover Vulkam's full fabrication process](#)

Protected key steps in Vulkam's industrial platform

1 Continuous casting

Casting of calibrated billets by melting the pre-weighed raw metals



Machine developed & patented by Vulkam

- Proprietary unique technical know-how** on the mix of raw metals to achieve optimum properties adapted to each industry-specific use case
- ▶ **No material waste** and no cutting needed
- ▶ **Billets caliber adjustable** depending on the size of the final product
- ▶ High quality atmosphere **limiting impurities and enhancing recycling**



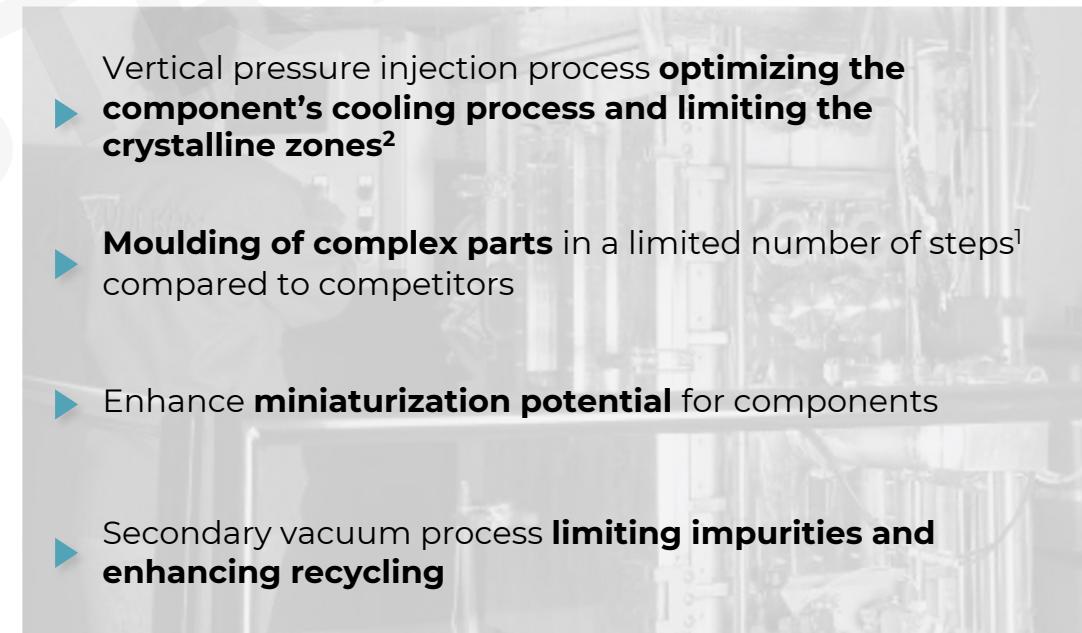
2 Thermo-moulding

Injection moulding and transformation of the primary alloy into amorphous alloy



Machine developed & patented by Vulkam

- ▶ Vertical pressure injection process **optimizing the component's cooling process and limiting the crystalline zones²**
- ▶ **Moulding of complex parts** in a limited number of steps¹ compared to competitors
- ▶ Enhance **miniaturization potential** for components
- ▶ Secondary vacuum process **limiting impurities and enhancing recycling**



Agile moulding process adapted to industries needs



Dental implant¹

“Net-shape” thermo-moulding

Obtaining the final geometry directly by thermo-moulding

- ▶ **No further industrial action** required
- ▶ After quality control and sprue cutting, the component can be **delivered directly to the customer**



Watch case¹

“Near-net-shape” thermo-moulding

External partner



Obtaining the final geometry requires two industrial steps

- ▶ **A preform, the closest to the final geometry**, made by thermo-moulding
- ▶ **Preform machining** to get final geometry



Watch movement¹

“2D microcomponents” laser

External partner & co-ownership patent



Obtaining the final geometry requires several industrial interventions

- ▶ **A standard preform** obtained by thermo-moulding
- ▶ **Thickening and laser machining steps** to create the final geometry



Surgery needles¹

“3D micro-components” thermo-moulding

External partner



Obtaining the final micro-components geometry two industrial actions

- ▶ **The micro-components** is obtained by thermo-moulding
- ▶ The components are then **machined at the margin to obtain** the final thickness

