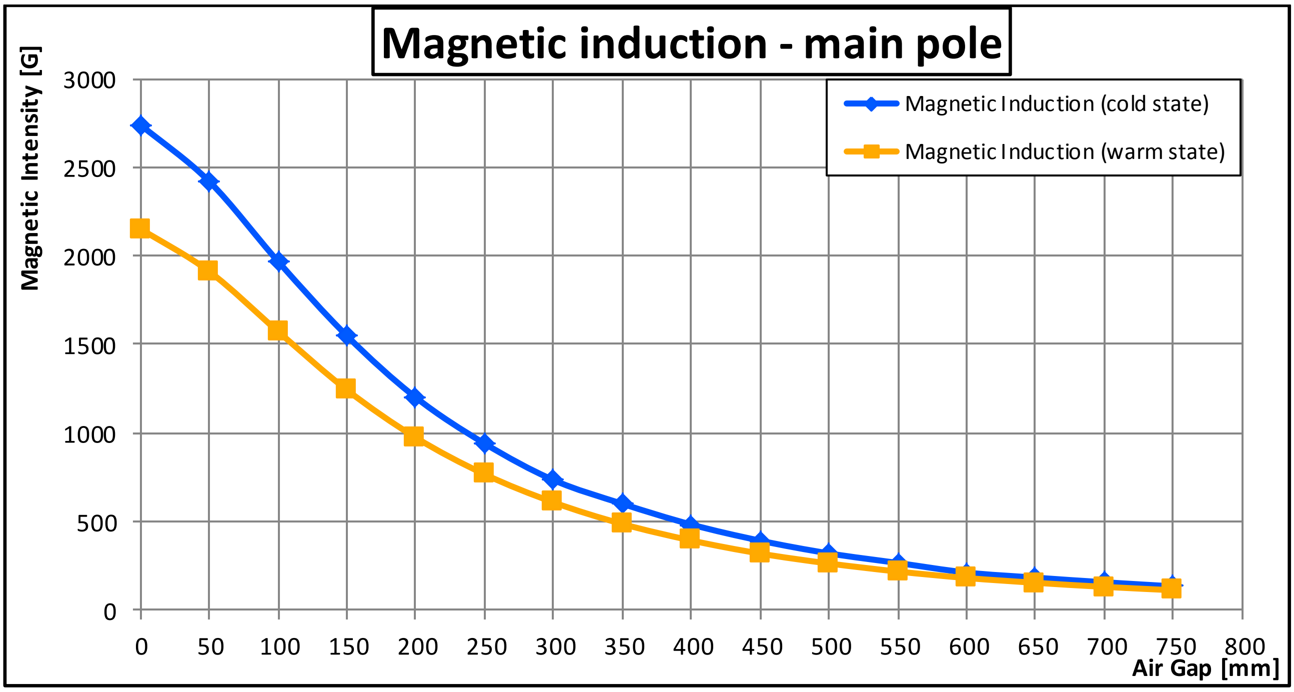
Test engineer	Václav Pikora
Test date	13-9-2018
ERP reference	18OP010100000530
Product key	ROEZ-05-C-100-W-G-R-B-B-B-B-NA
Object of test	A506_C00000
Magnet type	Electromagnet - main p.
Tesla meter	Tesla meter type: HGM09s, ser. number: 01113110
Tesla meter probe	HGM.T02.45.35.6., s.n.: 151113046

