

ERASTEEL

HIGH-SPEED STEEL POWDER METALLURGY

HIGH-PERFORMANCE SOLUTIONS
FOR HIGH-END TAPS







Erasteel, your solution provider and partner of choice for the tap market

End users of **high-performance taps** require long tool life and high-performance when cutting difficult materials. Longer tool life facilitates mass production of parts reducing the need for frequent and time-consuming tool changes.

The challenge for tap manufacturers is therefore to **select the appropriate grade that will meet these requirements with an optimized Total Cost of Ownership (TCO)**. This can be achieved with a Powder Metallurgy High-Speed Steel grade that has a good grindability, as grinding operations account for a large portion of the costs involved in tap production.

CUTTING TAPS

FORMING TAPS

THREAD MILLS



SPIRAL FLUTE



SPIRAL POINT



STRAIGHT FLUTE



Erasteel, the only player in the world dedicated to High-Speed Steels and the market leader in Powder Metallurgy, has developed **customized solutions for the specific requirements of high-end taps production** through:

A PREMIUM RANGE OF POWDER METALLURGY HIGH-SPEED STEEL GRADES



A range specially developed for taps

BlueTap®Co
BlueTap®Max



Grades well suited for taps

ASP®2015
ASP®2023
ASP®2030

ASP®2052
ASP®2055
ASP®2060

BlueTap® and ASP® grades, the perfect solution for the high-performance taps!

BlueTap®Max - patent application filed



Why are Powder Metallurgy High-Speed Steels the best solutions for your taps?

A UNIQUE PROCESS FOR UNIQUE PERFORMANCE

Both **ASP®** and **BlueTap®** signify that the High-Speed Steel has been produced through a **Powder Metallurgy route**. This entails that the material has been **atomized** into a fine powder at our Erasteel plant in Söderfors and **compacted** into a 100% solid body of ASP® or BlueTap® by a method called Hot Isostatic Pressing (HIP).

