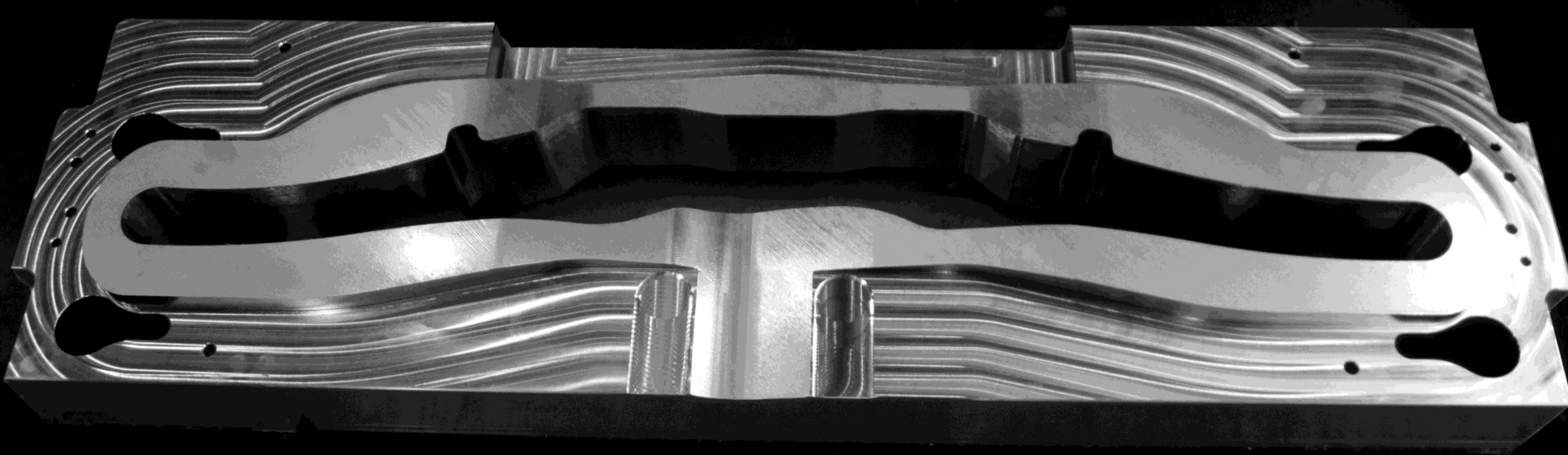




Toolox[®] para deformacion en frio

SSAB

TOOLOX® IN COLD WORK TOOLS

Toolox® is a unique steel for production of mold, die, tool and engineering applications. Toolox® is based on the low- carbon and ultra clean steel metallurgical concept which gives to it extraordinary properties.

Toolox® is delivered in quenched and tempered (at 590°C) condition and has guaranteed and tested hardness and impact toughness. There are 3 different hardness level of Toolox®: 30, 40 and 45 HRC.

Toolox® is used in cold work mainly for forming, bending, drawing where its combination of high strength, fatigue and toughness values gives an optimum result. Toolox® is also successfully implemented for other die components such as guide plates, supporter plates and staple holder plate.

Compared to materials such as 1.2379, Toolox® eliminates the time losses, distortion, cracking etc. related to heat treatment. It gives fast tool production and short commissioning time advantages.

Eliminating heat treatment also gives possibility to use longer parts (pic.2) without distortion risk. Instead of making segments with extensive CNC machining work on the tool. It also makes easier other costly operations such as CAD/CAM programming.

The low-carbon concept of Toolox® grades make them suitable for oxy/plasma/laser and wire EDM cutting. Making it possible to costeffectively produce non-square components. Also welding is much easier to carry out.



Pic.1: Washing machine die.



Pic.2: No segment (monoblock) on drawing edge.

Surface hardening and tool life expectation

Toolox® is an ideal steel for surface hardening processes such as nitriding, PVD coating and induction hardening. Depending on the expected tool life one of the surface treatment processes in below tables can be chosen. Below data is based on extensive SSAB experience. It is not to be seen as a guarantee. Instead it is to meant to be an indication what can be achieved.

