PLASMA NITRIDING

PLASNIT, PLASOX, Plasma nitrocarburizing

Plasma nitriding is also called ion nitriding or in short PLASNIT. When plasma nitriding, a gas mixture with i.a. nitrogen is activated by means of vacuum and electric fields. By activating or ionising (another name for it) the gas, it gets into a state that can penetrate steel surfaces.

This will increase the hardness of the surface, because the nitrogen reacts with iron and the alloying elements, which are part of a steel. The hardness and the depth of the treament will depend partly on the type of steel being treated and partly on how long and at which temperature the treatment takes place.

Low temperature and local treatment

Due to the plasma activation of the process gases, it is possible to nitride most steel types at temperatures down to 480 °C. Compared to other heat treatments, this minimizes the risk of distortion and deformation. Because of the characteristics of the process, it is relatively easy to carry out local treatments, so that areas, which do not require increased hardness or need subsequent processing, are protected against the active gases. The gentle PLASNIT treatment is well suited for nitriding of tool parts and precision machine parts as e.g. plastics and punching tools as well as gears and the like.

the Process is tailored

As opposed to traditional nitriding, where ammonia is normally used as process gas, the Tribology Centre mixes the gases hydrogen and nitrogen in a ratio matching the specific task. To avoid decarbonization in the surface, it is often chosen also to add a carbonaceous gas to the mix.

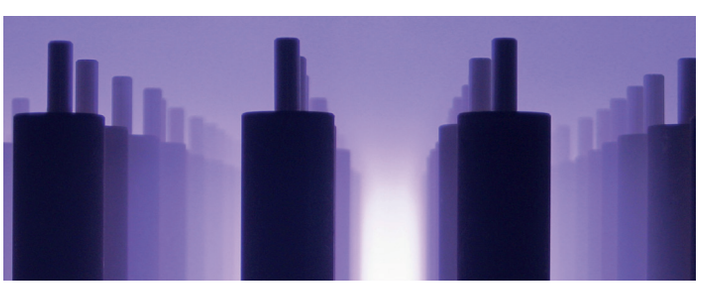
In some cases it may be advantageous to run the treatment at higher temperatures than 480 °C. Plasma nitrocarburizing is for instance most often run at 575 °C. Apart from the layer where nitrogen has penetrated the steel (diffusion layer), this treatment also segregates a hard nitride layer on the surface (compound layer). The plasma nitrocarburizing process is most often used on structural steel and other low-alloy steel.

Corrosion protection with PLASOX

By combining the treatment with a subsequent controlled oxidation, it is possible to obtain a certain corrosion protection and the parts will get a beautiful black colour.

As pretreatment

As it is possible to control the plama nitriding process very precisely and also the formation of the brittle white layer, this treatment is especially well-suited as pretreatment for a number of other surface treatments. Plasma nitriding is therefore suitable for use in combination with e.g. a PVD coating or ion implantation.



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QUALITY SYSTEM CERTIFICATION DNV ISO 9001

DANISH TECHNOLOGICAL INSTITUTE

Materials suitable for plasma nitriding

MATERIAL TYPE	DESCRIPTION	W.NO.	HARDNESS, HV_1	NITRATION DEPTH, mm
Structural steel	St 37-2	1.0038	200-350	max. 1,0
	St 60	1.0062	300-550	max. 1,0
Machining steel	9 S 20	1.0711	200-300	max. 1,0
	9 SMnPb 28	1.0718	200-350	max. 1,0
	ETG 80	1.0727	350-450	max. 1,0
	ETG 100	1.0727	450-650	max. 1,0
	16 MnCrS 5	1.7139	600-750	max. 1,0
Carburizing steel	Ck 15	1.1141	300-400	max. 1,0
	15 CrNi 6	1.5919	650-750	max. 1,0
	21 NiCrMo 2	1.6523	500-600	max. 1,0
	17 CrNiMo 6	1.6587	650-750	max. 0,8
	16 MnCr5	1.7131	650-750	max. 1,0
	20 MnCr 5	1.7147	650-750	max. 1,0
Hardenable steel (unalloyed)	Ck 30	1.1178	300-450	max. 1,0
	Ck 45	1.1191	30-500	max. 1,0
	C 60E	1.1221	350-500	max. 1,0
Hardenable steel (alloyed)	25 CrMo 4	1.7218	550-650	max. 1,0
	42 CrMo 4	1.7225	550-650	max. 1,0
	30 CrMoV 9	1.7707	850-950	max. 0,8
	50 CrV 4	1.8159	500-650	max. 0,8
Nitriding steel	34 CrAl 6	1.8504	950-1150	max. 0,8
	34 CrAlMo 5	1.8507	950-1150	max. 0,8
	31 CrMoV 9 V	1.8519	850-1000	max. 0,8
	34 CrAlNi 7	1.8550	950-1150	max. 0,8
Bearing steel	100 Cr 6	1.3505	500-650	max. 1,0
	X 102 CrMo 17	1.3543	1000-1200	max. 0,2
Spring steel	Ck 75	1.1248	500-600	max. 1,0
	60 SiMn 5	1.5142	500-600	max. 1,0
	58 CrV 4	1.8161	600-700	max. 0,8
Unalloyed tool steel	C 105 W1	1.1545	550-650	max. 1,0
	C 80W 2	1.1625	550-650	max. 1,0
High-speed steel	S 12-1-4	1.3302	1000-1200	max. 0,2
	S 6-5-2	1.3343	1000-1200	max. 0,2
	S 18-0-1	1.3355	1000-1200	max. 0,2
Cold-work steel	X 165 CrV 12	1.2201	1000-1200	max. 0,2
	29 CrMoV 9	1.2307	850-950	max. 0,4
	40 CrMnMo 7	1.2311	600-700	max. 0,8
	40 CrMnMoS 8-6	1.2312	600-700	max. 0,8
	X 100 CrMoV 5-1	1.2363	800-900	max. 0,4
	X 155 CrVMo 12-1	1.2379	1000-1200	max. 0,2
	X 45 NiCrMo 4	1.2767	600-700	max. 0,8
	90 MnCrV 8	1.2842	550-650	max. 0,8
Hot-work steel	42 Cr 13	1.2083	1000-1200	max. 0,2
	40 CrMoV 5-1	1.2344	900-1200	max. 0,2
	60 WCrMoV 9-4	1.2622	800-900	max. 0,2
	55 NiCrMoV 6	1.2713	500-600	max. 0,6
	15 CrCoMoV 10-10-5	1.2886	1000-1200	max. 0,2
Corrosion- and acid-resistant steel	X 30 Cr 13	1.4028	950-1200	max. 0,2
	X 14 CrMoS 17	1.4104	950-1200	max. 0,2
	X 90 CrMoV 18	1.4112	950-1200	max. 0,2
	X 38 CrMoV 15	1.4117	950-1200	max. 0,2
	X 5 CrNi 18 10	1.4301	950-1200	max. 0,2
	X 10 CrNiS 18-9	1.4305	950-1200	max. 0,2
	X 5 CrNiMo 17 12 2	1.4401	950-1200	max. 0,2
	X 90 CrCoMoV 17	1.4535	950-1200	max. 0,2
Cast iron	GG 25 CrMo		600-700	max. 0,2

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