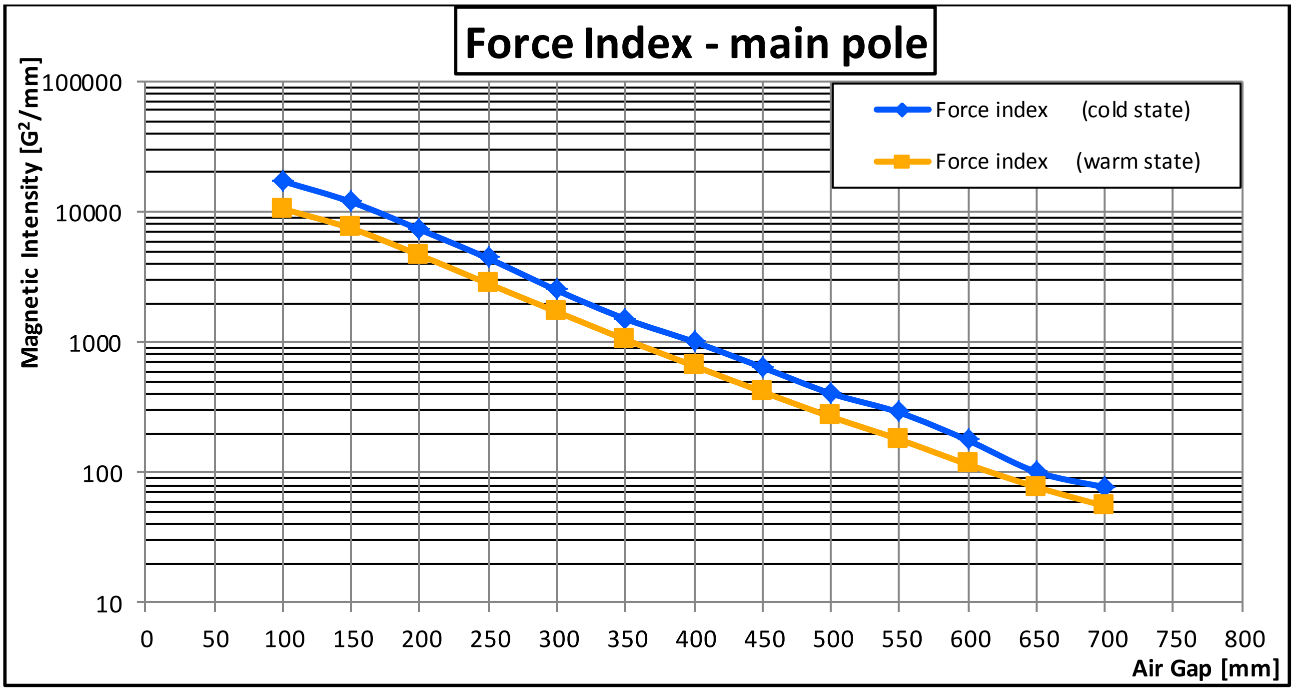
State	Cold		Warm	
Ambient temperature	21,8	[C°]	21,1	[C°]
Oil temperature	24	[C°]	82,1	[C°]
Coil voltage	-	[V]	127,4	[V]
Coil current	-	[A]	33,2	[A]
Power		[kW]		[kW]

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	2740		2153	
50	2420	18682	1912	11087
100	1968	17161	1573	10520
150	1548	11889	1243	7443
200	1200	7296	974	4634
250	940	4380	767	2802
300	734	2496	608	1705
350	600	1506	486	1045
400	483	1005	393	656
450	392	639	319	415
500	320	403	263	267
550	266	287	218	178
600	212	176	181	115
650	183	101	154	77
700	157	77	131	55
750	134		112	
800				
850				
900				

Test objects	Cold		Warm	
Ball Ø 8 mm	285	[mm]	252	[mm]
Ball Ø 25 mm	300	[mm]	240	[mm]
Hex nut M16 (DIN934)	370	[mm]	320	[mm]
Hex nut M20 (DIN934)	-	[mm]	-	[mm]
Hex nut M30 (DIN934)	390	[mm]	350	[mm]
Nail Ø 2,5 x 63 mm	710	[mm]	620	[mm]
Rod Ø 15x75 mm (VDE 0580)	560	[mm]	440	[mm]
Rod Ø 20x120 mm (VDE 0580)	-	[mm]	-	[mm]
Hex bolt M20x70	500	[mm]	450	[mm]

Distance of 400 gauss	445	[mm]	395	[mm]
Max [Gauss]	4500	[mm]	-	[mm]



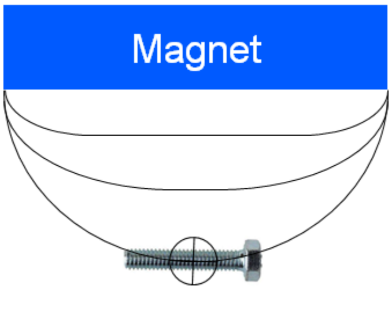


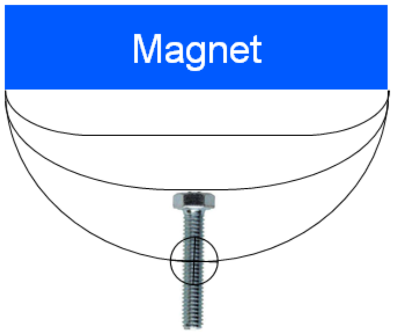
Notes:

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

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.