Table 1: Forming, Drawing, Bending Applications

Sheet Metal Thickness	Suitable Grade			Surface Hardness/Condition			
	TX33	TX40	TX44	Polishing	Nitriding	Induction Hardening	PVD Coating
0-3 mm	Ok	Ok	Ok	Ok	+++	++	+++
3-6 mm	-	Ok	Ok	Ok	+++	++	+++
6-10 mm	-	-	Ok	-	++	+++	+
10-15 mm	-	-	Ok	-	-	++	-

Table 2: Cutting Applications

Sheet Metal Thickness	Suitable Grade	Surface Hardness/Condition			
	TX44	No Treatment	Nitriding	Induction Hardening	PVD Coating
0-3 mm	Ok	+	-	++	++
3-6 mm	Ok	+	++	++	+
6-10 mm	Ok	-	+	++	+
10-15 mm	Ok	-	--	++	--

Table 3: Hardness and hardened layer depth correlation

Surface Hardening Method	TOOLOX® 33	TOOLOX® 44
	Hardness/Depth	
Nitriding	740 HV1-0.3 mm	850 HV1-0.3 mm
Induction Hardening	50 HRC-2 mm	55 HRC-2 mm
Laser Ind. Hardening	56 HRC-1 mm	64 HRC-1 mm

Availability

Plates from 6 – 130 mm. Bars between 21 and 172 mm with lengths up to 5000 mm. Toolox® is available from the local SSAB stock. Cut pieces of Toolox® can be obtained through the well-established global network of Approved Toolox® Distributors. Both SSAB and distributors can also provide you with good application support as well as technical guidelines.

Contact and more information

Contact your local sales representative to learn more, visit www.toolox.com or consult Tech Support at: help@ssab.com.



STRENX™
PERFORMANCE STEEL

The high-
strength, high-
performance
steel



HARDOX®
WEAR PLATE

The renowned
hard and tough
steel for
aggressive
environments



DOCOL®
THE AUTOMOTIVE STEEL

Safety for
automotive



TOOLOX®
ENGINEERING & TOOL STEEL

The premium
engineering and
tool steel



ARMOX®
PROTECTION PLATE

Hardest steel for
maximum
protection



GREENCOAT®
COLORFUL STEEL

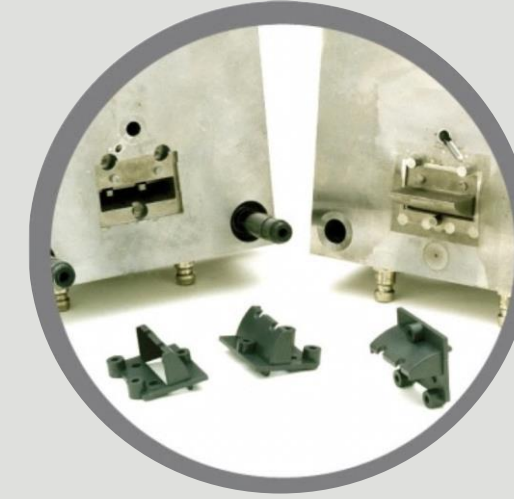
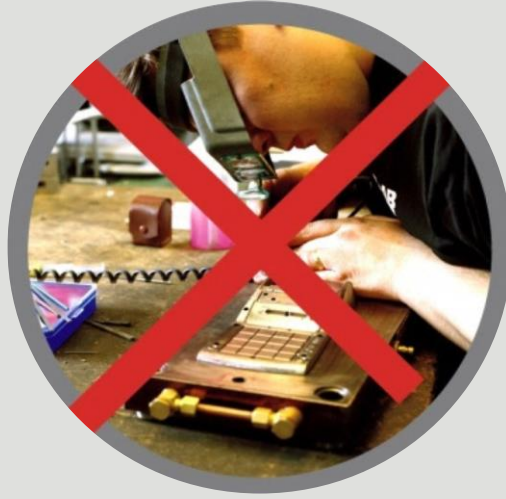
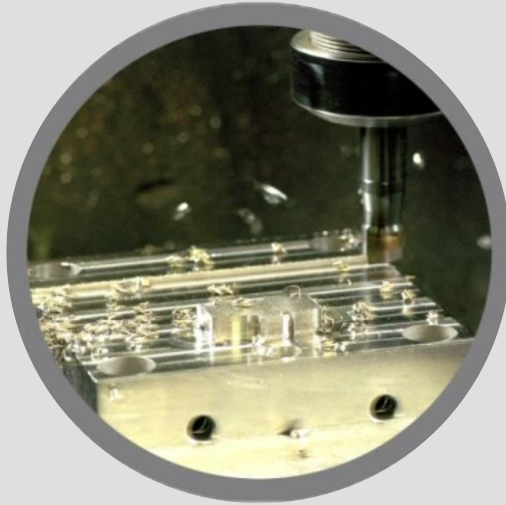
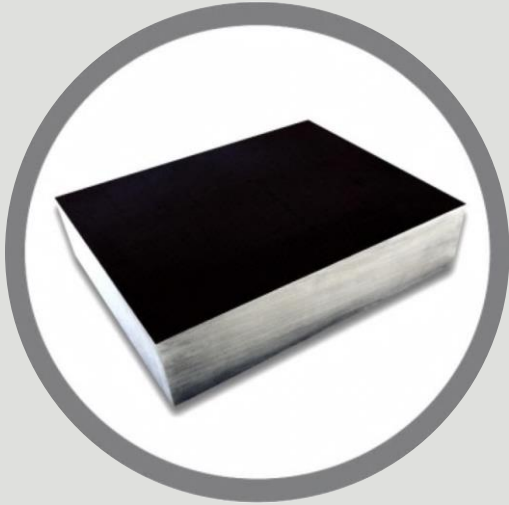
For harsh
weather and
greener living



