



graniton®

Mineral Cast Technology for High Precision Machine Tools

Agenda

- 1. UGG Group**
- 2. Introduction of Topic Mineral Cast**
- 3. Mineral Cast Technology**
- 4. Summary**

UNITED GRINDING Group

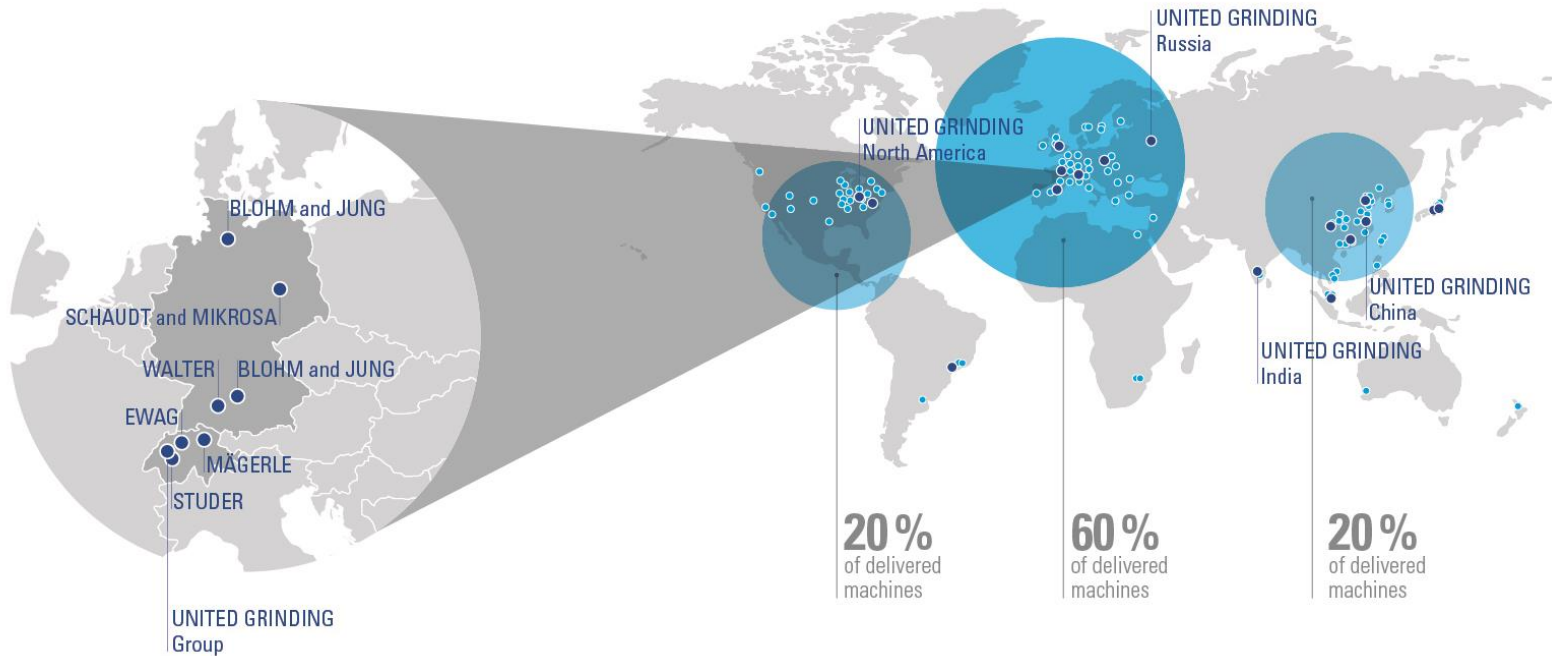
Montreux, 16.05.2014



Content

- Our customers
- Our company
- Our group
- Our brands

You will find us where our customers are



140.000 machines have been produced and delivered worldwide

Our customers



Aerospace | Energy | Automotive & Suppliers | Transportation & Heavy Industry
Machine Manufacturers | Tooling | Precision Engineering | Medical | Die & Mold