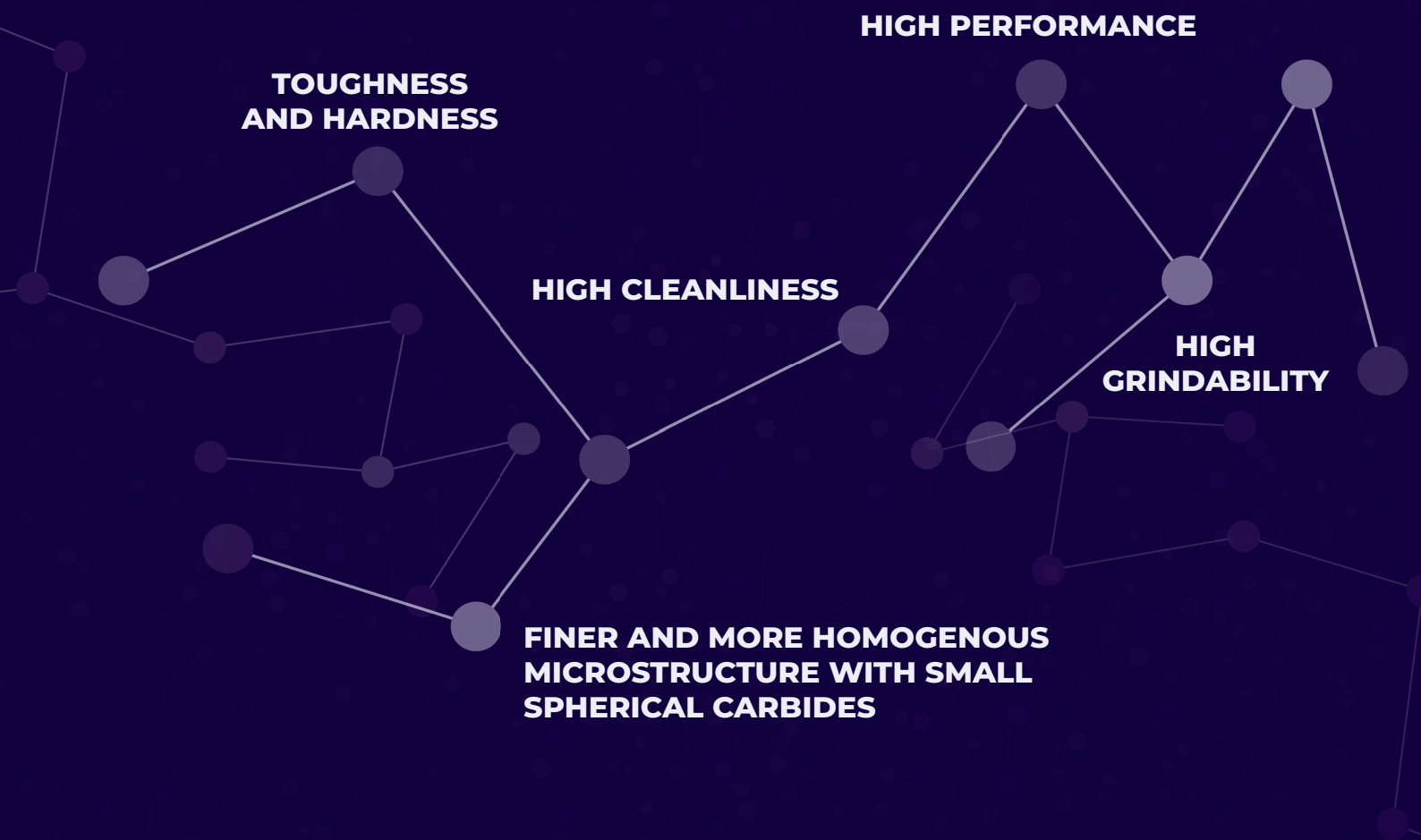


The material is then transformed by **forging, rolling** and **drawing** to required dimensions.



The **benefits of Powder Metallurgy High-Speed Steel** has long been known and appreciated by tap producers and end users.

A **large portion of high-end and specialty taps is produced with our ASP® and BlueTap® grades**, giving **unrivalled performance** to the end users and **simplifying manufacturing** for the tap producers.



