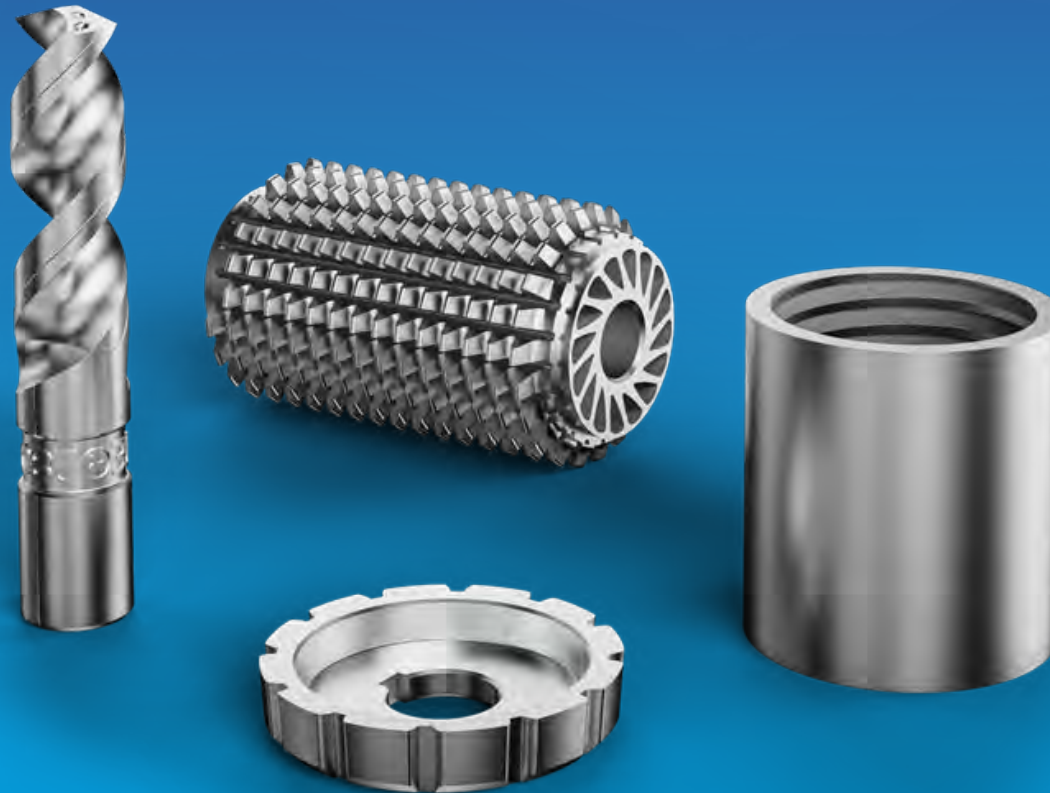


# *VBN Components Company Presentation*

*Metals with unique wear resistance - by 3D printing*

[www.vbncomponents.com](http://www.vbncomponents.com)  
T: +46 18 240 760  
E: [info@vbncomponents.com](mailto:info@vbncomponents.com)



