GOUDSMIT MAGNETICS

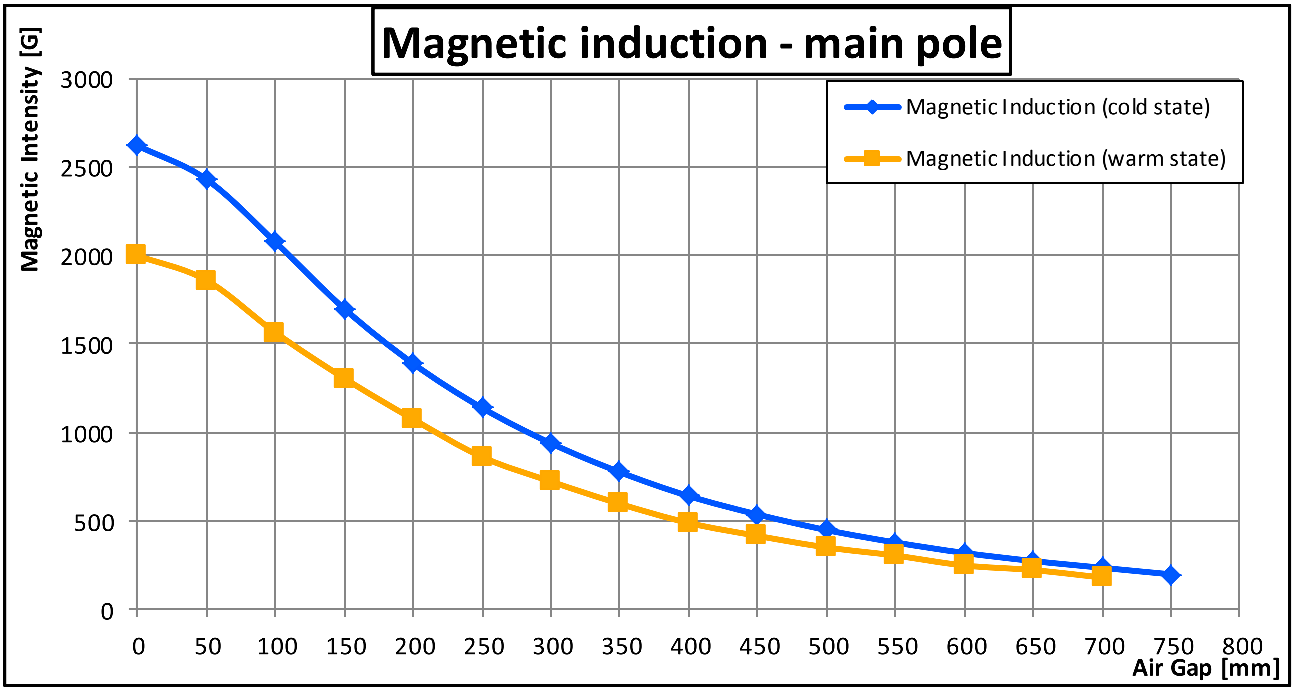
Test engineer	Jiří Semerád
Test date	29-1-2018
ERP reference	17OP010100000900
Product key	ROE-07-C-120-W-G-L-B-B-B-B-NA
Object of test	SEEB120022
Magnet type	Electromagnet - main p.
Tesla meter	Tesla meter type: HGM09s, ser. number: 01113110
Tesla meter probe	HGM.T02.45.35.6., s.n.: 151113046