A pre-industrial pilot illustrating production capacity

Since 2021, the industrial pilot is **operational**

Continuous casting

1.5kg

Alloy transformation capacity
into billets per day

34k

Maximum billet production
capacity per year

Thermo-moulding

1-10

Moulded components per 1.3
minute

78k

Maximum components
production capacity per year



- ▶ **Bespoke in-house developed industrial machinery** for the two core steps of Vulkam integrated platform
- ▶ **Protected technology** ensuring high entry barriers for competitors
- ▶ **Combining automated machinery & short injection cycle times** for an optimized pre-industrial platform

Leveraging on Vulkam's know-how **to scale capacities**



Volume capacity of each industrial line in number of parts

	Jun-24	2025	2026	2027	2028
France	Factory 1	200k	450k	2,600k	5,100k
	Factory 2	-	-	-	50k
Switzerland⁽¹⁾	1 st line	10k	35k	100k	175k
Total	210k	485k	1,400k	2,775k	5,510k

Bringing proven Vulkam integrated platform to industrial scale...

+6kg

Increase of the crucible capacity of the casting machine

4x

The number of thermo-moulded components per year²

... and improving its cost-efficiency

Reaching 70% automation

through the decrease of manual intervention

Parallelising specific machines

to reduce their cost weight in the component price

Commercial traction valued at €25m with existing clients...



€25m

Potential revenue

4.5m

Potential volume

2.5x

1st line production capacity

31%

Estimated profit margin

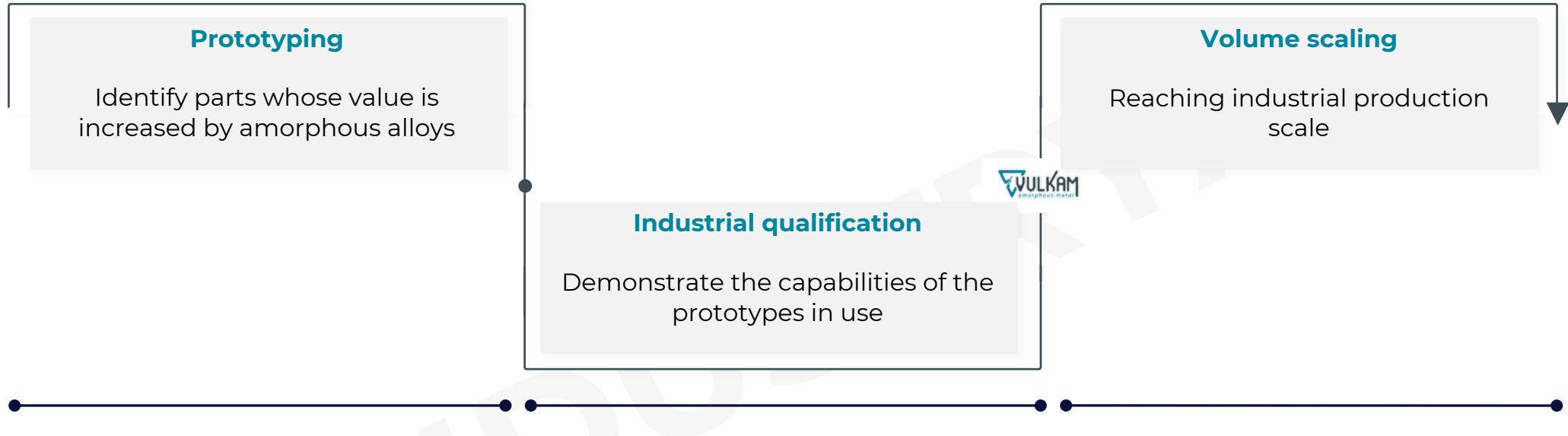
80%¹
of the 10 top Swiss Luxury Watches brand working with Vulcam

