Part Submission Warrant

MAGNA GETRAG

312761

Part Name:	Speed Gear 3	Cust. Part No.:	251.1.1248.50
Shown on Drawing No.:	251.1.1248.50	Org. Part No.:	251.1.1248.50
Engineering Change Level:	3 Index "a" (C009912_MIP_1)	Dated:	27/06/2017
Additional Engineering Changes:	na	Dated:	na
Safety and/or Government Regulation:	☐ Yes ☑ No Purchase Order No.:	Weight (kg):	1.017
Checking Aid No.:	na Checking Aid Engineering Change Level: na	Dated:	na

ORGANIZATION MANUFACTURING INFORMATION

Getrag S.p.A.
Organization Name & Supplier / Supplier Code

Via dei Ciclamini, 4
Street Address

Modugno (Ba) Puglia 70026 Italy
City Region Postal Code Country

CUSTOMER SUBMITTAL INFORMATION

Bari assembly line (GPS4)
Customer Name / Division

na
Buyer / Buyer Code

DCT300
Application

MATERIALS REPORTING

Has customer-required Substances of Concern information been reported? ☐ Yes ☐ No ☑ n/a

Submitted by IMDS or other customer format:
(IMDS=International Material Data System)

Are polymeric parts identified with appropriate ISO marking codes? ☐ Yes ☐ No ☑ n/a

REASON FOR SUBMISSION (Check at least one)

- ☑ Initial Submission
- ☐ Engineering Change(s)
- ☐ Tooling: Transfer, Replacement, Refurbishment, or additional
- ☐ Correction of Discrepancy
- ☐ Tooling Inactive > than 1 year
- ☐ Change to Optional Construction or Material
- ☐ Supplier or Material Source Change
- ☐ Change in Part Processing
- ☐ Parts Produced at Other or Additional Location
- ☐ Other - please specify below (e.g. additional specific customer requirement or e.g. change of EP parts

REQUESTED SUBMISSION LEVEL (Check one)

- ☐ Level 1 - Warrant only (and for designated appearance items, an Appearrance Approval Report) submitted to customer.
- ☐ Level 2 - Warrant with product samples and limited supporting data submitted to customer.
- ☑ Level 3 - Warrant with product samples and complete supporting data submitted to customer.
- ☐ Level 4 - Warrant and other requirements as defined by customer.
- ☐ Level 5 - Warrant with product samples and complete supporting data reviewed at organization's manufacturing location.

SUBMISSION RESULTS

The results for: ☑ dimensional measurements ☑ material and functional tests ☐ appearance criteria ☑ statistical process package

These results meet all drawing and specification requirements: ☑ Yes ☐ No (If "NO" - Explanation Required)

Mold / Cavity / Production Process na

DECLARATION

I hereby affirm that the samples represented by this warrant are representative of our parts which were made by a process that meets all Production Part Approval Process Manual 4th Edition Requirements. I further affirm that these samples were produced at the production rate of **163 / 8** hours. I also certify that documented evidence of such compliance is on file and available for review. I have noted any deviations from the declaration below.

EXPLANATION / COMMENTS: - First PPAP Submission (only differences from variant 251.1.1086.50).
- Identification grooves according with change C006077

Is each Customer Tool properly tagged and numbered? ☐ Yes ☐ No ☑ n/a

Organization Authorized Signature: Date: **18/05/2018**

Print Name: **Tursi Dario Maria** Phone No.: **+39 0805858360** Fax No.:

Title: **7DCT300 Launch Manager** E-Mail: dario.tursi@magna.com

FOR CUSTOMER USE ONLY (If applicable))