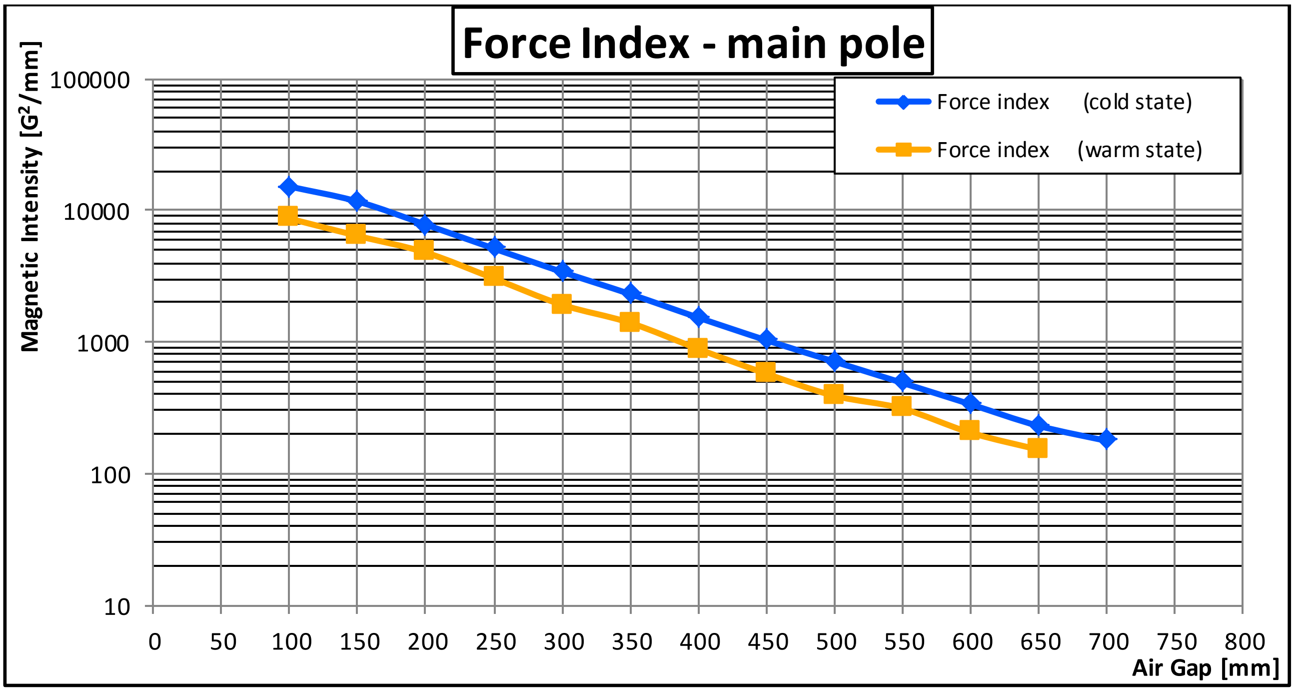
State	Cold		Warm	
Ambient temperature	19	[C°]	19	[C°]
Oil temperature	18	[C°]	92,8	[C°]
Coil voltage	165	[V]	177	[V]
Coil current	40	[A]	31	[A]
Power	6,6	[kW]	5,487	[kW]

Air gap	Magnetic Induction (cold state)	Force index (cold state)	Magnetic Induction (warm state)	Force index (warm state)
[mm]	[Gauss]	[Gauss²/mm]	[Gauss]	[Gauss²/mm]
0	2620		1999	
50	2430	13219	1860	8072
100	2076	15155	1565	8654
150	1700	11662	1307	6391
200	1390	7784	1076	4777
250	1140	5130	863	3038
300	940	3412	724	1919
350	777	2315	598	1399
400	642	1534	490	887
450	538	1033	417	575
500	450	711	352	391
550	380	490	306	312
600	321	337	250	205
650	275	231	224	152
700	237	178	182	
750	200			
800				
850				
900				

Test objects	Cold		Warm	
Ball Ø 25 mm.	320	[mm]	260	[mm]
Hex nut M16 (DIN934)	-	[mm]	-	[mm]
Hex nut M30 (DIN934)	-	[mm]	-	[mm]
Nail Ø 2,5 x 63 mm.	770	[mm]	730	[mm]
Rod Ø 15x75 mm (VDE 0580)	560	[mm]	520	[mm]
Rod Ø 20x120 mm (VDE 0580)	-	[mm]	-	[mm]
Hex bolt M20x50	-	[mm]	-	[mm]

Distance of 400 gauss	525	[mm]	460	[mm]
Max [Gauss]	-	[mm]	-	[mm]





Notes:

- Flux density values measured from magnet (from wear plate = 0 mm)

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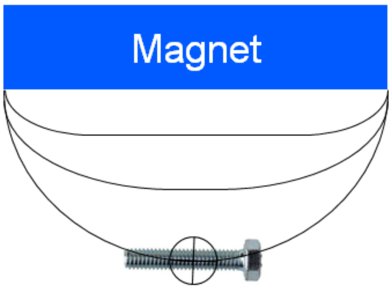
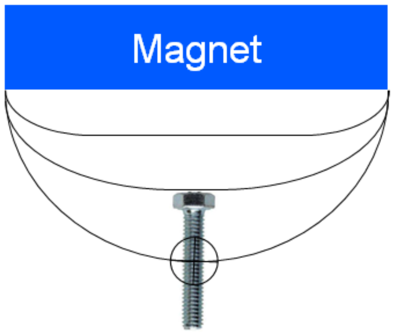
Orientation:

When measuring a magnet, the orientation of the particle to be caught is very important. We believe that, placing the particle **always** horizontal, and the **centre** of the particle being zero, will give the most representative situation in comparison to the field. A bolt for example can be placed horizontally or vertically. The vertical situation is way easier to catch, but very unlikely to occur in practice.