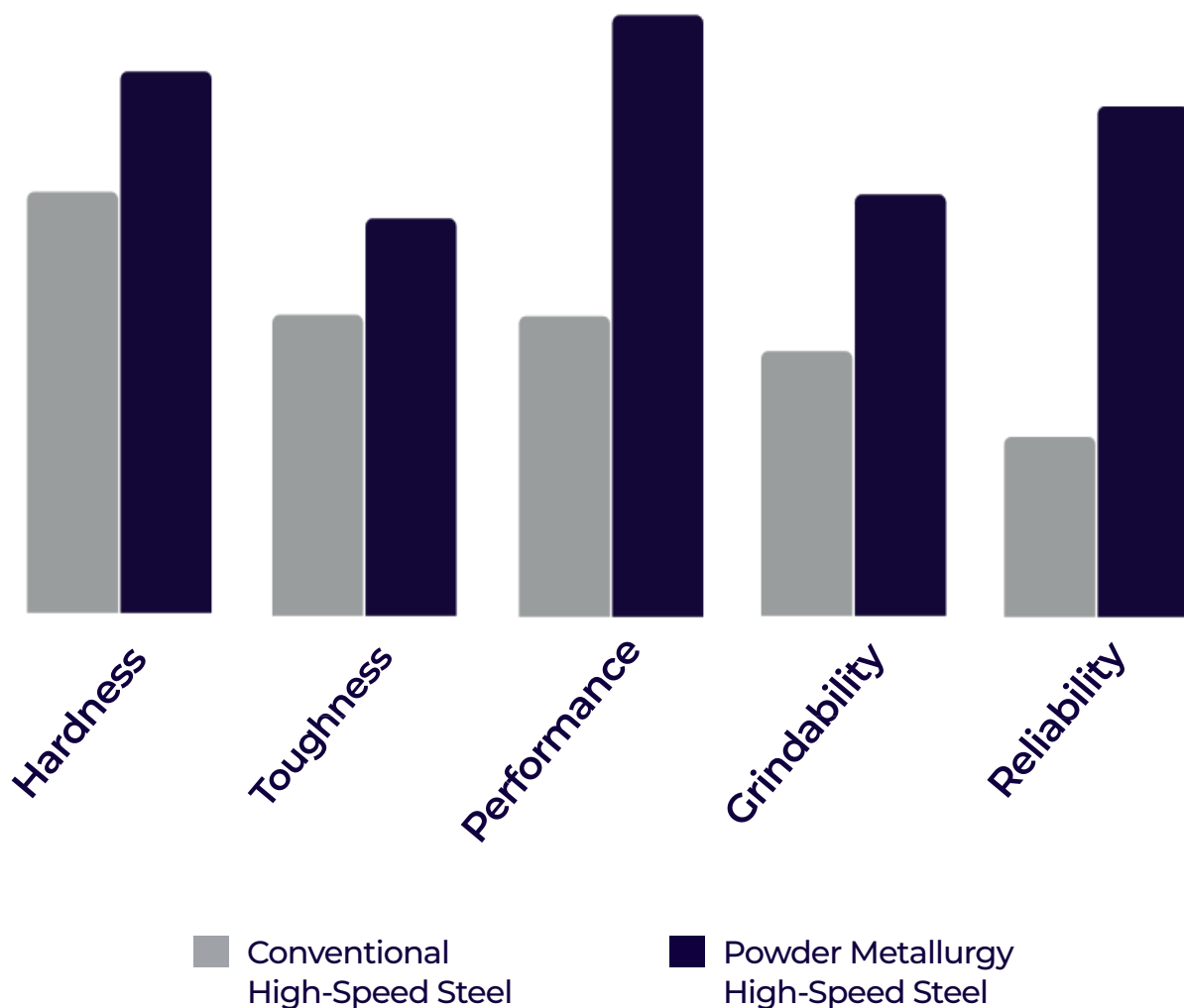
BOOSTED **PERFORMANCE** TO INCREASE PRODUCTIVITY AND DOUBLE THE LIFETIME OF TAPS

The **performance of a tap** is mainly controlled by **toughness, hardness** and **wear resistance**.

Powder Metallurgy produced material **is inherently tougher** compared to conventionally cast material due to the **homogenous microstructure**, the **small carbides** and the **high cleanliness**. This reduces the risk of sudden fractures and chipping of the cutting edges.



Some limitations on alloying are imposed for conventionally manufactured High-Speed Steel but are not relevant for the Powder Metallurgy process. This allows the use of **higher hardness** and **high alloyed grade** with **better wear resistance** which increase the **performance of taps** and their lifetime.



+125%* OF GRINDABILITY

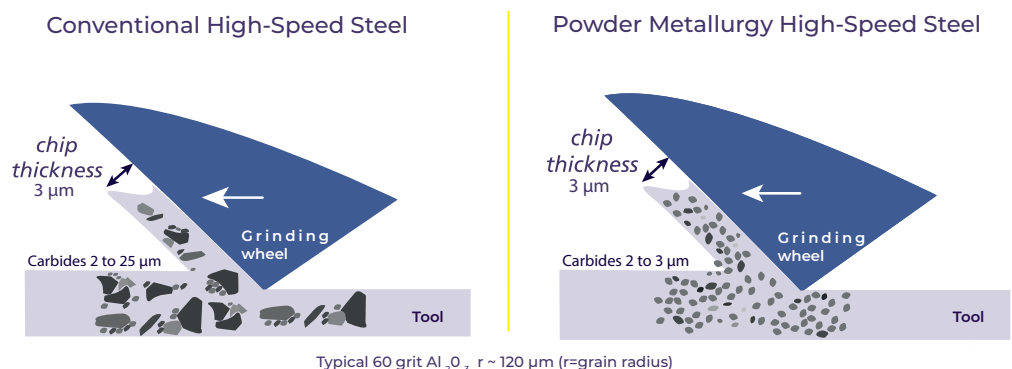
The grindability of a material defines how easy it is to grind. A high grindability indicates that the material is **easier to grind** and has **less risk of defects** being introduced during grinding such as burning the material. This also means that **fewer passes** can be made during the grinding process with **higher feed rates**.