SSAB
DOMEX / BORON
FORM / WEATHERING
LASER® PLUS

Optimized
families

SSAB



”Durante los primeros 6 meses 2014,
ahorramos 40 dias utilizando Toolox[®] 44
para fabricar nuestros troqueles. Hasta el
comienzo de las pruebas” *Automotive T1 supplier*

La empresa ha cambiado todas sus piezas para embuticion para su propio
production a Toolox[®] 44

Toolox[®] 33
300 HB

Toolox[®] 40
40 HRc

Toolox[®] 44
45 HRc

+

Nitruración • PVD • Temple con Laser • Temple por Inducción



SSAB

Pureza de aceros SSAB en comparison con aceros estandar



Toolox® 44		W.Nr 1.2379 (D2)
Dureza	410-475 HBW	(tratado a 55-62 HRc)
Garantia de resiliencia	Min 18 J @ RT	Ninguno
C	0.31	1.55
Mn	0.90	-
Cr	1.35	12.0
Ni	0.70	-
Mo	0.80	0.70
V	0.145	0.80
CE	0.97	4.25



SSAB

SSAB EMEA AB, SE-613 80 OXELÖSUND, Sweden A01			
Inspection certificate EN 10 204 - 3.1 A02	Issuing department Quality inspection A05	Purchaser order no SC 93 527 - 232 A07	Our order no 10056586-190 A08
		Invoice no A19	Certificate no and date 17220868 2018-04-10 A03

Purchaser SSAB Oxelösund AB C/O Bvba Thor Shipping & Transport Quay 117-123, Vrieskaaiport 2030 Antwerpen Belgium	A11 46172		Product Tool steel		B01	Marking (Stamping) Manufacturer, MATERIAL ID		B06	Customer marks		B15	
	Quantity 1	B08	Dimensions (mm) T 66 W 2115 L 5040		B09-B11		Weight (kg) 5662	B12	Deliv. Cond. Q	B04	Internal code 20794	B16
	Consignee SSAB Oxelösund AB C/O Bvba Thor Shipping & Transport Quay 117-123, Vrieskaaiport 2030 Antwerpen Belgium							A06	Standard/rules OX Steel grade TOOLOX 44			
MATERIAL ID 085782-231717												B07

Chemical composition C71-C92															Carbon equivalent etc C93-C99
Heat no	C	Si	Mn	P	S	Cr	Ni	Mo	V	Ti	Cu	Al	Nb	B	N
085782	.32	1.08	.78	.007	.001	1.32	.05	.778	.138	.013	.02	.013	.016	.002	.005