Size, shape and material:

The main factor that determines the type of magnet required, is the amount of Force Index (Gauss ^{2}/mm) that is needed to remove a target size and shape of ferrous from a burden of product material travelling at a certain belt speed.

Size

The size of an object is far less important than the shape of a ferrous particle to be caught. Theoretically the shape determines the catching distance. However, in the field, a ferrous particle is most likely underneath some material or some material sticks to it, making it heavier. This negatively affects the catching distance. This phenomenon will play a larger role with small sized particles compared to large sized particles.

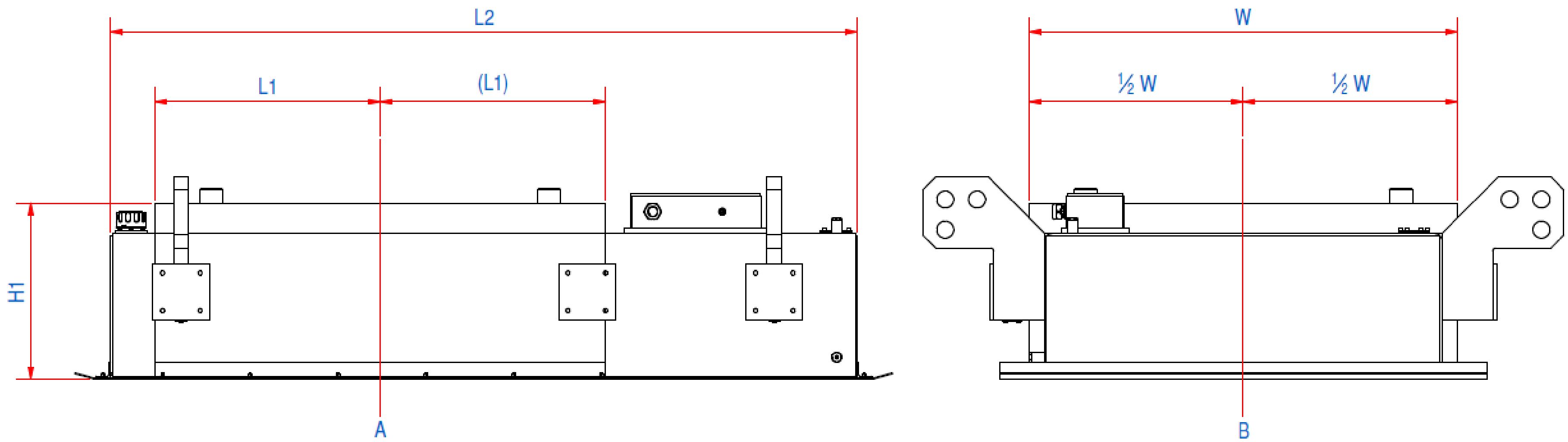
Shape

Nails, beams, rods, plates and other oblong shapes are relatively easy to remove as they are easily orientated north-south and present a larger surface area to the magnet. Spherical shaped ferrous like; nuts, cubes, balls and spheres are very difficult to remove.

Material

Ferrous material is attracted by a magnet. The degree of magnetization of a material in response to a magnetic field is called permeability. Simply stated: the higher the proportion of Fe, the higher the permeability, the easier the particle is to catch.