**VIBENITE®**

Redefining  
wear resistance

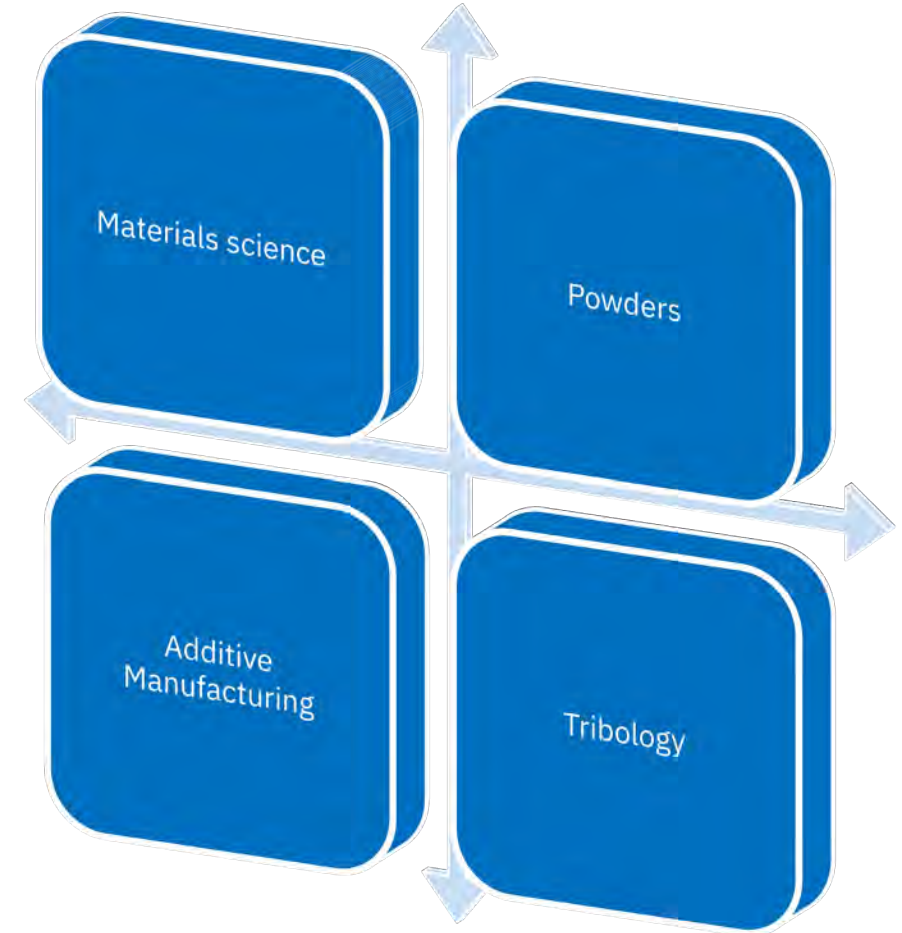
**VBN**  
COMPONENTS

# The core of VBN

- Alloys with improved properties through AM\*
- Development of the Vibenite® alloys
- Deep knowledge in materials science
- AM production unit in Uppsala, Sweden
- Extensive research in tribology\*\*
- Word-wide export of wear resistant components
- Sustainable production and optimum material usage
- Wide experience in powder manufacturing
- AM experience since 2008