In some cases, this can **reduce the number of roughing passes** for the flute or thread grinding of the taps **saving in production cost and time**.

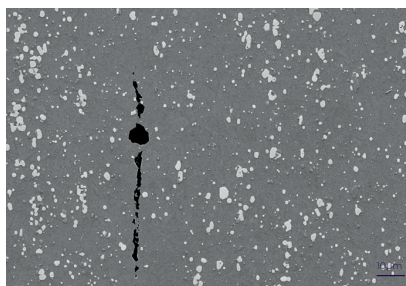
Grinding cost is a major part of the total cost for manufacturing a tap and depending on the dimension of the tool, the cost that is saved from grinding can make up for the increased material cost for Powder Metallurgy material.

The reason?

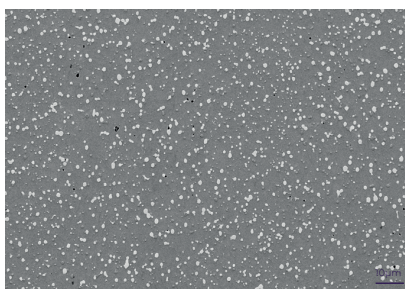
Increased grindability comes from the fact that the Powder Metallurgy process allows a finer and more homogenous microstructure with small spherical carbides



Grit, carbide and chip sizes when grinding Powder Metallurgy High-Speed Steel and conventionally manufactured steel



Conventionally manufactured High-Speed Steel with large inclusion (dark area) and larger carbides than BlueTap®



BlueTap® material with a homogeneous microstructure and high cleanliness

A RELIABILITY 10 TO 50X HIGHER** AND MORE PREDICTABLE PERFORMANCES

Tapping a hole is typically the last operation before finishing a machined part. This operation always poses a risk of completely breaking the tap inside the hole. In some cases, this means that the whole part must be scrapped in a very late stage of manufacturing.

Reliable and predictable performance is key to avoid these issues and Powder Metallurgy High-Speed Steel grades have shown to deliver this. The high cleanliness, the finer carbides and homogeneity of material produced through the Powder Metallurgy process lead to:

- fewer early failures
- more reliable tool
- more predictable performance

*E M35 vs. BlueTap®Co

**related to the reduction in number of inclusions



How to choose the best solution for each need and achieve the best performance?

When selecting a High-Speed Steel grade two main aspects are important:

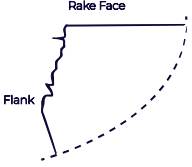
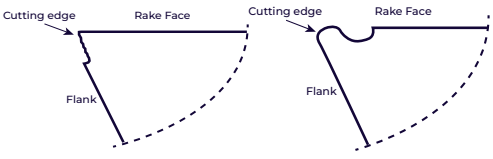
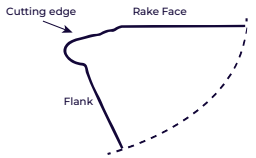
Reliability

is mostly dictated by the **homogeneity** of the steel and the **cleanliness**. When the highest reliability and lifetime predictability are needed **ASP® or BlueTap®** are the obvious choice compared to conventional High-Speed Steels.

Performance

is increased by **matching the correct grade with the given application**. Some applications require more **toughness**, while other require higher **hardness**.

The **best way to optimize performance** is to **pay attention to the failure mechanisms** the current solution is subjected to, and adjust to a new grade more optimized for the application, as shown below.