...with outstanding profit margins for Vulkam

Examples of Vulkam's commercial pipeline projects

Category	Product	Revenue ¹		Molding process	Production load associated
		Volume	€		
Luxury watches	Watch case #1	50k	€2.5m	Near-net-shape	12.5%
	Watch case #2	50k	€0.3m	Net-shape	12.5%
Luxury watches	Variable thickness spring	200k	€0.6m	“3D micro-components” thermo-moulding	4%
	Lever spring	6k	€0.3m	“3D micro-components” thermo-moulding	0.4%
Medical instruments	Surgery needles	800k	€1.2m	“3D micro-components” thermo-moulding	10%
	Surgery clamps	200k	€1.2m	Near-net-shape with overmoulding	9%
Medical implants	Dental implant	50k	€1.0m	Net-shape	4%

Customers are banking on Vulkam's industrial scale



9

Customers in the luxury watches and medical sectors are waiting for Vulkam to reach the industrial scale



€9.5m

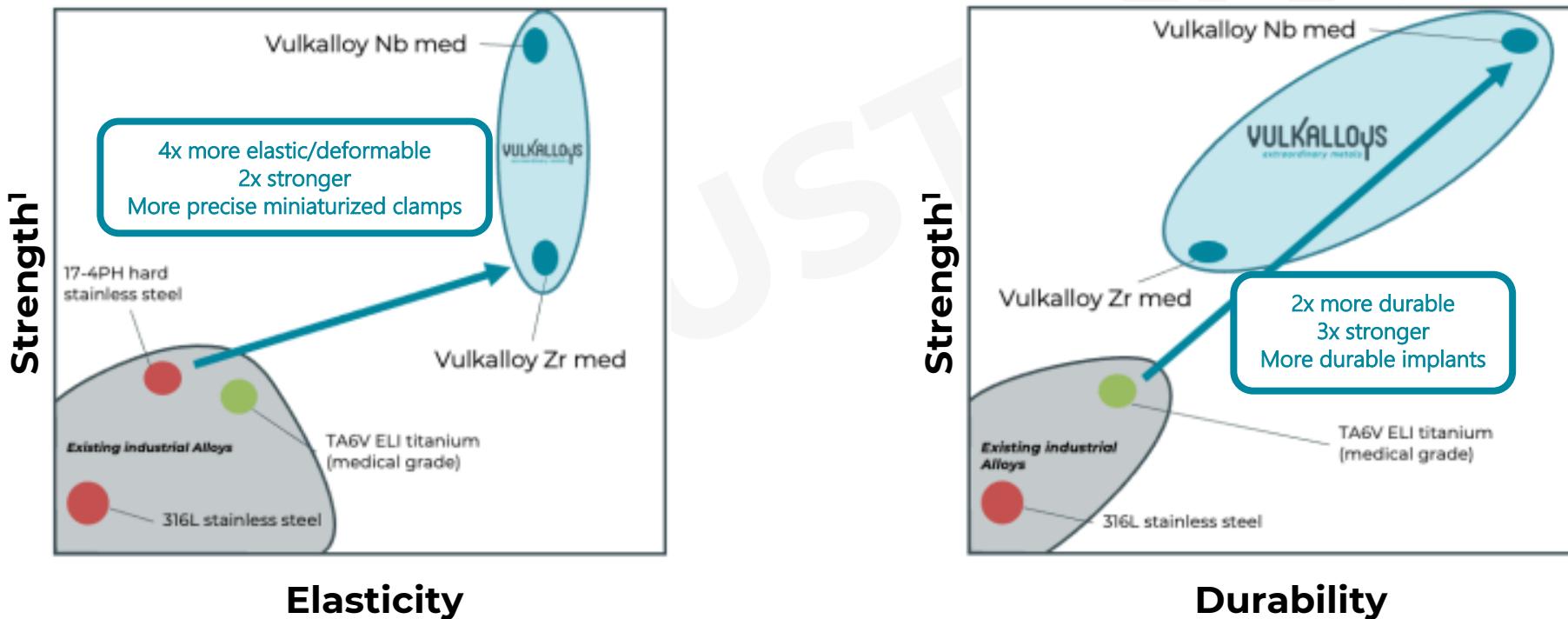
Estimated revenue to be quickly converted