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The Körber Group

Tobacco Division

**Tissue, Automation,
Logistics, Mailing**

Machine Tool Division

**Pharmaceutical
Packaging System**



**Hauni
Maschinenbau AG**

**Körber Process
Solutions GmbH**

**United Grinding
Group AG**

**Körber Medipak
Systems GmbH**

Employees
3.900

Employees
2.000

Employees
2.200


Employees
1.300

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Our figures

	2010	2011	2012
Employees	~ 2.100	~ 2.100	~ 2.200
of which are trainees	~ 130	~ 130	~ 110

- 
- UNITED GRINDING belongs to the most major 20 machine tools manufacturers worldwide. (*Metalworking Insider Report*)
 - UNITED GRINDING is one of the ten biggest machine tool manufacturers throughout Europe. (*VDW*)

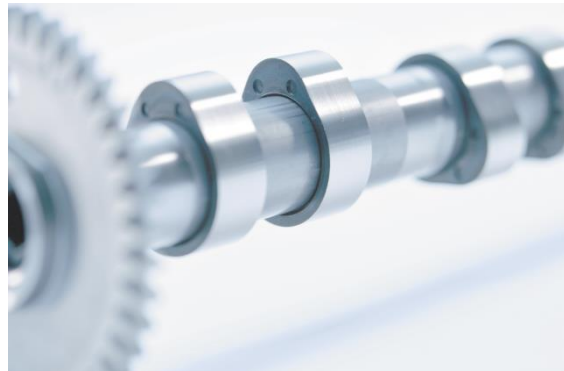
Content

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- **Our brands**

Our brands



Surface and Profile



Cylindrical



Tool



gromitor[®]

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Convential
Cylindrical Grinding
Machines