\* AM = Additive Manufacturing = 3D-printing = Free forming

\*\* = The Science of wear and friction of materials



# Internal production capabilities



Electron Beam Melting (EBM)  
Powder Bed Fusion



HIP and Uniform Rapid  
Quenching Equipment






Workshop and powder  
handling equipment

# VBN

COMPONENTS

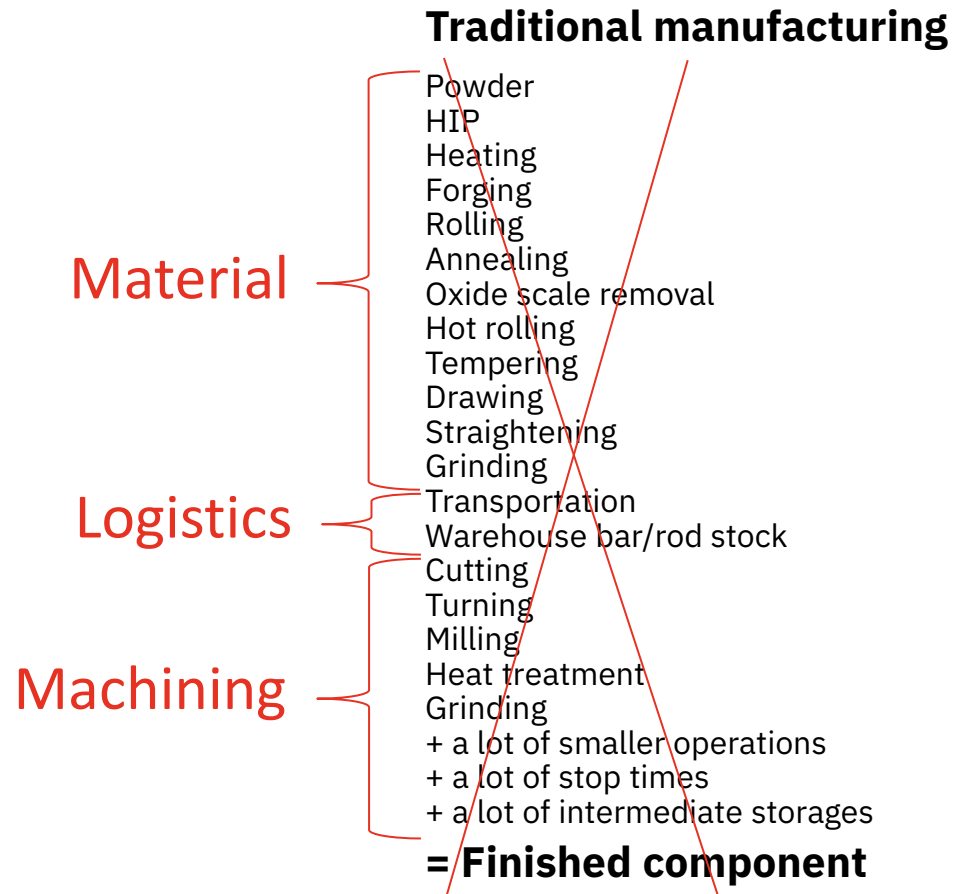
VBN Headquarters, Uppsala, Sweden

-  Sales Partners
-  License Customers
-  Delivered Parts by country

*Worldwide partner and delivery network*



# Why 3D printing of wear resistant metals?



## VBN Components' manufacturing

Powder  
Additive manufacturing  
Heat treatment  
Grinding  
= Finished component