Testtype C04	Millcode C00	Specimen position C01	Direction C02	Treatment B05	Specimen type C10	Temp [degr C] C03	Test results			
Impact test (1/4 T)	427234	Tail end	Longitudinal	Delivery condition	Charpy-V 10x10	20	C42 E [J] 26	C42 E [J] 26	C42 E [J] 29	C43 Ave [J] 27
Hardness test (HBW)	427247	Tail end		Delivery condition			C32 Ave 456			
Tensile Test	427250	Tail end	Longitudinal	Delivery condition	Round		C11 Rp0.2 [MPa] 1310	C12 Rm [MPa] 1472	C13 A5 [%] 13	

Ultrasonic testing: Satisfactory results according to: TOOLSTEEL

	This certificate is produced with EDP and valid without signature Z02	It is hereby certified that the material described above complies with the requirements of the order. Z01	A22	TOOLOX® PREHARDENED TOOL STEEL www.toolox.com A04
	Quality Inspection Department/ A Backlund / S Koekkoek			



Espesor
6 – 165 mm

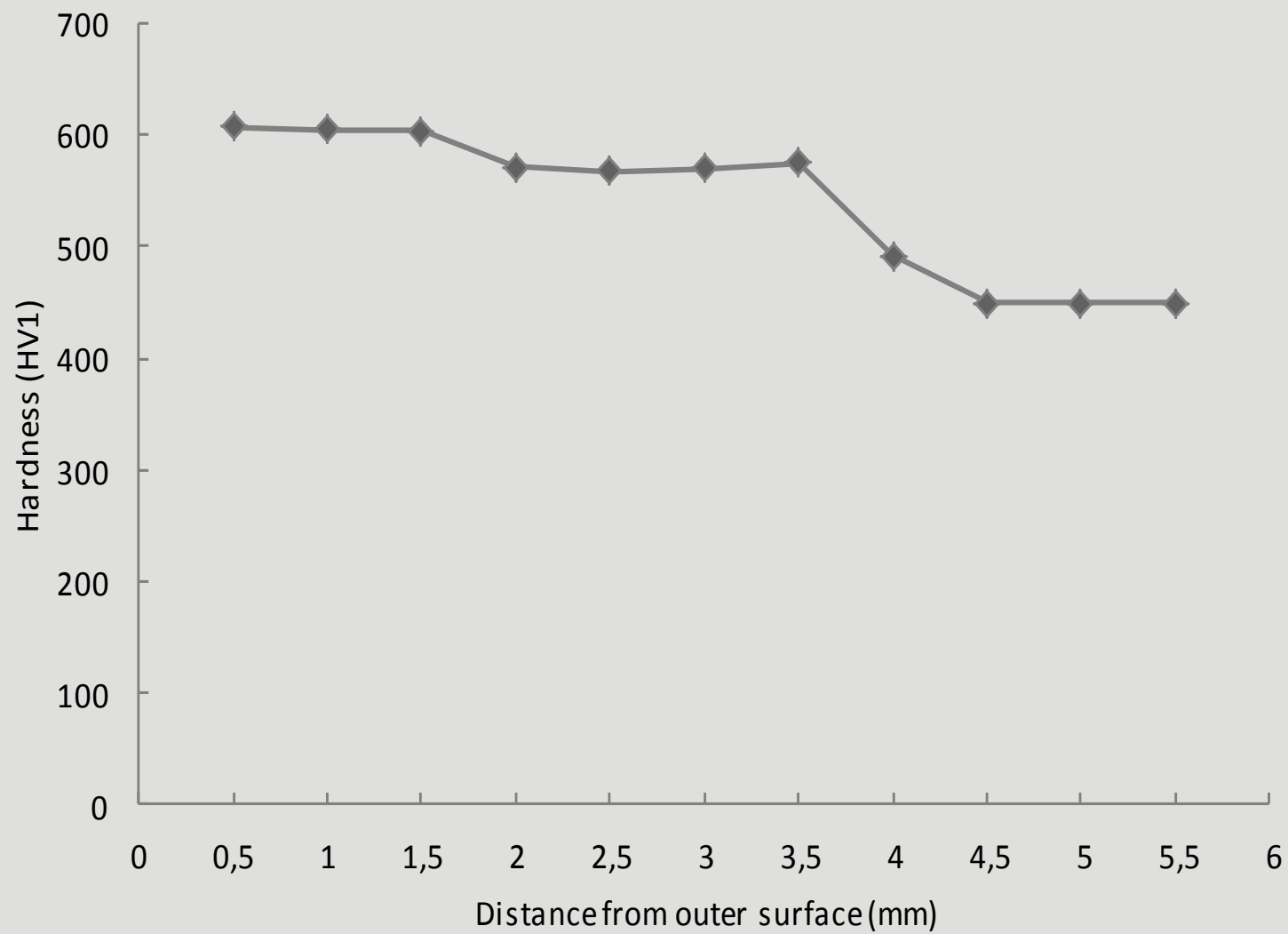
TOOLOX[®]
ENGINEERING & TOOL STEEL



Diametro
16 – 353 mm

TOOLOX®
ENGINEERING & TOOL STEEL

	Tipo de nitruración	Temp. (C°)	Tiempo de tratamiento(hrs)	Dureza superficial (HV ₁)	Espesor de la capa nitrurada (mm)
Toolox® 33	Nitro-carburizado en baño de sal	580	1.75	790	0.18
	Nitro-carburizado en baño de sal	580	1.5	800	0.19
	Nitro-carburizado con gas	580	4	780	0.27