		REASON	SOLUTION
FRACTURE OR CHIPPING		The material is most likely lacking toughness	To select a tougher lower alloyed grade and a lower hardening
FLANK WEAR OR CRATER WEAR		For taps this is typically an indication of a lack of wear resistance Crater wear can also be linked to a lack of hot hardness	To select a higher alloyed grade with a higher carbide composition
PLASTIC DEFORMATION		The material does not have the required compressive strength for the work material being machined	To select a high hardness grade or heat treat the current grade to a higher hardness

When facing performance and reliability issues **it is also important to consider tool geometry, machining parameters, cutting fluids and coating**. Selecting a good tool material needs to be done in combination with these other factors.

Erasteel has developed a range of grades to meet every application and requirement

Our expert teams are here to help you choose the best solution!



GRADES	ANALYSIS %						CHARACTERISTICS
	C	Cr	Mo	W	Co	V	
BlueTap®Max	1.08	3.8	9.3	1.5	7.8	1.1	Unrivalled tap performance to TCO ratio
BlueTap®Co	0.93	4.2	5.0	6.4	4.8	1.8	Excellent grindability, and a good combination of hardness, wear resistance and toughness
ASP®2060	2.30	4.2	7.0	6.5	10.5	6.5	For both hot hardness and wear resistance
ASP®2055	1.69	4.0	4.6	6.3	9.0	3.2	2.1% Nb. High alloyed Co-grade with good grindability
ASP®2052	1.67	4.8	2.0	10.5	8.0	4.9	High W-and Co-alloyed grade for high performance cutting and good wear resistance
ASP®2030	1.28	4.2	5.0	6.4	8.5	3.1	Co-grade with good combination of hardness and toughness
ASP®2023	1.28	4.0	5.0	6.4	-	3.1	Non-Co-grade with overall good properties
ASP®2015	1.60	4.0	-	12.0	5.0	5.0	High W-alloyed grade for high-performance tools



BlueTap® brand: the best solution for your taps

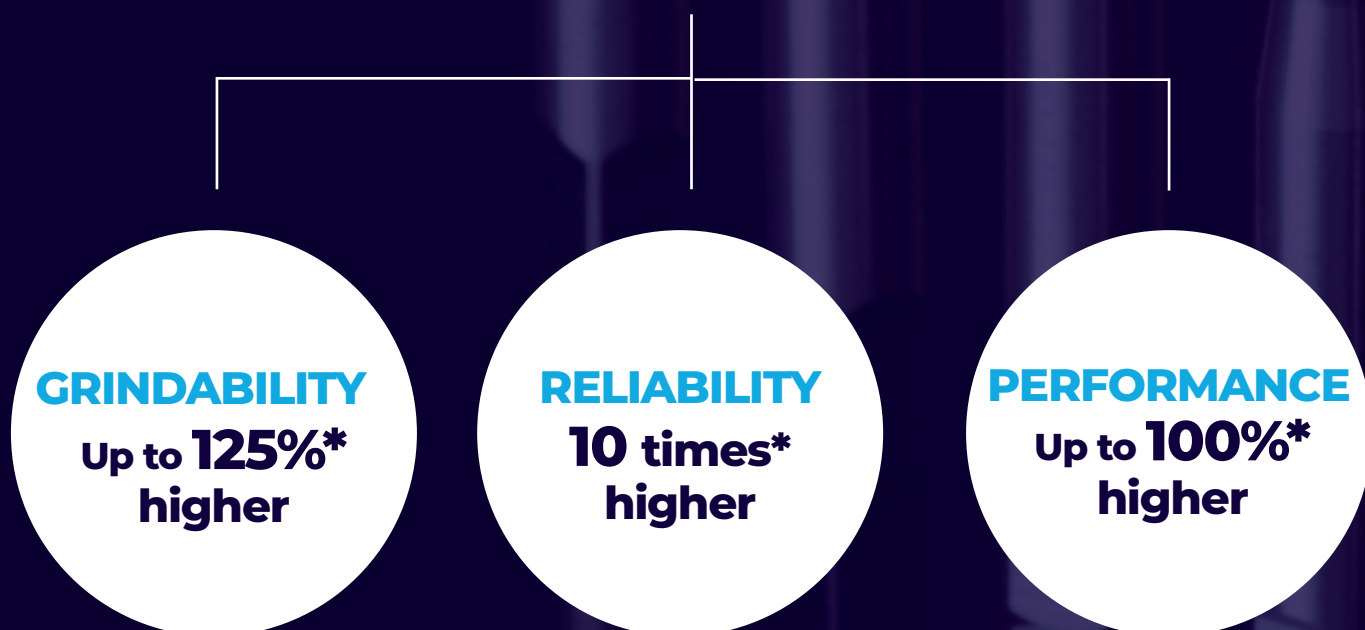
BlueTap®, an exclusive Erasteel range of Powder Metallurgy High-Speed Steels designed for high-performance taps

