Industeel

Newsletter 05-2024

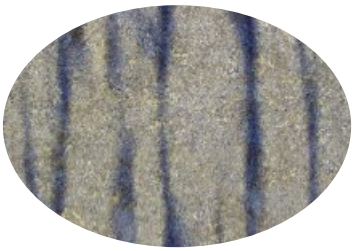
ArcelorMittal

Machining Superplast® steels

The machinability of steels is a very complex phenomenon, and this is also one of the key points while choosing a steel for a tooling or a mechanical application.

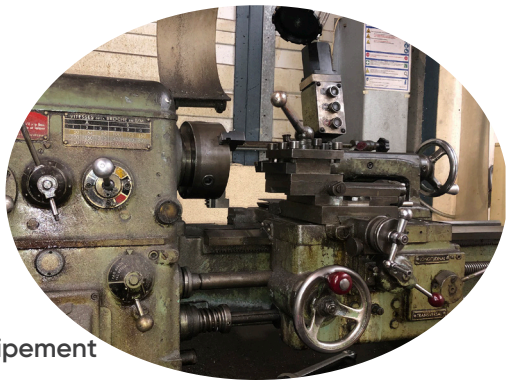
This complexity depends on interactions between the steel, the tool and the milling-grinding machine.
In the recent past, the so-called "recommended machining parameters" for steels were presented as tables in data sheets, and were coming from tests in well-defined conditions, but they cannot be strictly applied to all the machining equipment, tools or shapes.

Nowadays, tools manufacturers have extensively developed softwares which consider most of the interactions we spoke previously, and these softwares are ready to simulate very accurate machining parameters based on homogeneous steels, like our **Superplast®** branded grades, which are now being included into one of the most known software.
This is what will be presented in this Newsletter.



Structure

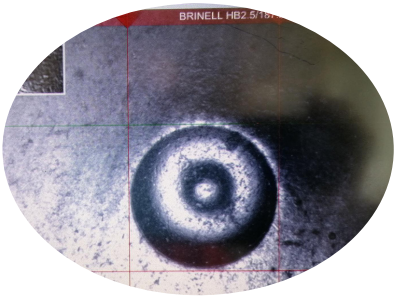
Machining conditions



Equipement

Machinability

Hardness



Tool

What is « Walter GPS »?

Walter GPS is an online database to find optimized recommendations for machining. Thanks to this search tool for a specified steel, you can easily find recommendations for tools and parameters of use tailored to the desired application.

Great news: **Superplast®** grades are now referenced in this database!

How does it work?

1.Connect to this website:
Walter GPS (walter-tools.com)

2.Choose the section: Application-related search

3.Choose the specified steel:

Tips: You can adapt the hardness level according to your material!

4.Select a task depending on the desired machining operation:

- Cubical feature
- Rotational feature
- Hole
- Thread

Tips: You can combine several tasks as drilling and threading!

5.Set the parameters for the required machining operation

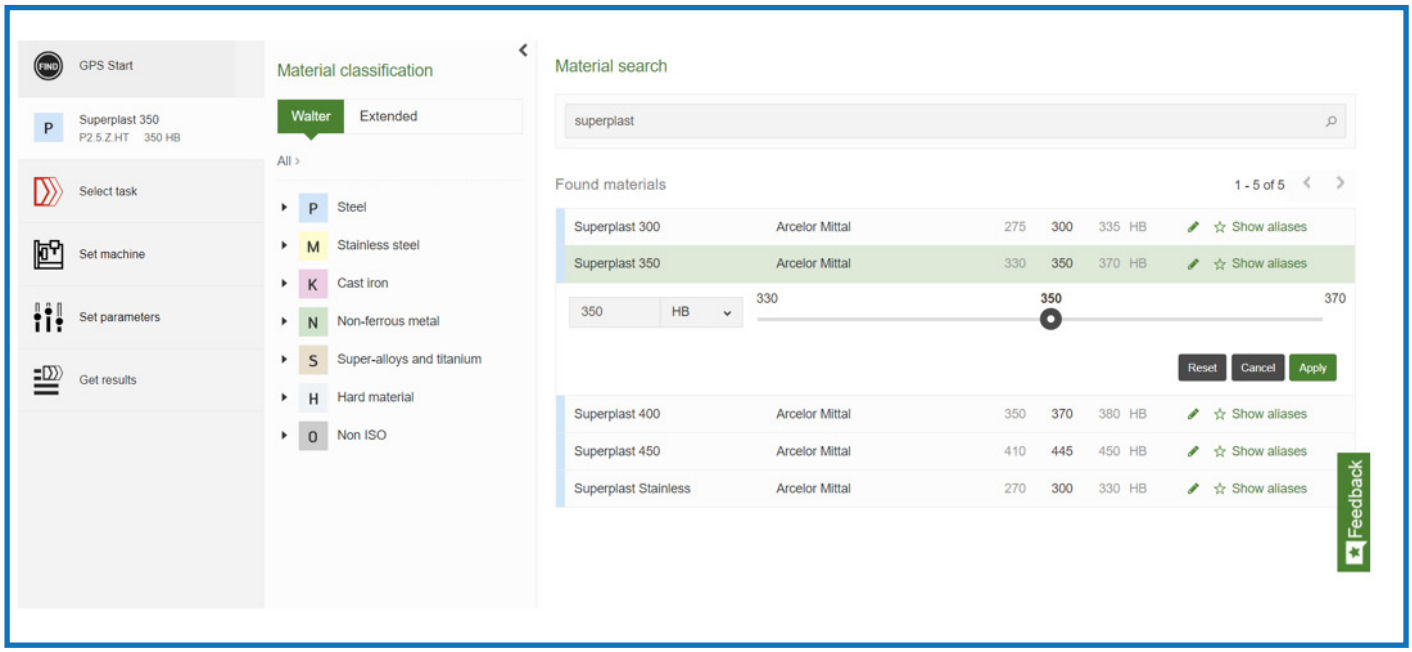
6.Get the results:

- You can filter the results based on new criteria
- Select the appropriate tool suggested (Walter brand tools but close to another supplier)
- Get cutting data and recommendations for machining depending on tool, material and machine
- You can modify these data according to your machine capacity and extract the recommendations in PDF

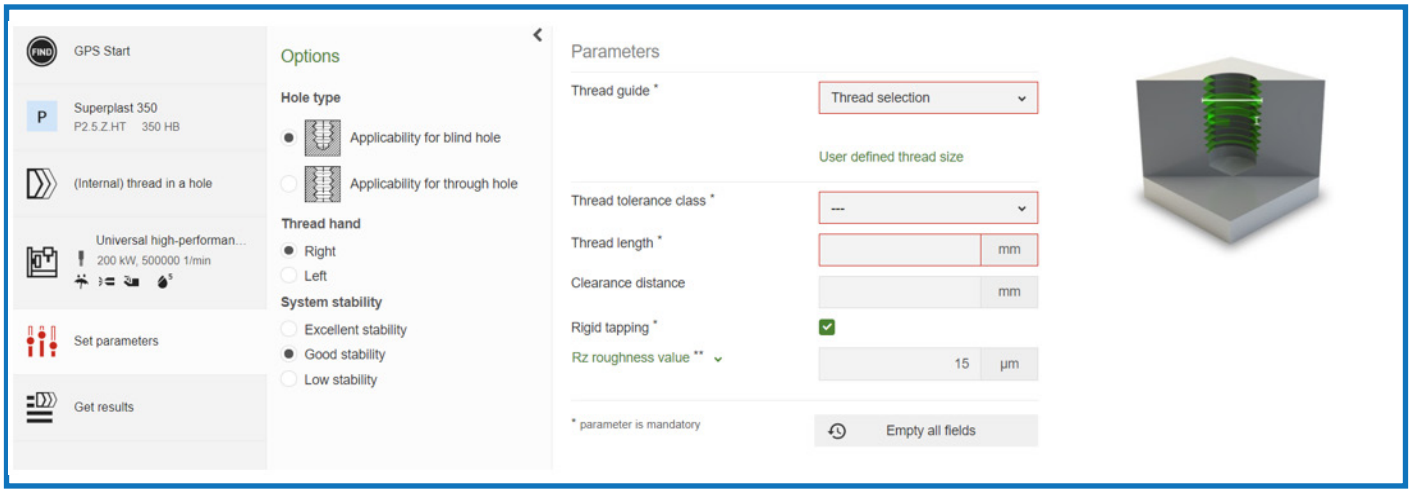
Tips: If you create an account on the Walter website (free) you can directly download programming lines adapted (CNC code) to your machine for the milling cutters!

What are the advantages?