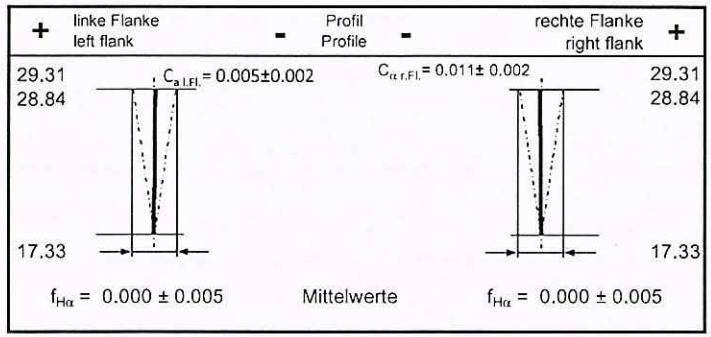
Part Warrant Disposition: ☑ Approved ☐ Rejected ☐ Other

Customer Signature: Date: 18.05.18

Print Name: F. SPEDRACATENA Customer Tracking No.:

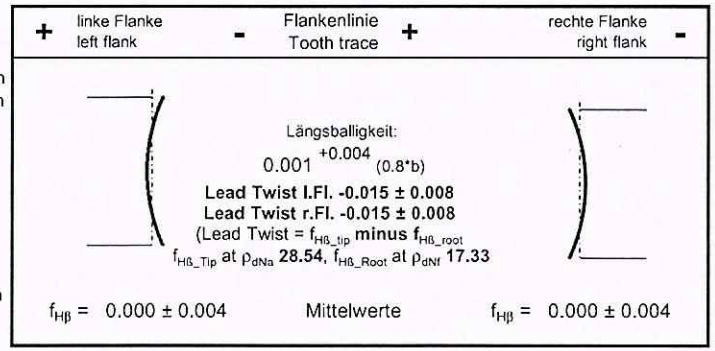
Released by Fabrizio.Cricenti on 2017-11-10
Document Status: approved

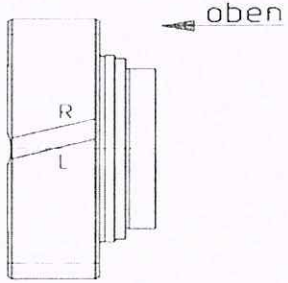
STIRNRAD / GEAR	außenverzahnt / external	Toleranzen der Verzahnung (DIN 3961 vom Aug. 1978) gültig für Werte am Einzelzahn / Tolerances of gearing (DIN 3961 of Aug. 1978) valid for values at individual tooth (7)				
Zähnezahl z / Number of teeth	50		linke Fl. / left flank	rechte Fl. / right flank		
Modul m_n / Normal module	1.950000	Profil-Formabweichung $f_{f\alpha}$ / Profile form error	0.005		Eingriffsteilungs-Abweich. f_{pe} / Normal pitch error	0.010
Eingriffswinkel α_n / Normal pressure angle	17° 30' 0"	Profil-Gesamtabweichung F_α / Total profile error			Teilungs-Einzelabweichung f_p / Adjacent pitch error	0.010
Schrägungswinkel β / Helix angle	30° 36' 0"	Profil-Winkelabweichung $f_{H\alpha}$ / Profile angle error	0.000 ± 0.008	0.000 ± 0.008	Teilungssprung f_u / Diff. bet. adjacent pitches	0.012
Steigungsrichtung / Hand of helix	LINKS	Flankenl.-Winkelabweich. $f_{H\beta}$ / Tooth alignment error	0.000 ± 0.008	0.000 ± 0.008	Teilungs-Summenabweich. F_{pk} / Cumulative circ. pitch error	
Profilverschiebungsfaktor x / Addendum modification coeff.	0.741	Flankenl.-Gesamtabweich. F_β / Total alignment error			Rundlaufabweichung F_r / Radial run-out	0.022
Teilkreisdurchmesser d / Pitch diameter	113.274	Flankenl.-Formabweich. $f_{f\beta}$ / Longitudinal alignment err.	0.005		Zahndickenschwankung R_S / Range of tooth thickn. error	
Kopfkreisdurchmesser d_a / Outside diameter	121.90 $_{-0.26}$	Teilungs-Gesamtabweich. F_p / Cumulative pitch error	0.032			
Kopfnutzkreisd. theo. max. d_{Na} / Tip diam. usable theo.	121.45	Einf.-Wälzabweichung $F_{i'}$ / Tangential composite error			Zweifl.-Wälzabweichung $F_{i''}$ / Radial composite error	0.028
Kopfnutzkreisd. theo. min. d_{Na} / Tip diam. usable theo.	121.00	Einflanken-Wälzsprung $f_{i'}$ / Tang. tooth to tooth comp. err.			Zweifl.-Wälzsprung $f_{i''}$ / Radial tooth to tooth comp. err.	0.012
Fußkreisdurchmesser d_f / Root diameter	109.57 $_{-0.30}$	Radbreite im Meßkreis d_M b / Facewidth in meas. diam.	13.80		Meßkreis Krümmungsradius ρ_{dM} / Radius of curvature meas. diam.	23.35
Fußnutzkreisdurchmesser d_{Nf} / Root diameter usable	111.87	R. Fl. Zug				
Grundkreisradius r_b / Base circle radius	53.181					
Grundkreisdurchmesser d_b / Base diameter	106.363					
Normalzahndicke max. s_n / Normal tooth thickness	3.974					
Normalzahndicke min. s_n / Normal tooth thickness	3.944					
Meßzähnezahl k / Number of teeth spanned	9					
Zahnweite max. W_k / Base tangent length	51.943					
Zahnweite min. W_k / Base tangent length	51.914					
Meßkugeldurchmesser D_M / Ball diameter	3.0000					
Diam. Zweikugelmaß max. M_{dK} / Measurement o. balls	119.172					
Diam. Zweikugelmaß min. M_{dK} / Measurement o. balls	119.091					
Verdrehflankenspiel theo. / Circumferential backlash						