Focusing on the core needs of tap producers and end users and on their growing requirements, Erasteel introduced the BlueTap® brand of grades. Through an innovative Powder Metallurgy process BlueTap® grades achieve state of the art performance.

The signature properties of ASP® and the Powder Metallurgy process, like grindability, reliability and performance are maintained or even exceeded with this new process, while enabling an optimized Total Cost of Ownership (TCO).



BlueTap®, combining the ASP® performance with an optimized Total Cost of Ownership



** compared to conventional High-Speed Steels*

BlueTap®Max - patent application filed

BlueTap® **MAX**: a new grade with unrivalled properties for high-performance taps

Building upon the **success of BlueTap®Co** launched 10 years ago, Erasteel set out to develop a **new grade, BlueTap®Max**, that exceeds the **best performing grades** used in tapping today.

+ Performance

Extremely high hardness while maintaining a good **toughness** for the most demanding applications and machining conditions

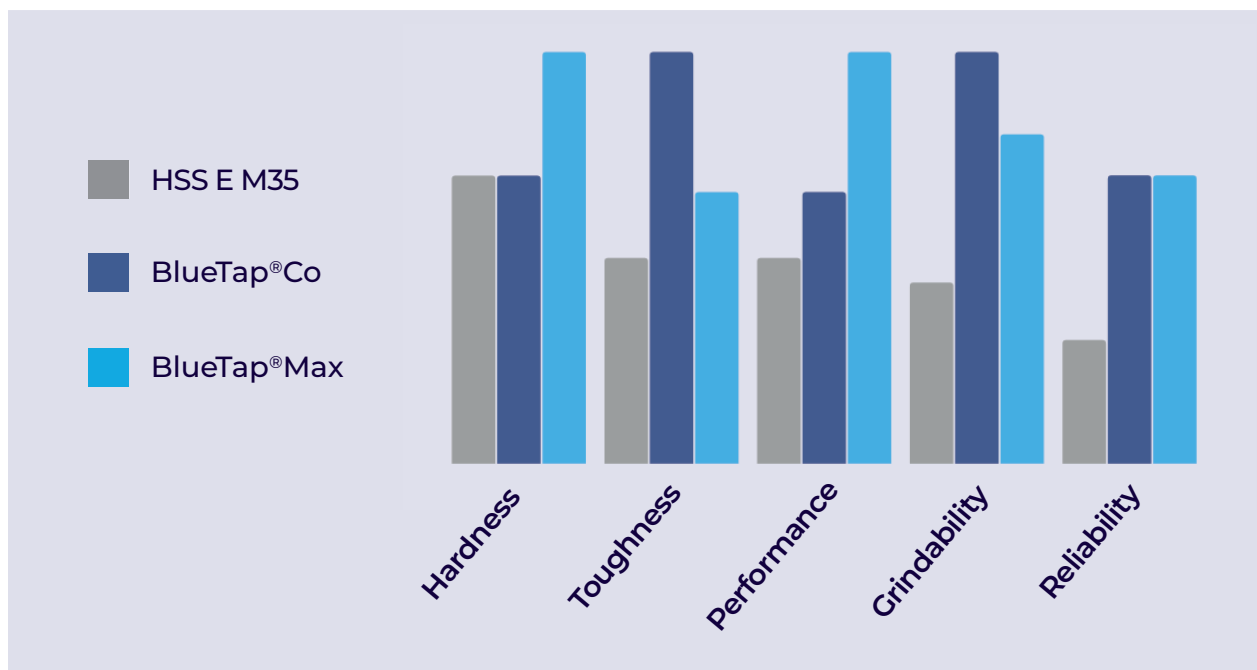
+ Reliability

Like BlueTap®Co, a **higher cleanliness** and **finer structure** compared to conventional High-Speed Steel grades giving a **better and more reliable tool life**

+ Grindability

Much easier to grind than conventional High-Speed Steels as well as highly alloyed Powder Metallurgy High-Speed Steel grades offering a **unique advantage for both tap producers and end users**