Shaper cutter in Vibenite® 280 Optimum 70

# The Vibenite® material group

High-speed  
steels

**VIBENITE® 150**

Toughness and wear resistance

~7% carbides

Hardness of 55-63 HRC

**VIBENITE® 280**

Excellent combination hardness - toughness

~20% carbides

Hardness of 63-70 HRC

**VIBENITE® 290**

Extreme wear resistance

~25% carbides

Hardness of 68-72 HRC

Now 75.5 HRC

Corrosion-  
resistant  
steel

**VIBENITE® 350**

Corrosion AND wear resistance

~20% carbides and nitrides

Hardness of ~60 HRC

Hardmetal

**VIBENITE® 480**

Hybrid carbide metal – Heat, corrosion and  
wear resistance

~65% carbides

Hardness of 66-70 HRC

hardness

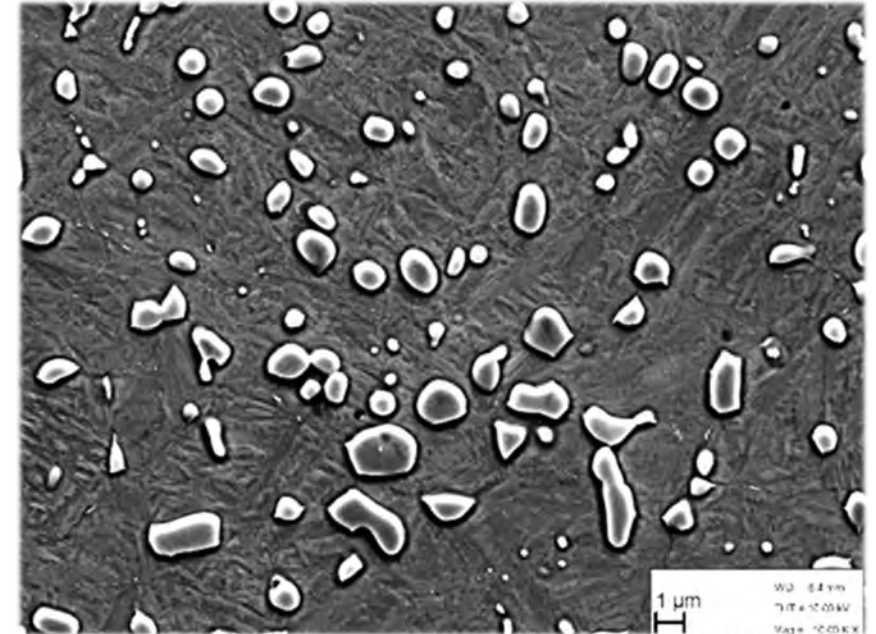
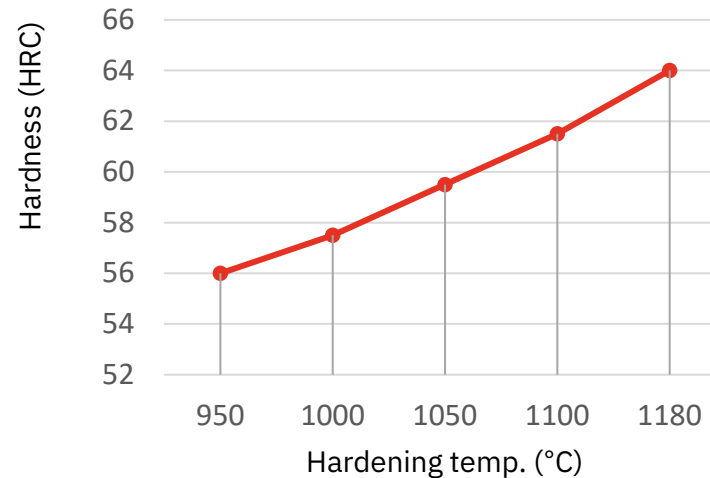
# Vibenite® 150

Hardness 55–64 HRC.

Fine microstructure with fine and wear resistant carbides -  
> unique combination of toughness and wear resistance.

Very high fatigue resistance.

High performance, wear resistant Multi-purpose material.



**Microstructure**

C	Cr	Mo	W	V	Fe
1.5	4.0	2.5	2.5	4.0	Bal

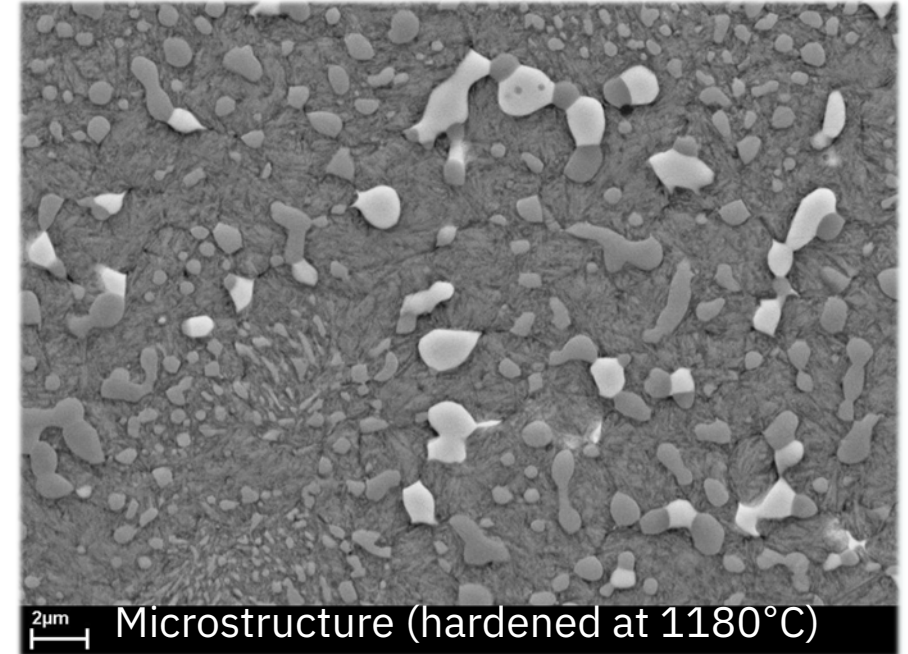
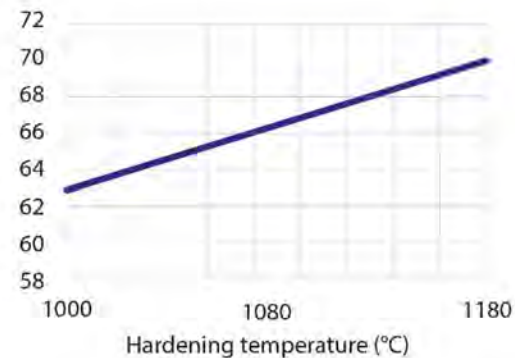
**Composition**