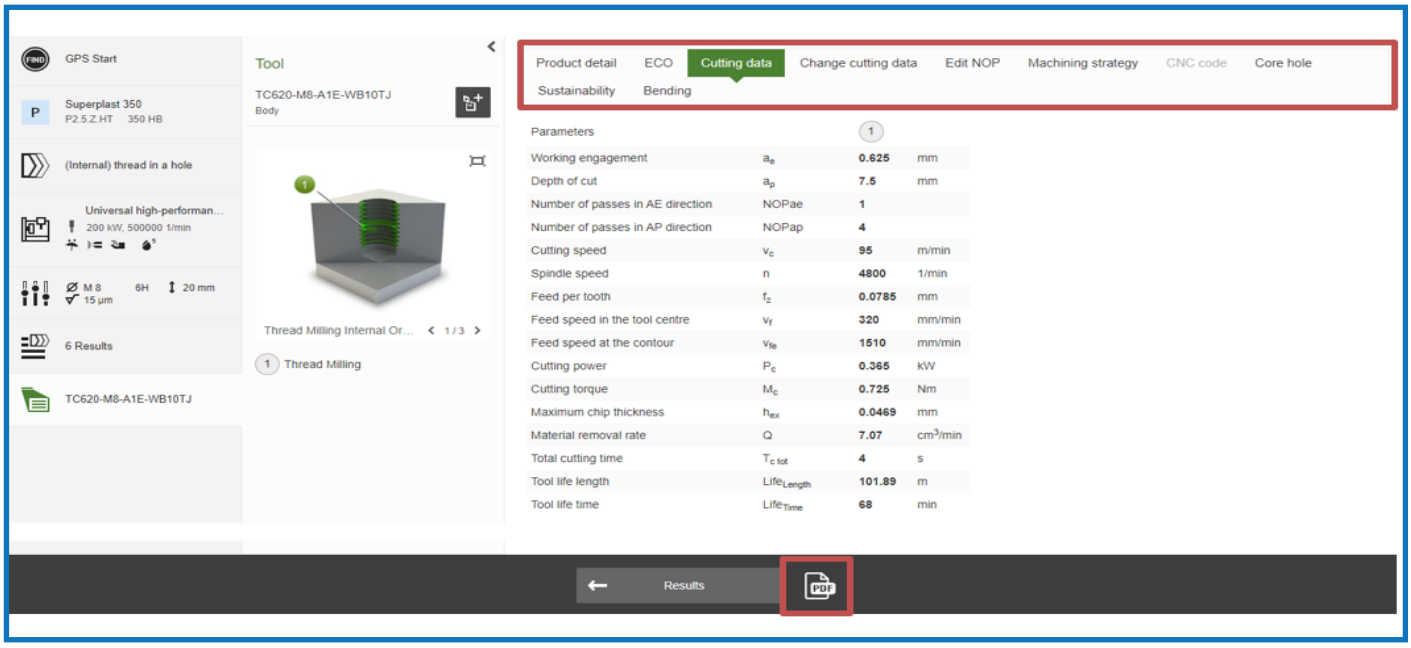
The Walter GPS is very easy to use. By setting a few parameters, you can rapidly obtain tool and machining recommendations tailored to your requirements. The more detailed the parameters, the more appropriate the recommendations will be. Moreover, this resource is free and open to all!



Selection of the material with hardness adaptation



Example of parameters to be defined for a thread operation



Example of results obtained with cutting data, change cutting data, CNC code and option to download all data in PDF

Technical tip 1

There is no standardized "universal" test nor unit for defining the machinability.
The most common parameters in milling are the feed rate and the depth of cut and the shape-color of the chips measured in definite conditions.
In such conditions a range of "correct parameters" can be defined but if there is a local evolution in the properties of the steel the range "of correct parameters" will change!
This range is also not the same for users working in similar but not identical conditions.

Technical tip 2

The tool life can be defined by the length of time a tool can be used profitably in nominal conditions.
This is not an absolute value since the real data to be considered for measuring the efficiency is "how much material can I convert into chips using a single tool?"

A tool can have a short life and a very high efficiency!

Conclusions:

The high homogeneity of the structure and of the hardness of the **Superplast®** steels, but as well the repeatability of the production, all those parameters allow to optimize and to compute the detailed machining parameters according to the chosen tool and the kind of job to be done.

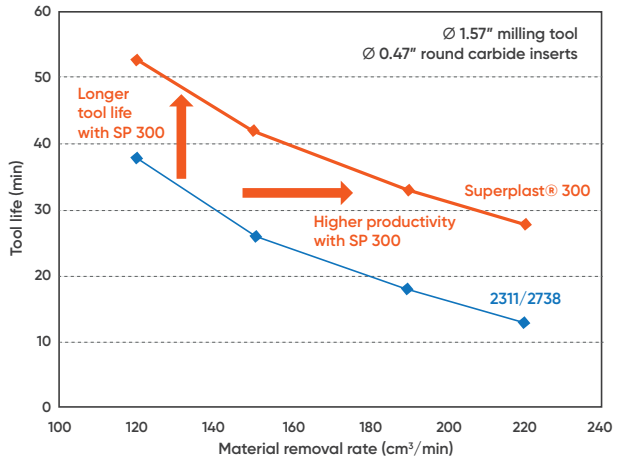
In less homogeneous steels as the common P20, 1.2311, 1.2714, 1.2738... the structures and hardness are highly depending on the producer, from the thickness and also from the section of the blocks of steel at the time of the heat treatment. As a consequence, the machining parameters cannot be optimized. Moreover, they are in constant change during the machining of big parts.

The lack of segregation in the **Superplast®** steels lead to a better machinability with all kinds of classical methods.

Some typical enhancements of performances are:

- High ejection rate +20-30%
- Better dimensional stability
- Higher productivity: from +10% in milling to +50% in deep hole drilling

All these topics and a detailed metallurgical approach of the machining will be developed in a short coming webinar.



Work done with ENSAM university

Your contacts

Jean-Michel Machefert
jean-michel.machefert@arcelormittal.com

Carolina Bicego
carolina.bicego@arcelormittal.com

Perrine Lavalley
perrine.lavalley@arcelormittal.com

industeel.arcelormittal.com