	Nitruración con gas	520	12	760	0.23
	Nitruración con gas	520	30	720	0.64
	Nitruración con plasma	540	8	780	0.55
	Nitruración con plasma	540	12	800	0.44
	Nitruración con plasma	540	30	810	0.51
Toolox® 44	Nitro-carburizado en baño de sal	580	1.5	820	0.18
	Nitro-carburizado con gas	580	4	840	0.27
	Nitruración con gas	520	12	750	0.19
	Nitruración con gas	520	30	660	0.55
	Nitruración con plasma	540	8	840	0.31
	Nitruración con plasma	540	12	880	0.28
	Nitruración con plasma	540	30	760	0.41



Equipo Media frecuencia
induction vertical
Frecuencia 10 kHz
Potencia 100 kW

Estampacion, Embuticion profunda y Plegado

Espesor de la chapa a deformar	Tipo de Toolox aconsejable			Condicion de superficie			
	TX33	TX40	TX44	Pulido	Nitruracion	Temple induction	PVD
0-3 mm	Ok	Ok	Ok	Ok	+++	++	+++
3-6 mm	-	Ok	Ok	Ok	+++	++	+++
6-10 mm	-	-	Ok	-	++	+++	+
10-15 mm	-	-	Ok	-	-	++	-



Barra para chasis del coche Ford.

3 mm DC04

Despues 5 años mas que 1 million de
piezas han sido fabricados

Porque Grupo Segura han utilizado Toolox[®] 44 para mas que 100 utiles de estampacion

- ▶ No hace falta mecanizar dos veces
- ▶ Puede hacer modificaciones en 45 HRc y no como antes en 60 HRc
- ▶ Mantenimiento mas facil
- ▶ Nunca problemas en el production