Combined machine
tool
Turning / Grinding



Universal
Grinding Machines
internal/external



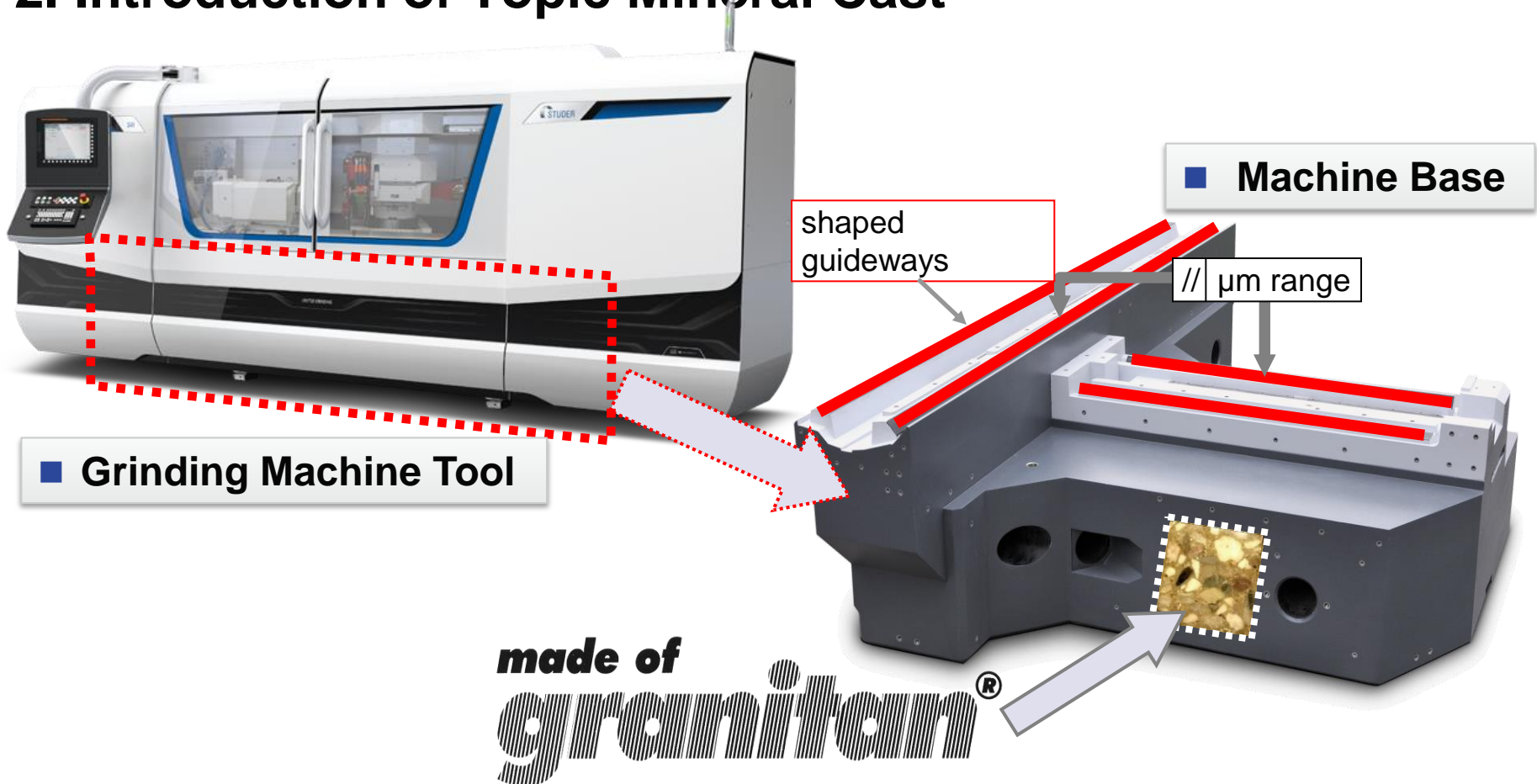
Production
Grinding Machines



Internal
Grinding Machines



2. Introduction of Topic Mineral Cast

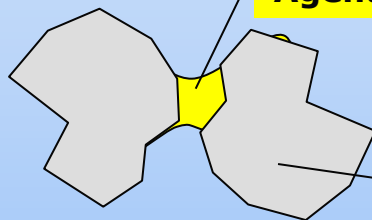


2. Introduction of Topic Mineral Cast boundaries

Mineral Cast / Polymer Concrete



Epoxy Binding Agent (Matrix)

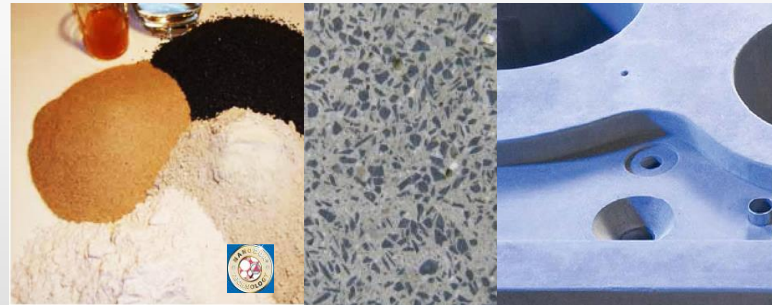


Mineral Filler (Stones)

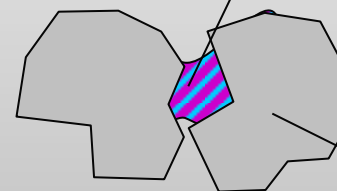
Brand Names

granitan® EPUMENT®, BAERLIT®,

Concrete / Ultra High Performance Concrete (UHPC)



Cement + Additives



Mineral Filler (Stones)

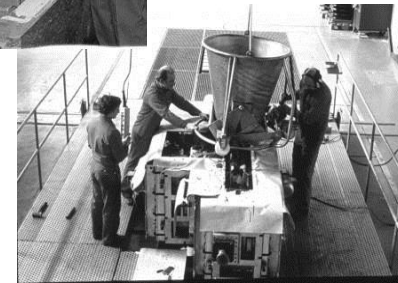
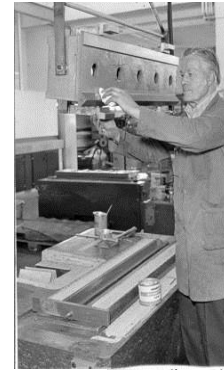
Brand Names