* Schreibbeginn
* Start of checking

∅ = 110.76 $_{-0.30}$ ≡ 15.45





#Waviness evaluation (fitted sine) in profile and helix direction
until 4th gear order to be documented according to G_00_05_S_0012
Order referenced to the considered gear

(a)

* ffαf (zwischen dNf und dem Schreibbeginn ds) max ffα/2, jedoch 0.003 zulässig
* ffαf (between dNf and start of checking ds) max ffα/2, 0.003 allowable.

Profil- und Flankenlinienmessung nach G_808006 und VDI/VDE 2612
Flankenlinienprüfbereich Lβ = 0.8*b hochgerechnet auf 1.0*b
Begriffe für Stirnräder nach DIN 868, 3960, 3998

Profile and helix checking according to G_808006 and VDI/VDE 2612
Tooth trace testing area Lβ = 0.8*b calculated to 1.0*b
Terms of the tooth system according to DIN (German Industrial Standards) No. 868, 3960, 3998

Bezugsprofil-Schleifscheibe
Grinding tool data
Schleifscheibenkopfhöhe h_{aP0S} = 3.300
Grinding wheel tip height
Schleifscheibenkopfradius ρ_{aP0S} = 0.669
Grinding wheel tip radius
Schleifdurchmesser = 110.76 $_{-0.30}$ ≡ 15.45
Grinding diameter

Vorbearbeitungsdaten siehe Verzahnungsblatt Vorbearbeitung gleicher Nr.
For pre-machining dimensions, see gear data sheet same number

Wkz-Profil siehe Werkzeugdatenblatt Nr.
For Tooth profile, see tool data sheet number 251.1.1248.50

Buch.	Anz.	Änd.Nr.		Datum	Name
a	1	C011518	See CO	20171108	Cricenti

Verteiler:

Schutzvermerk nach ISO 16016 beachten
Protection per ISO 16016

GETRAG
GETRAG Getriebe- und Zahnradfabrik Hermann Hagenmeyer GmbH & Cie KG

Abbildungen sind unmaßstäblich.
Diagrams not to scale.