This grade offers an **unrivalled performance** with an **optimized Total Cost of Ownership (TCO)**



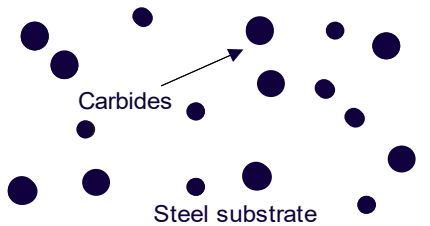
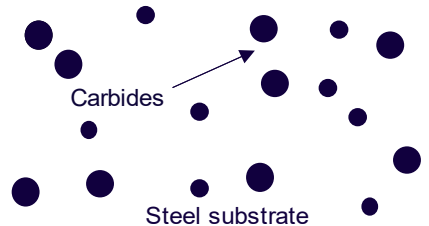
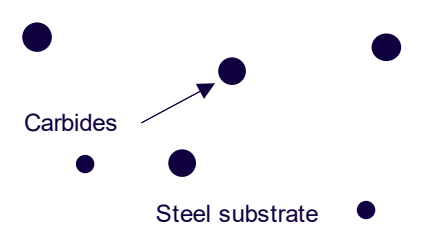
PVD coated BlueTap®Max combines all benefits!

- wear resistance
- hot hardness
- hardness
- excellent grindability
- toughness

BlueTap®Max: achieving higher performance with an optimized Total Cost of Ownership (TCO)

To explain the concept of BlueTap®Max, three separate scenarios are presented indicating how these solutions would perform and influence the cost effectiveness.

Highly alloyed grades are used for **high-performance taps** today in order to meet customers' requirements. These **grades are paired with PVD coatings** in order to facilitate **wear resistance and smooth chip evacuation**.

High carbide volume and no PVD coating		PVD coated with high carbide volume PVD coating		BlueTap®Max concept PVD coating	
					
-	+	-	+	-	+
Lower grindability	High intrinsic wear resistance	Lower grindability	PVD coating to block wear	Less wear resistance under PVD	Excellent grindability
Lower toughness	No PVD cost	Lower toughness	PVD coating for good chip evacuation		Good toughness
No PVD coating to block wear		Low cost efficiency	Better wear resistance once coating fails		High hardness to support the coating
No PVD coating for good chip evacuation					PVD coating to block wear and good chip evacuation