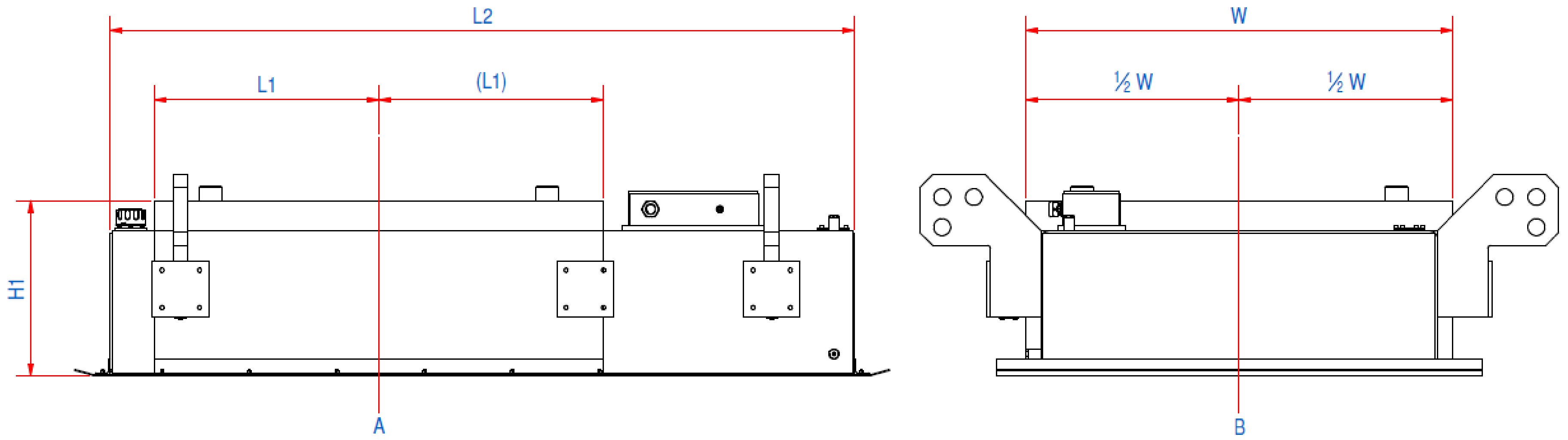
Shape

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	950
L1	500
L2	500
H1	434

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.

SEEB100023: Magnetic flux density norm (T)