NANODUR®, HYDROPOL®, DUROPOL®,

Source: Bögl Reitz, durcret

GRANITAN® history

- 1976 first series machine tool with GRANITAN machine base Studer RA5
- 1979 start of production Granitan mixture S100 in Thun
- 1991 release mixture S102
- 1995 release mixture S103
- 2008 cooperation with Schneeberger in a Joint Venture
- 2011 start-up of most recent casting machine in europe



3. Mineral Cast Technology



Source: Epucret

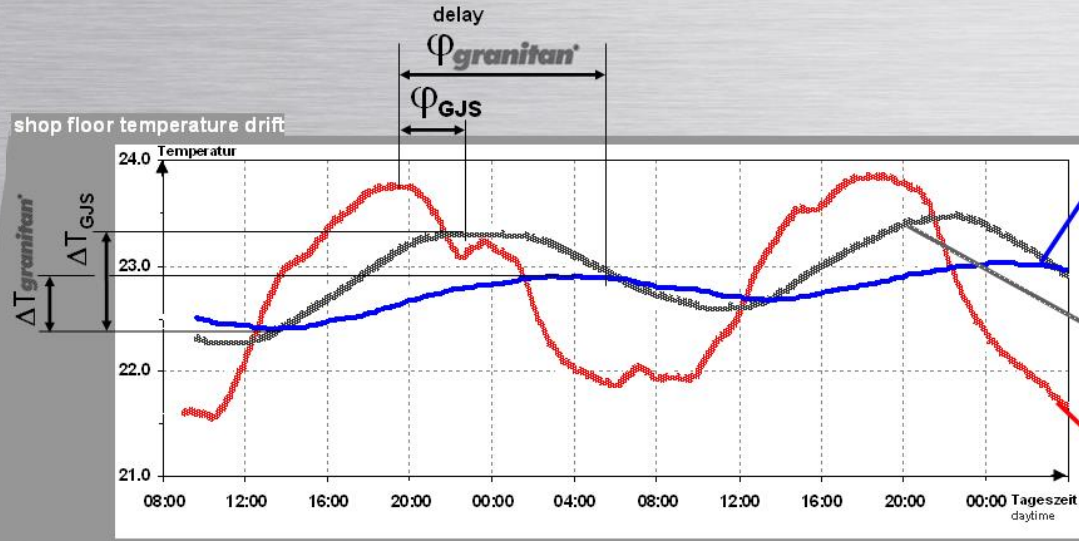
3. Material Properties, Comparison



property	unit	granitan®	factor	EN GJL 250 cast iron	Steel S235	UHPC
damping	%	0.3	x15	0.02	0.02	0.3
thermal conductivity	[W/m⊙K]	3.4	1/13	45	50	2.0
specific heat capacity	[kJ/kg⊙K]	0.8	x1.7	0.46	0.5	0.75
thermal expansion coefficient	[μm/m⊙K]	15	1/1.3	11.7	12	11
density	[g/cm³]	2.36	1/3	7.2	7.8	2.45
elastic modulus	[kN/mm²]	41	1/2.7	110	210	45
tensile strenght	[N/mm²]	13.2	1/15	200	300	10...20
compression strenght	[N/mm²]	105	1/8	840	300	140
poisson ratio		0.25	≈	0.26	0.3	

Source: durcret, Epucret

high thermal inertia



temp. response **granitan**

Temperature response cast iron

ambient temperature in shop floor

ambient conditions

made of granitan®

- 3 times slower response on temperature variation
 - 2 times less temperature response
- better tolerances
 - higher precision