Test objects	[Gauss²/mm]	[10^{-8} Tesla²/m]	Photo
Ball Ø 8 mm	3181	31810	
Ball Ø 25 mm	3181	31810	
Hex nut M16 (DIN934)	1650	16500	
Hex nut M20 (DIN934)	1650	16500	
Hex nut M30 (DIN934)	1650	16500	
Nail Ø 2,5 x 63 mm	150	1500	
Ø 15 x 70 mm (VDE 0580)	550	5500	
Ø 20 x 120 mm (VDE 0580)	550	5500	
Hex bolt M20x70	267	2670	
Crown closure	200	2000	
Cube 12x12x12 mm	1600	16000	



Dimension	Length [mm]
W	1140
L1	600
L2	600
H1	464

The measurement spot of the main pole is located on the cross section of line **A** and **B**, right against the wear plate is the **0 mm mark** (start point for measuring). Performing a flux density measurement of **increasing steps of 50 mm** gives a clear view on the performance and the condition of the magnet.

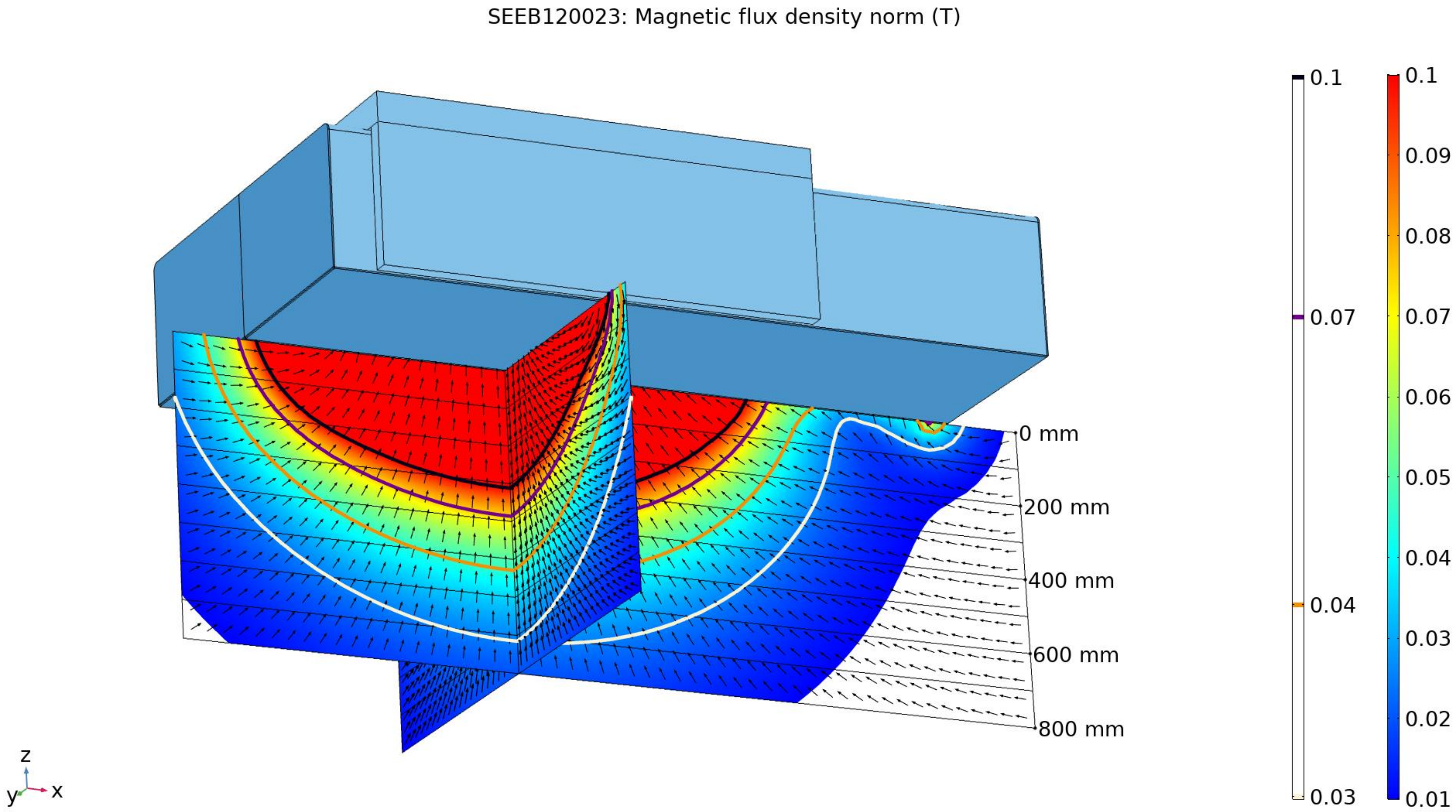


Figure 1: Simulated Flux density [Tesla] (cold state)