# Vibenite® 280

- High strength, high hardness and very high wear resistance.
- Hardness:
  - 63-70 HRC traditional hardening
  - 72 HRC (1100 HV) in URQ-HIP-hardening
- **Fine** microstructure with high volume of fine carbides => high toughness.
- High hot hardness and uniformity.

Hardness HRC <sup>(1)</sup>	63-70 HRC
-----------------------------	-----------

<sup>(1)</sup> = Depends on hardening temperature, see graph.



Fe	C	Cr	Mo	W	Co	V
Bal.	2,30	4,2	7,0	6,5	10,5	6,5
<b>Composition</b>						



# Vibenite® 290

The world's hardest commercially available steel grade.  
Released in November 2017.

Hardness:

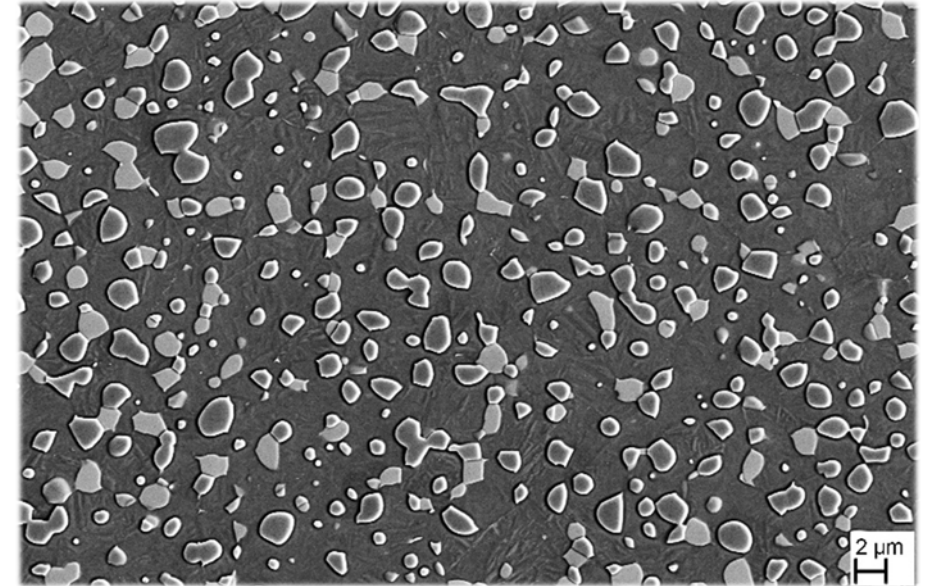
68–72 HRC traditional hardening

75.5 HRC (1240 HV) in URQ-HIP-hardening.

Fine microstructure with high volume (~25vol%) of very fine carbides.

Extremely high hot hardness and uniformity.

Can replace cemented carbides in several applications.