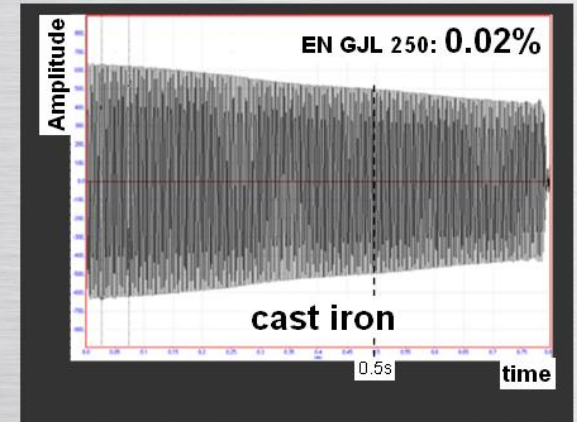
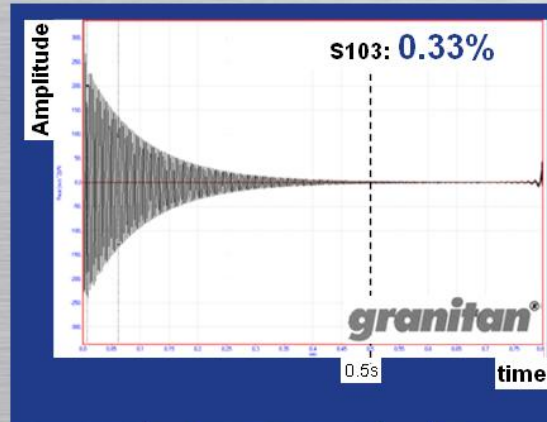
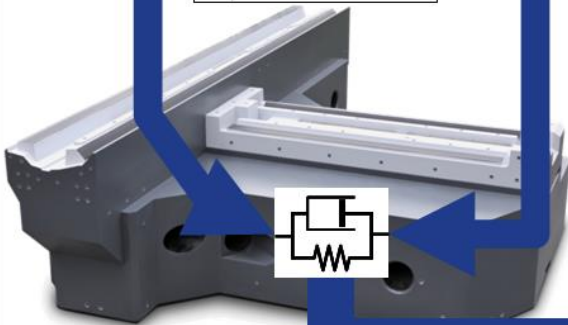
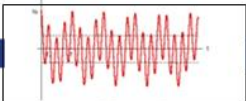
high material damping