Note: Tesla to Gauss in this overview is x 10.000 (1 Tesla = 10.000 Gauss)

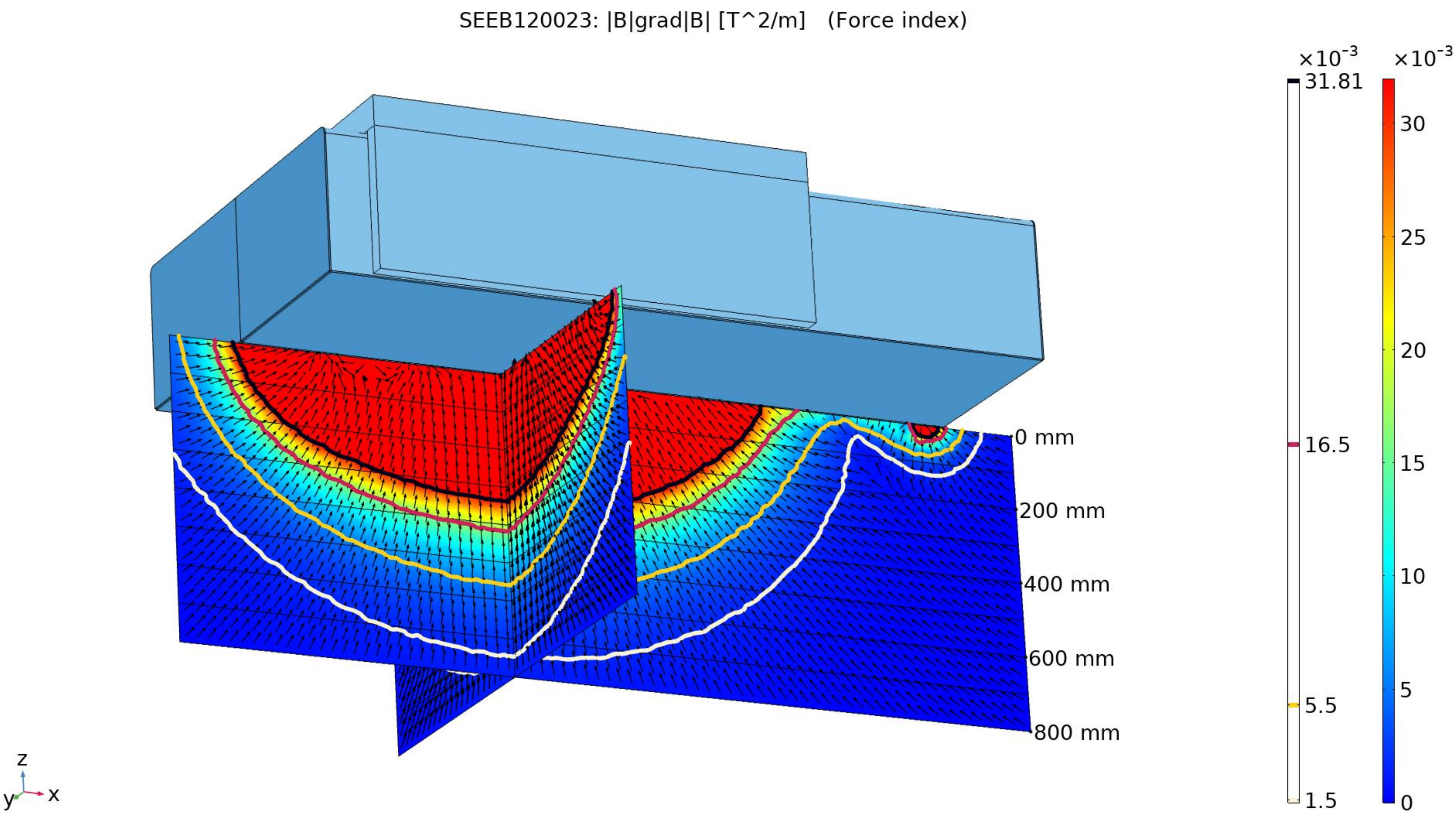


Figure 2: Simulated Force index [Tesla²/m] (cold state)

Note: Tesla²/m to Gauss²/mm in this overview is x 10^5 (1 Tesla²/m = 100.000 Gauss²/mm)