A clear path to the widespread use of Vulkam products



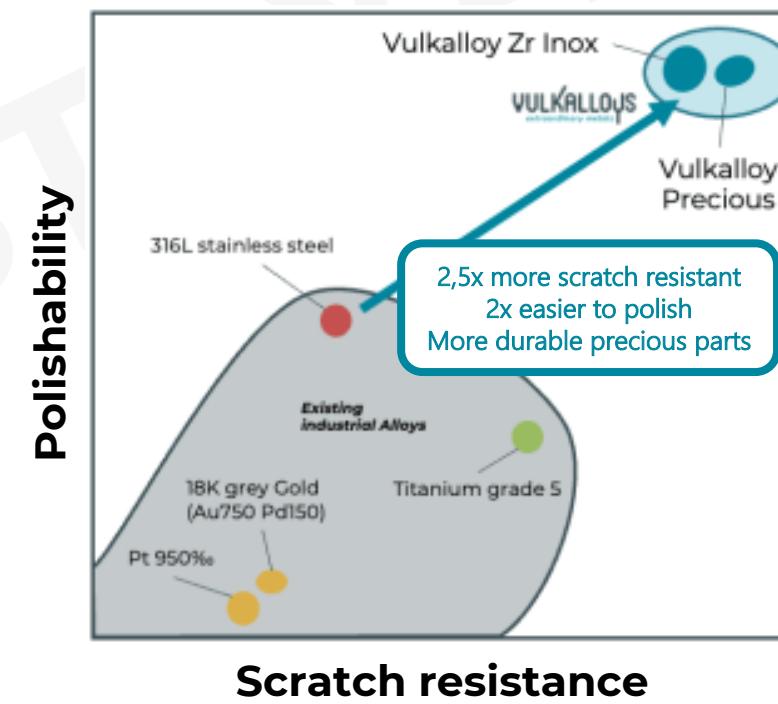
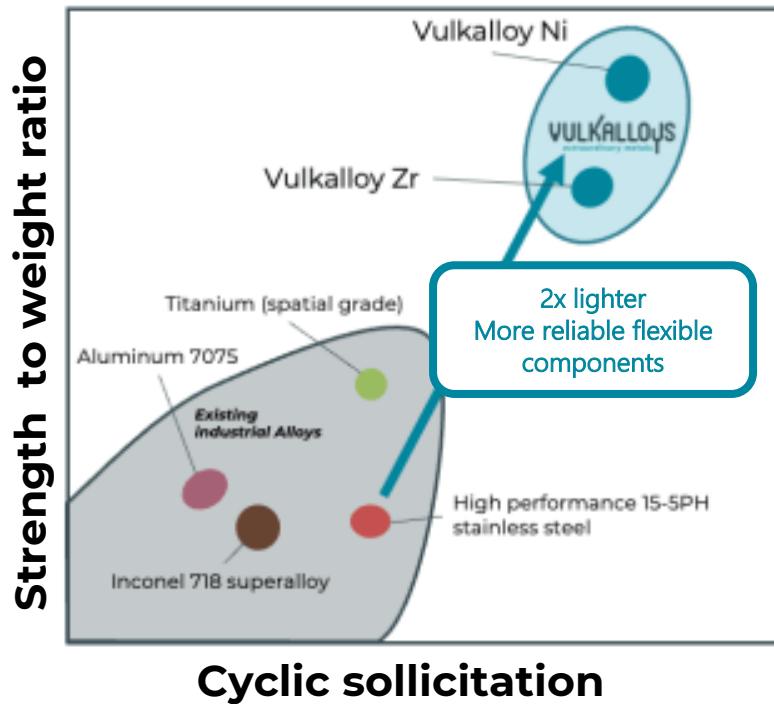
Answering **underserved problematic**

Offer components with **a unique combination** of physical properties, size, and geometry
Corrosion resistant - Biocompatibility – Strength – Elasticity



Facing **new challenges** and creating **premium products**

Facing issues on components **downsizing vs. steady resistance**, and working on **clients brand image improvement**
Durability - Mechanisms - Aesthetics



Vulkam's alloys **applications** in main industries

Luxury watches



Name: Toggle spring

Alloy: Vulkalloy® Ni

Description:

Holds the toggle in position

Technical problem

Various machining steps resulting in material loss and high prices

Vulkam's answer

3D micro-thermomoulding for close-to-the-core manufacturing

Components are not resistant enough

Twice the mechanical strength and friction resistance of crystalline alloys

Current crystalline component are expensive to use for the watchmaker

Price divided by three while preserving high margin for Vulkam

Medical equipment



Name: Suture needles

Alloy: Vulkalloy® Nb-Med

Description:

Micro-suturing operations

Technical problem

Diameter difference between needle and suture string is a key problem

Maximizing the flexibility would fragilize the needle

Vulkam's answer

3D micro-moulding to mould the part in one step not performing a machining step that could break the part

The flexibility and resistance with amorphous alloys is higher than with crystalline structure

Space industry



Name: Flexibles Pivots

Alloy: Vulkalloy® Ni

Description:

Rotation guidance

Technical problem

Traditional metals cannot withstand the extreme space environment

Further miniaturization of parts without additional fragility

Vulkam's answer

Increasing low temperature resistance with optimum metal alloying

Improved strength-to-weight ratio allowing to miniaturize a component for equal resistance

A strong IP structure protecting key industrial steps

Exclusive licensing with the UGA¹

Process

► Family 001 - Demoulding process

Local cooling process to eject the part at the end of the moulding process without altering its physical characteristics

► Family 002 - Injection process²

Vertical injection process of metal heated by induction coils for industrial production

► Family 003 – Metallic billets²

Billets manufacturing by casting, with specific adaptable size

Owned patents

Process

► Family 004 – Micro-moulding

Sacrificial insert moulding process to produce very small components with high precision utility

► Family 005 - Laser cutting³

Protect the femtosecond laser machining of low thermal stability amorphous alloys parts, including Vulkalloys

► Family 006 - Electrical discharge machining

Local cooling process to eject the part at the end of the moulding process without altering its physical characteristics