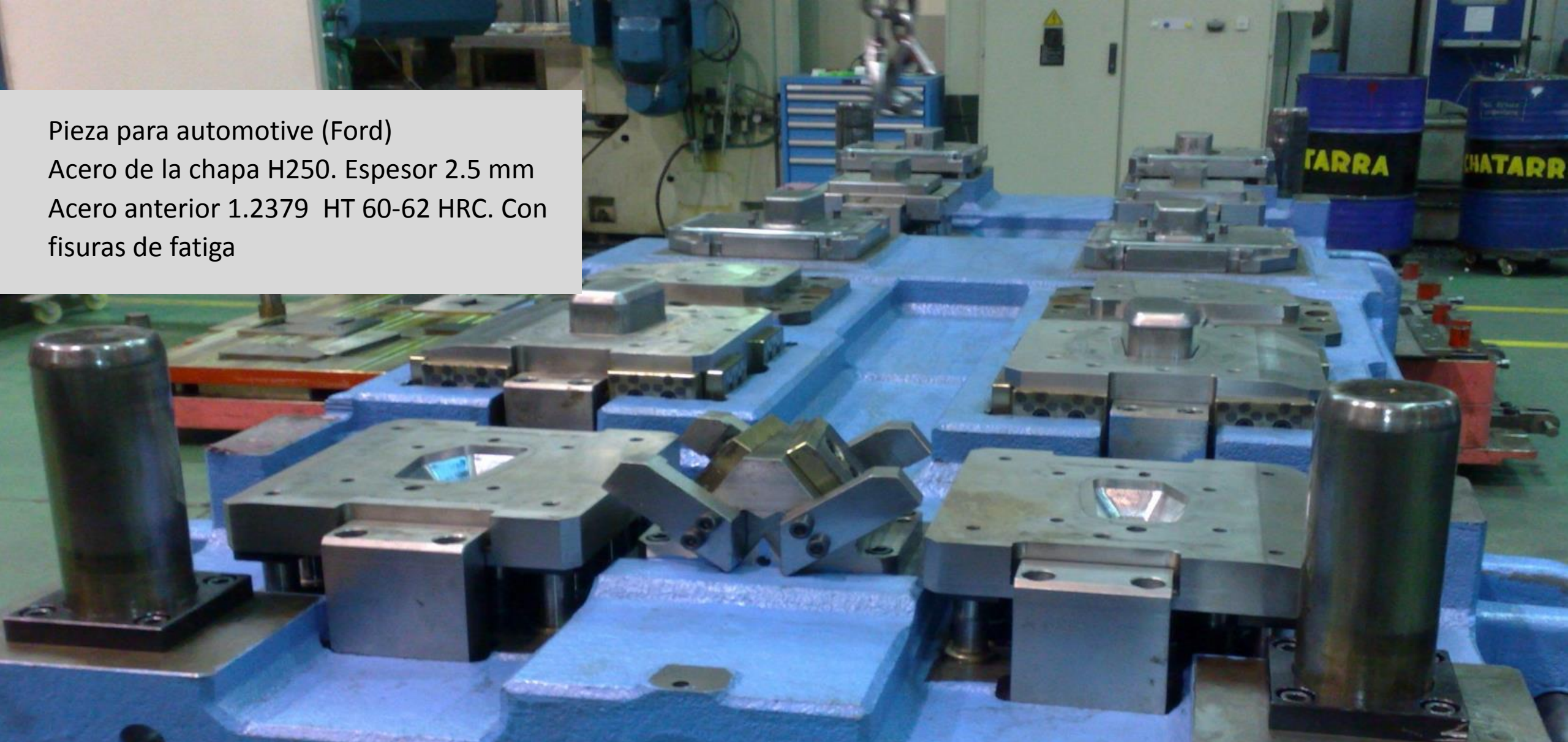


Material	Chapa a deformar	Vida del troquel	Estado
Toolox® 44	DP400 1 mm	1.600.000 pcs	Todavía trabajando

Pieza para automotivo (Ford)