machine base

made of
granitan®

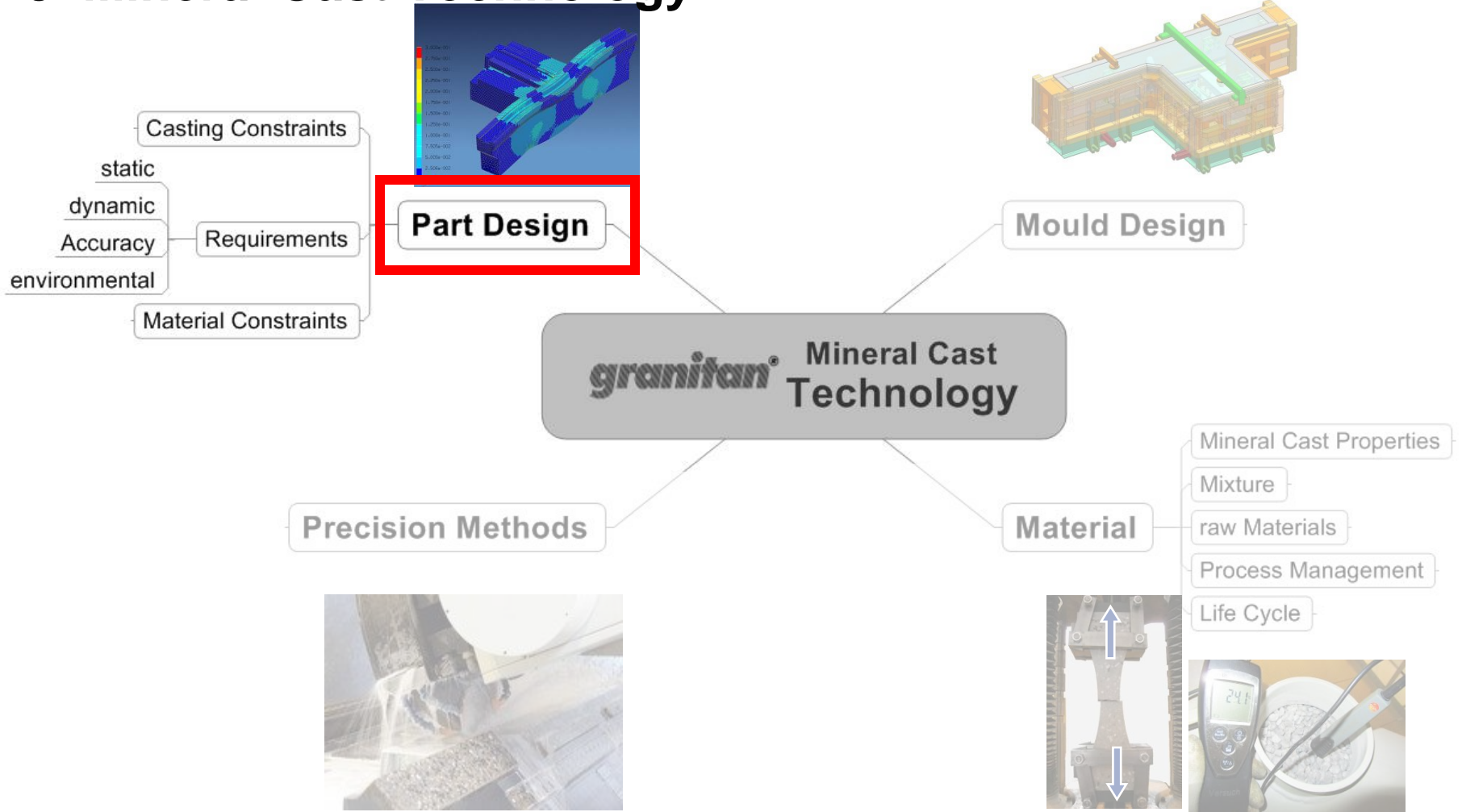
vibrations from cutting process



- perfect surface
- high process stability
- shorter machining time



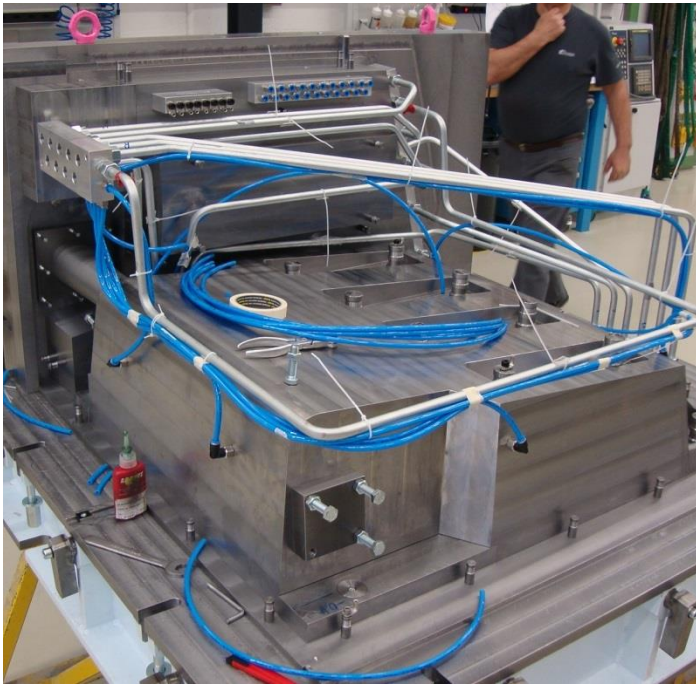
3. Mineral Cast Technology



Source: Epucret

3. Casting Constraints

- integration of cables, tubes, earthing in process step casting easily possible



tubes, cables



thread dowels



casting

3. Casting Constraints

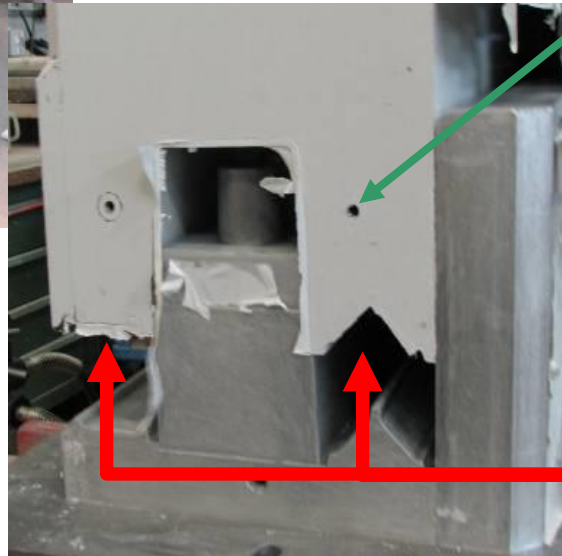
casted green body