► Family 009 – Injection machine

Protect innovation for the injection machine increasing the production pace

Alloys

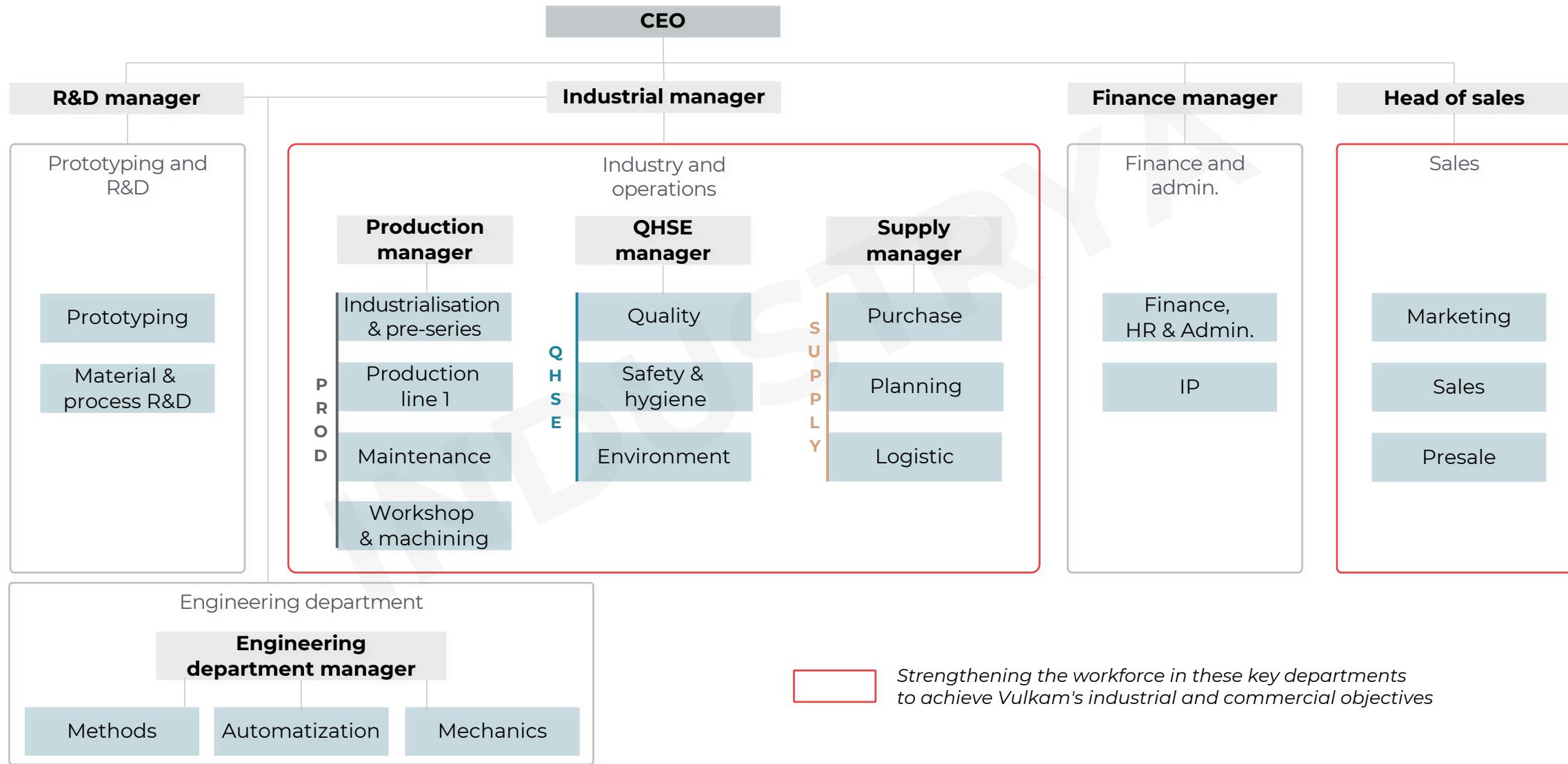
► Family 007 – NiNbCu Alloy

Excellent alloy for medical and watchmaking applications

► Family 008 – Zr Med Alloy

Excellent alloy for medical, especially instruments miniaturization

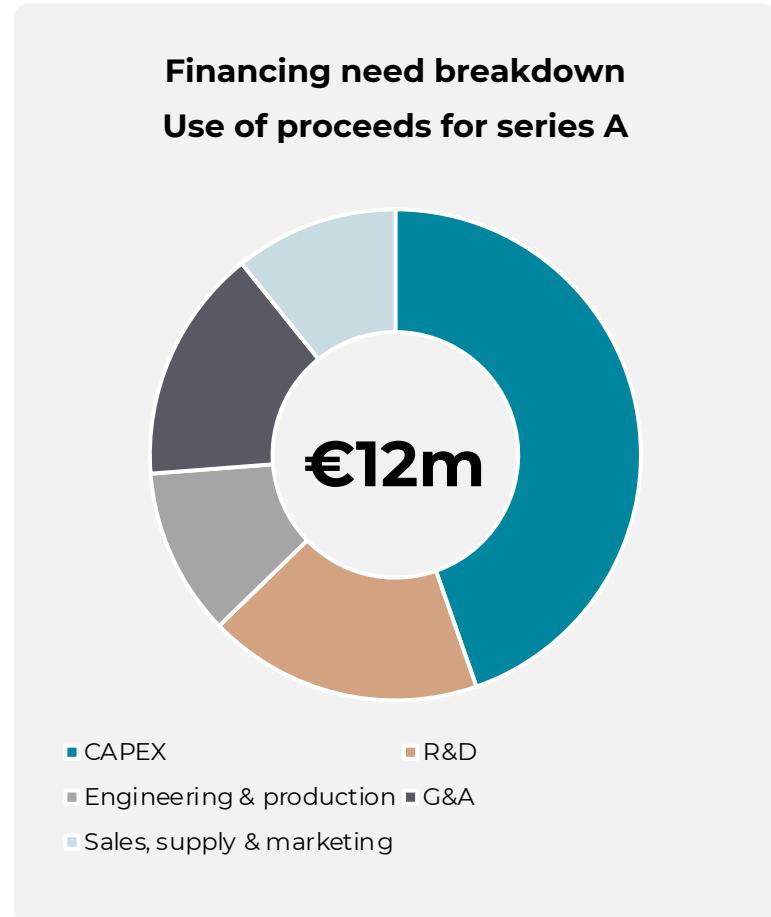
Consolidating a **highly-skilled industrial team** in 2024