Microstructure (hardened at 1180°C)

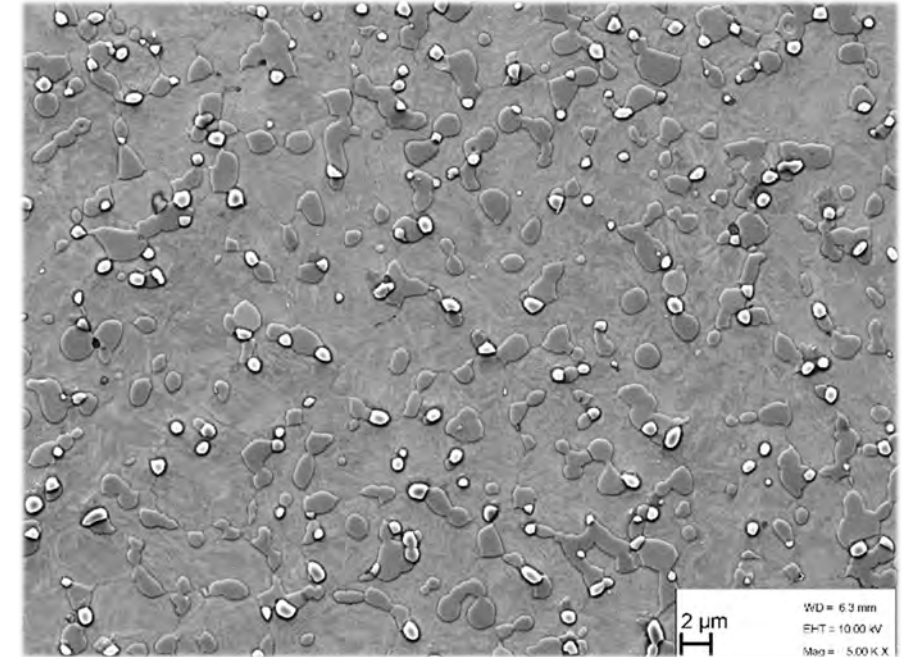
Fe	C	Cr	Mo	W	Co	V
Bal.	2,50	4,0	5,0	11,2	16	6,3
Composition						

Please note that we leave no guarantees, these are just indications of what we have measured. There are no "correct" Vickers to HRC conversions. Different indentation loads give different results in a multiphase material.

# Vibenite® 350

Very wear resistant and stainless material. ~60 HRC.

Fine microstructure with fine carbides in a chromium rich martensitic stainless matrix => excellent properties.



**Microstructure (hardened)**

C	Cr	Mo	V	Fe
1.9	20	1.0	4.0	Bal

**Composition**

# Vibenite® 480

The world's first commercial, 3D printed cemented carbide (patented).

Hardness:

66 HRC (160µm layer thickness)

70 HRC (50µm layer thickness)

Carbide content: ~65%

Extremely high hot hardness

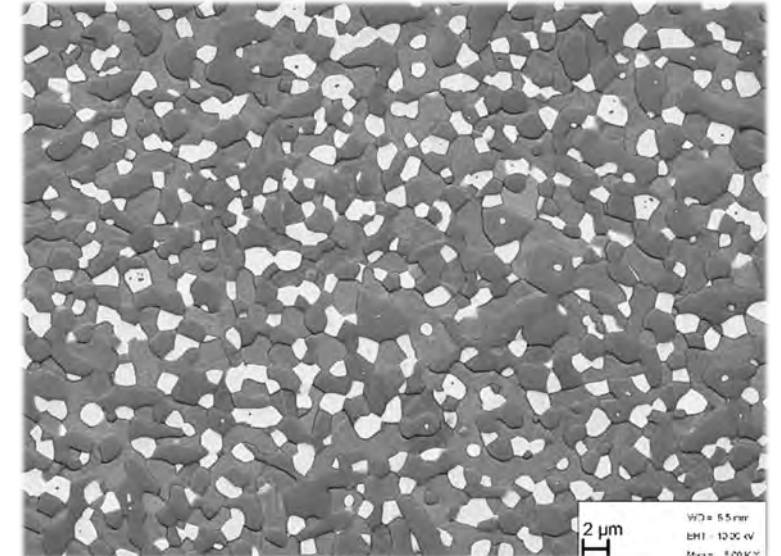
High wear resistance

The first alloy in a new group of materials called *Hybrid Carbides*.