PERFORMANCE TO TCO RATIO 



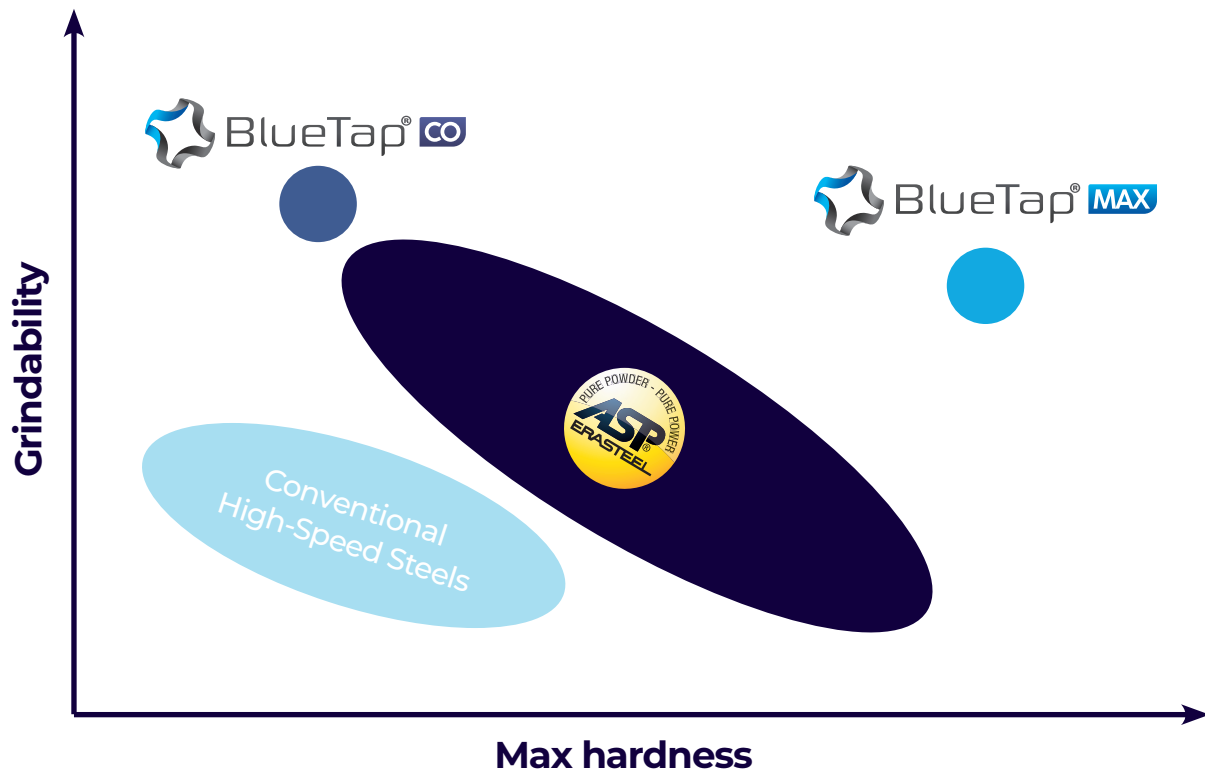
The **high alloying** is needed to support the **PVD coating** as it offers a harder material with a high compressive strength. However, the **higher alloying** also makes the material **more brittle** and harder to grind affecting both performance and cost effectiveness.

The solution

BlueTap®Max solves this issue by an alloying concept increasing its hardenability without increasing the carbide content significantly, benefiting both the toughness and the grindability of the grade. Thus BlueTap®Max can offer an **excellent performance to TCO ratio**.

Unprecedented combination of grindability and hardness

The concept of **BlueTap®Max** combines **excellent hardenability** with **excellent grindability**, unmatched by previous material used for taps.



ABOUT US

Erasteel is the **only player in the world dedicated to High-Speed Steels with comprehensive know-how**: design, development, production, atomization, processing and direct sales of conventional and Powder Metallurgy (ASP®/BlueTap®/PEARL®) High-Speed Steels.

Erasteel is a **privileged partner of today's and tomorrow's industry**: automotive, motorsports, aeronautics, electronics, energy, construction, high value-added tooling, etc.

To meet the growing challenges related to the **supply of strategic metals** and the **preservation of natural resources**, Erasteel has also developed a **unique activity in the world of recycling strategic metals with high added value through the recycling of batteries and spent oil catalysts**.

Erasteel has **850 employees, 6 industrial sites** (3 in Sweden, 2 in France, 1 in China), **3 distribution centers** and a **global sales network** in Europe, America and Asia.



ASP® and BlueTap® are registered trademarks of Erasteel
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