■ Mineral Cast is a Near-Net-Shape Technology

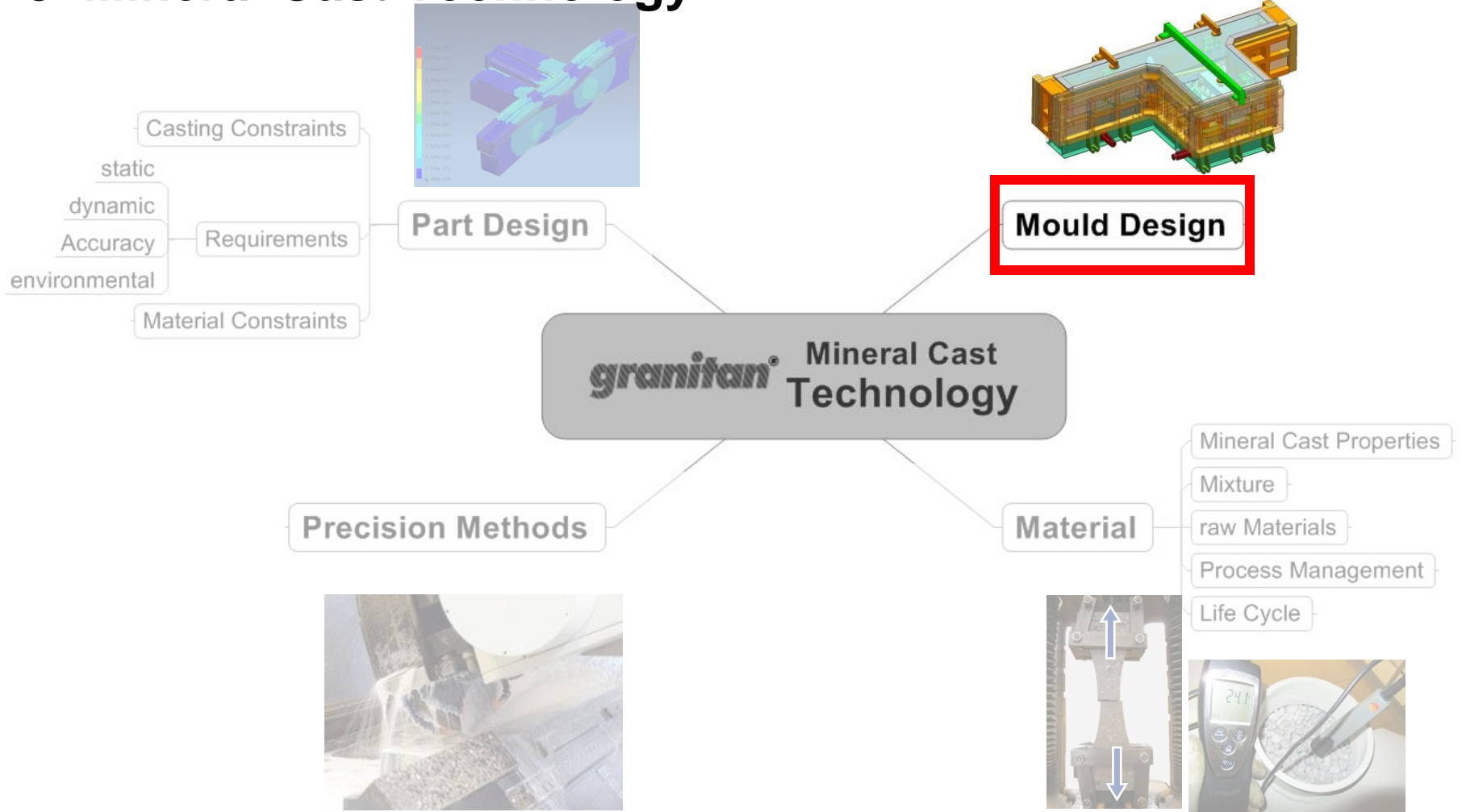
flatness sidewall

position of drill



flatness bottom

3. Mineral Cast Technology

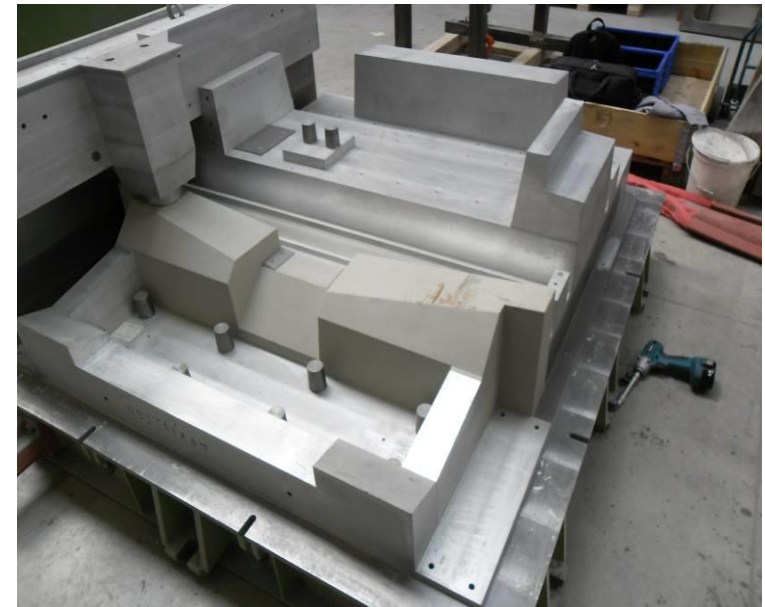
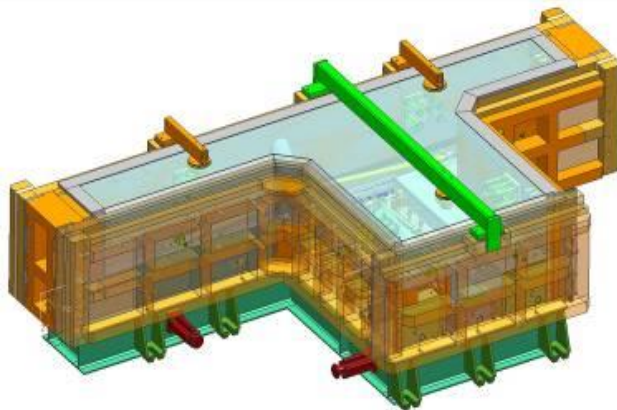


Source: Epucret

3. Mould Design

requirements

- „sustain cast part weight
- sustain vibration 10...60 Hz
- sustain demoulding
- sustain multiple assembly / disassembly
- allow later changes in detail



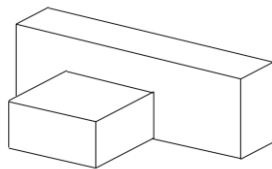
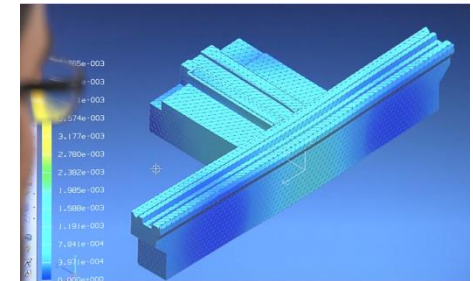
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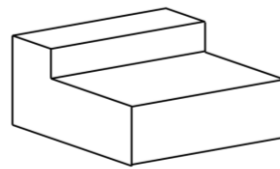
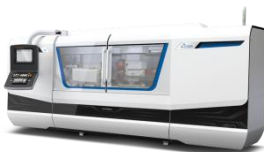
4. Summary

for high precision machine tools with mineral cast

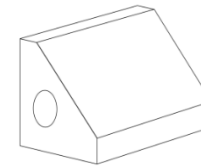
- design the Machine for Mineral Cast Technology
- cubic+massive design of machine base
- use big grain mineral cast mixtures, minimum binding agent
- use suitable guideway system



S41



S22



S242



granitum[®]

Questions