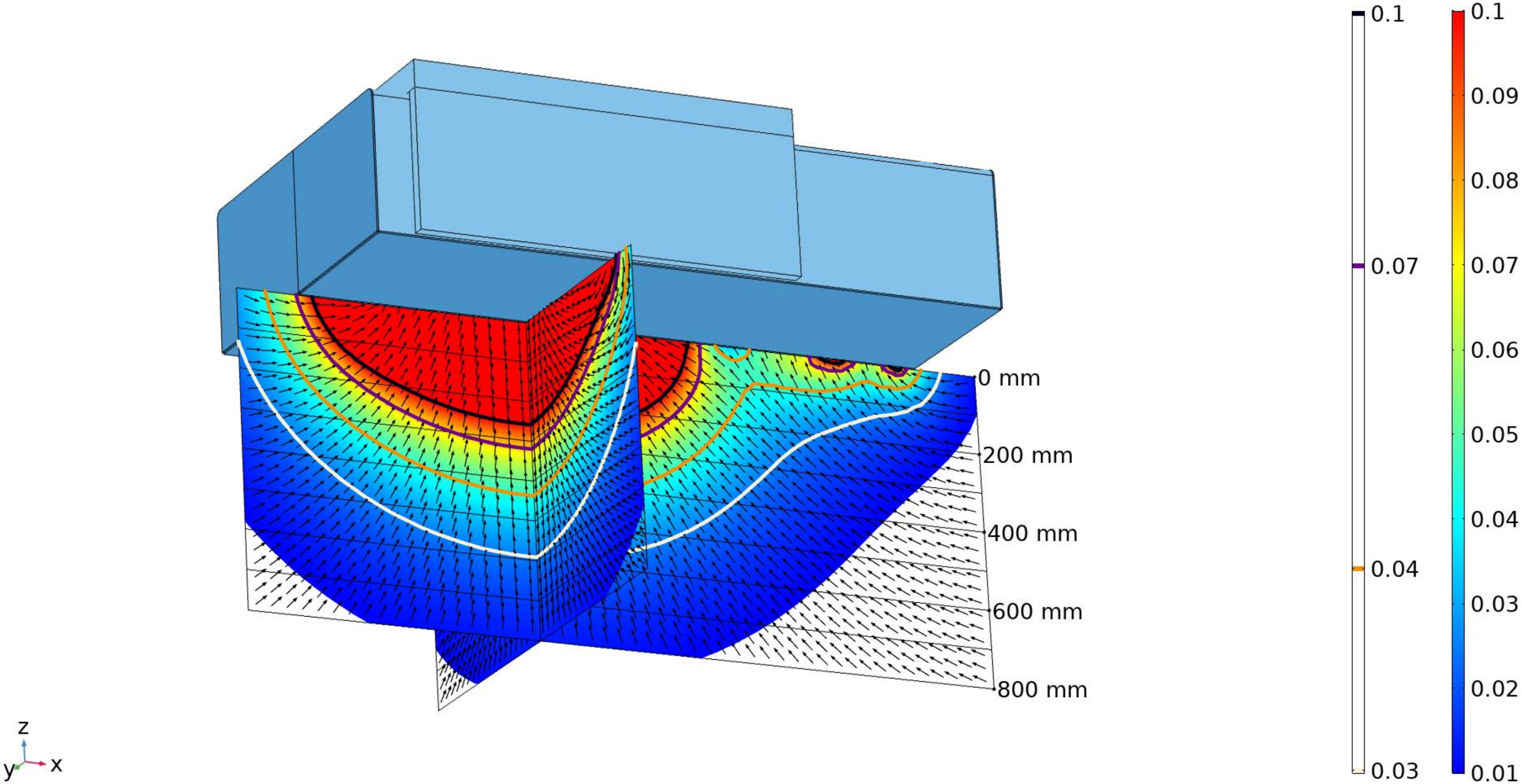


Figure 1: Simulated Flux density [Tesla] (cold state)

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

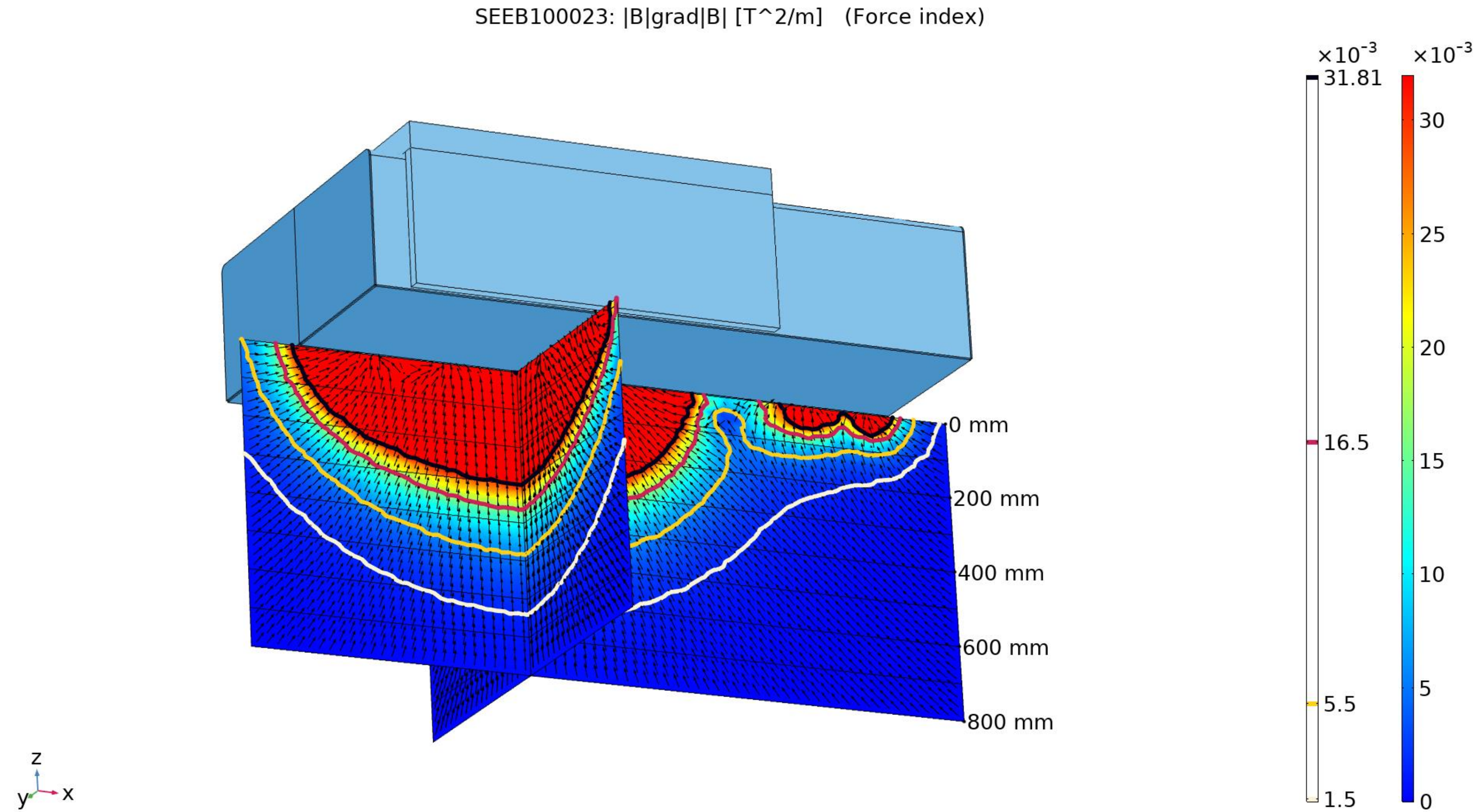


Figure 2: Simulated Force index [Tesla²/m] (cold state)

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