Vulkam's detailed consolidated P&L

	2023	2024	2025	2026	2027	2028	2029	2030
Metrics (k)								
Volume	n.a.	140	411	1,360	2,680	5,270	8,515	11,525
P&L (k€)								
Revenue	447	2,021	6,148	14,446	30,109	62,267	101,617	137,631
Direct costs	(224)	(826)	(2,398)	(5,380)	(10,593)	(20,191)	(31,994)	(40,898)
Direct payroll	(153)	(558)	(808)	(1,494)	(2,381)	(5,316)	(8,536)	(14,356)
Contributive margin	70	638	2,942	7,572	17,135	34,569	54,967	69,913
% of revenue	16%	32%	48%	52%	57%	56%	54%	51%
R&D	(1,070)	(1,060)	(1,319)	(1,785)	(2,547)	(3,226)	(4,712)	(5,547)
Engineering	(171)	(237)	(249)	(381)	(598)	(763)	(980)	(1,232)
Sales	(171)	(365)	(654)	(906)	(1,240)	(1,640)	(2,220)	(2,857)
Supply	(45)	(47)	(131)	(160)	(293)	(496)	(748)	(1,095)
Marketing	(60)	(439)	(449)	(505)	(831)	(950)	(1,400)	(2,000)
G&A	(1,038)	(1,256)	(1,464)	(1,912)	(2,818)	(3,997)	(5,227)	(6,408)
EBITDA	(2,484)	(2,766)	(1,323)	1,924	8,809	23,497	39,680	50,774
% of revenue				13%	29%	38%	39%	37%

Funding needs & use of proceeds



- 1 **CAPEX – 45%**
Investment of €16m in the first industrial production unit in Grenoble, and in its ramp up through the successive opening of new industrial lines
- 2 **R&D – 18%**
Development of new alloys and improvement of processes and machines to meet the growing performance needs of customers, while protecting these innovations through intellectual property
- 3 **Engineering & production – 11%**
Develop teams to support production rates
- 4 **Sales, supply & marketing – 11%**
Strengthening of the teams to enable the deployment of Vulkam in new sectors and to consolidate its position in its existing sectors

Vulkam's innovations are valued by cutting-edge industries



Surgery needle

"Needles with a 1:1 ratio of thread to needle represent the holy grail of suturing. Vulkam is the only global company capable of industrializing this solution and represents a strategic partnership for our group."

Sales Manager, Medical Manufacturing Company

"When it comes to luxury, providing a durable product is always a top priority for brand image. It's difficult to apply high price to customers and to end with a scratched watch 2 month later..."

Director, Top Luxury Watches Group



Watch bracelet links



Flexible pin

"When you launch something in space, you'd want it to be able to run quite a while. And of course every gram gained is a win so it's both a matter of reliability of the mechanical behavior during lifetime and a matter of weight saving."

Director, CNES Comet

... and by **partners** as well



" My numerous exchanges in this field confirm the immense potential of amorphous alloys for watch movement parts. In this context, the patent and the joint developments we have with Vulkam are very structuring for the future of our company. "

Sales Director, Manufacturing Laser Company

"The first tests and sharing of experience with major companies in the high-end luxury watches industry have only confirmed the potential of this partnership. A volume of 1 million pieces by 2027 is targeted."

Managing Director, Industrial Company



Microgripper for medical clamps

Vulkam is ISO certified for regulated markets



Jan-2023 – Obtaining the ISO13485 standard

The ISO13485 in few words

Demonstrates that the company **takes into account customers' requirements, the regulations in force** and the ability to **grasp new technologies and market opportunities** related to **medical devices**

Vulkam is now considered as ...

... a key subcontractor for the production and marketing of amorphous metal alloys for the instrumentation and production of miniature parts in the medical field, which require biocompatibility

Understanding **key points on materials**



Metals

A **naturally crystalline material** made up of metallic elements and characterised by high thermal and electrical conductivity and deformability.

Nickel
Copper
Niobium

Titanium
Iron
Zirconium

Alloys

Product obtained by **mixing several metallic elements**, naturally as a crystalline structure

Amorphous Alloys – opposed to crystalline

Alloy characterized by **a disorganized structure**, inducing particular physical/mechanical properties and obtained by specific manufacturing processes



avolta

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Avolta

With 100 deals executed for €2bn in total over the last 7 years, Avolta is one of the most active Tech M&A advisors in Europe. Based on this expertise, Avolta's team of 20 people has maximised the value of each and every deal in terms of valuations and overall conditions – this due to its time-tested sectorial methodology and expert negotiating skills.

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