The hybrid carbide combines toughness from high-speed steels and high hot hardness from carbides.

Does not require binders and sintering and is therefore not “cemented”.

Also possible to 3D print in laser-PBF (using heat stage about 650–700°C)



Microstructure

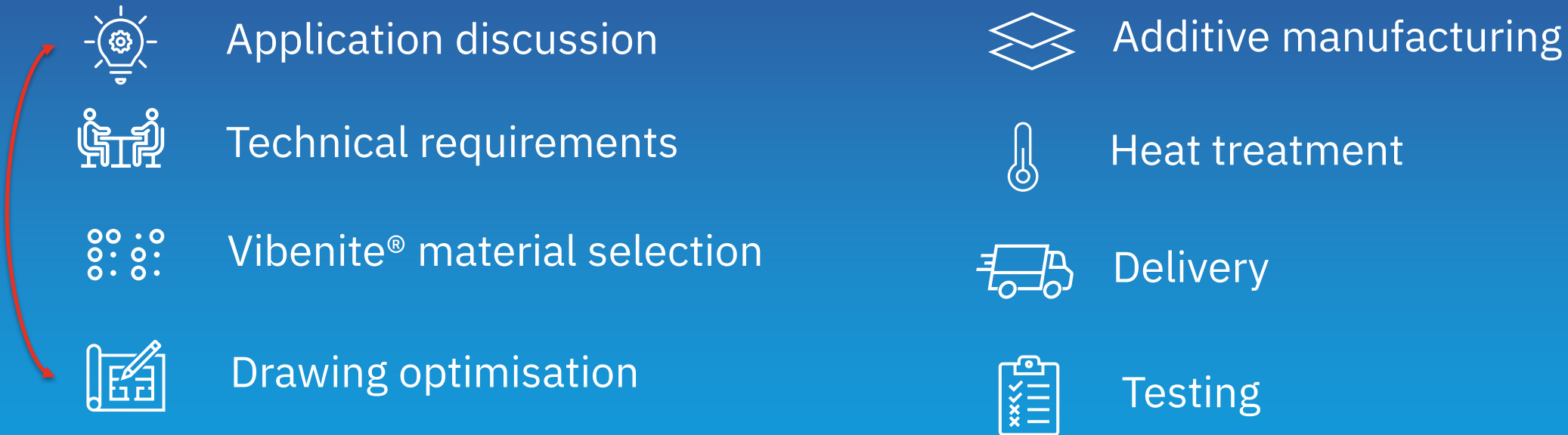
C	Cr	W	Co
3.6	20.5	22.5	Bal

Composition

# Unlocking success with VBN Pre-Studies



Maximise the performance and lifespan of your components by starting with our tailored pre-studies.



*Typical delivery time: 2 - 8 weeks*

# From Pre-study to serial production



Pre-study



Optimise for  
production



Low-volume serial  
production



Licensing / customer  
manufacturing

# Get in touch to learn more!



The defence sector requires reliable, high-performance materials that can withstand extreme conditions during operation. VBN can enhance combat capability with materials that are extremely resistant to wear and heat. These materials are also easily shaped using additive manufacturing, a production method that facilitates the creation of durable yet lightweight structures.

Vibenite<sup>®</sup> materials exhibit excellent fatigue resistance and are exceptionally clean. Their microstructure contains very fine, well-dispersed carbides that afford the materials uniform hardness. Vibenite<sup>®</sup> is suitable for engine and vehicle components as well as armour and other applications with specific requirements when it comes to wear, heat, fatigue, or complex geometries. Order your parts on-demand with short lead-times, design flexibility and rapid product development.

[www.vbncomponents.com](http://www.vbncomponents.com)

T: +46 18 240 760

E: [info@vbncomponents.com](mailto:info@vbncomponents.com)