Acero de la chapa H250. Espesor 2.5 mm

Acero anterior 1.2379 HT 60-62 HRC. Con
fisuras de fatiga

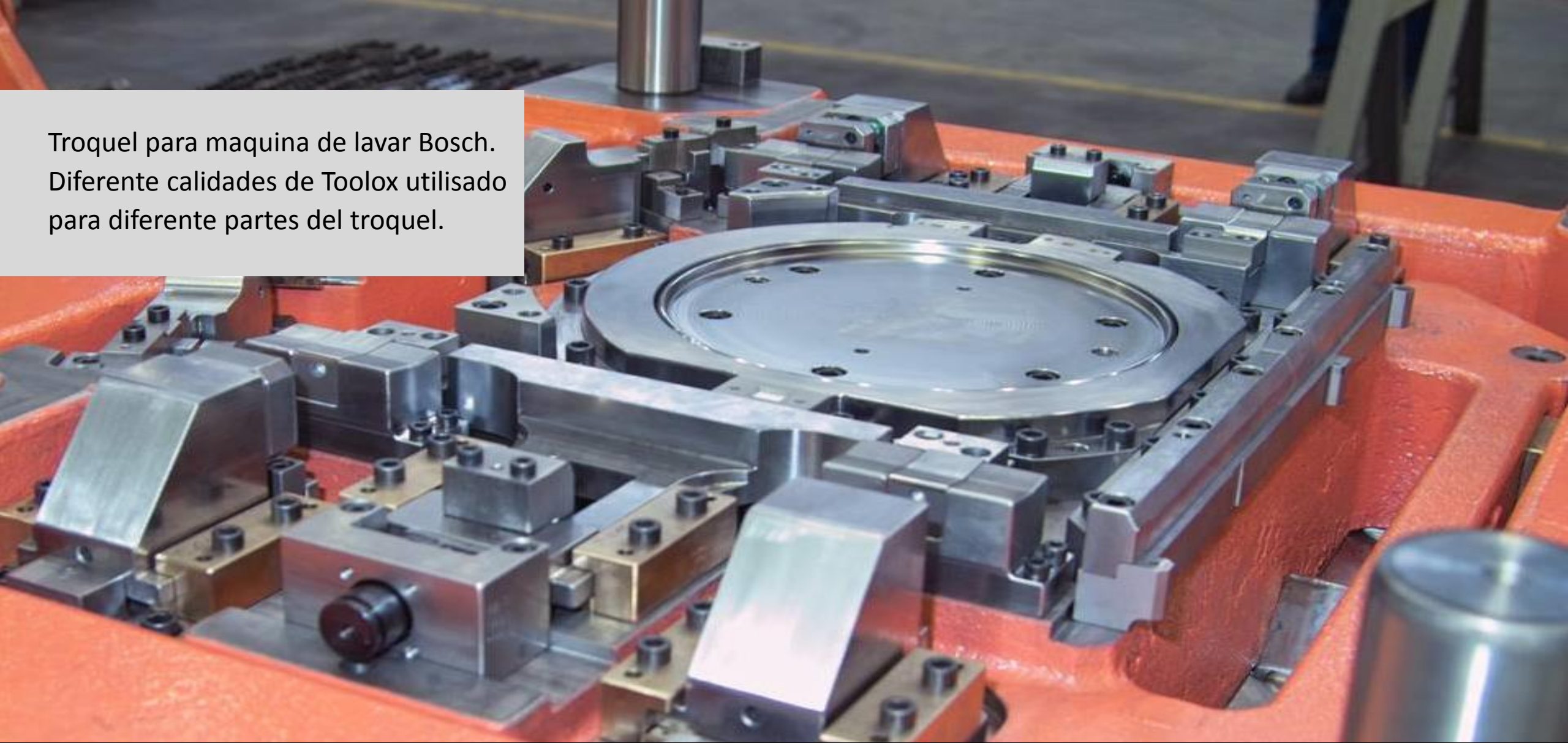






Material	Vida del util	Estado
Toolox® 44 + nitruración	800.000 pcs	Desgaste mínimo, Todavía en producción

Troquel para maquina de lavar Bosch.
Diferente calidades de Toolox utilizado
para diferente partes del troquel.



Capa hecho en acero inoxidable. Para el equipo de aire acondicionado para un camion Scania.

Toolox® 44 + nitruración + PVD



Corte

	Tipo de Toolox	Condicion del superficie			
Espesor de la chapa para cortar	TX44	Sin tratamiento superficial	Nitruracion	Temple por induccion	PVD
0–3 mm	Ok	+	-	++	++
3–6 mm	Ok	+	++	++	++
6–10 mm	Ok	-	+	++	+
10–15 mm	Ok	-	--	++	--



Canto de corte templado
con induccion

Corte de chapa de 0.9 mm

Material	Dureza	Vida del util	Razon del fallo
1.2379	56-58 HRc	20.000 pcs	Fisuras
Toolox® 44 + Ind.	57 HRc	50.000 pcs	Sin desgaste
Toolox® 44 + Ind.	57 HRc	80.000 pcs	Desgastado



Material	Chapa deformado	Vida del util	Estado
Toolox® 44 + Nitruración	270 MPa. Espesor 3.8 mm	> 256000	Todavía en producción



Application Trimming
Material 1040 forjado
Espesor 4 – 4,5 mm

Material	Dureza	Vida del util	Estado
1.2358	55-56 HRc	3.500 pcs	Desgastado
%8 Cr acero	58 HRc	5.000 pcs	Desgastado
Toolox® 44	45 HRc + Nitrucion	6.000 pcs	Desgastado

TOOLOX[®]

ENGINEERING & TOOL STEEL