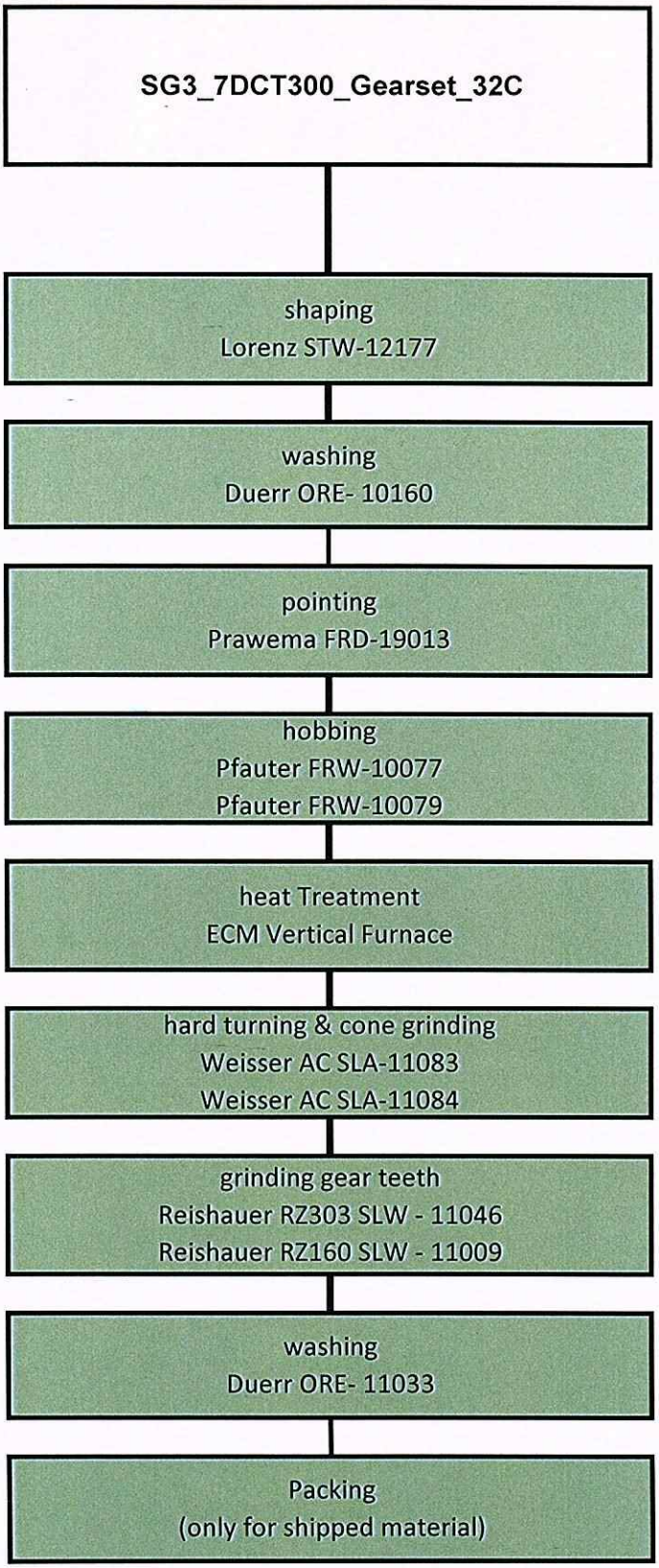
Ersatz für
Erstverwendung bei Getriebetype: 251

Remark:

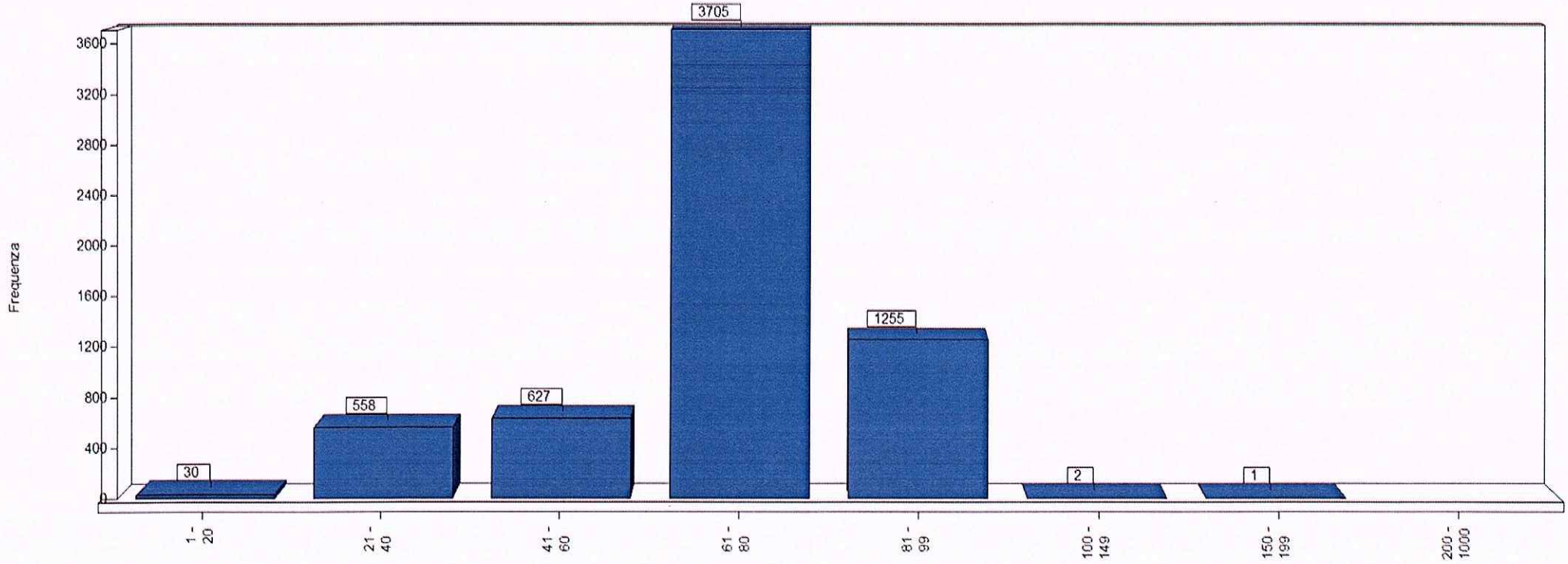
	Datum	Name
gez.	23.03.2017	Cricenti, Fabrizio
gepr.		

Verzahnungsblatt Endkontrolle
Final Check Gear Data
Benennung:
Naming:
Schaltrad 3.Gg.

Zeichnungsnummer:
Drawing number:
251.1.1248.50


SG3_7DCT300_Gearset_32C
shaping
Lorenz STW-12177
washing
Duerr ORE- 10160
pointing
Prawema FRD-19013
hobbing
Pfauter FRW-10077
Pfauter FRW-10079
heat Treatment
ECM Vertical Furnace
hard turning & cone grinding
Weisser AC SLA-11083
Weisser AC SLA-11084
grinding gear teeth
Reishauer RZ303 SLW - 11046
Reishauer RZ160 SLW - 11009
washing
Duerr ORE- 11033
Packing
(only for shipped material)

GETRAG	FMEA Processo		Numero: 1.2.1.1.1.1 Pagina:
Tipo/Modello/Produzione/Lotto: 7DCT300	Numero Disegno: Gearset 1A + 21A + 21H + 32C Stato modifica: -	Responsabile: Getrag Ditta: Getrag	Emesso: 31/08/2015
FMEA/Elemento: GEARSET 7DCT300	Codice dell'operazione: Tutte Stato modifica: -	Responsabile: Papagna, Oscuro, Nitti, Cicirelli, Tanzi T., Terlizzese, Landriscina, Guerra, Sinibaldi, Caponio, Vicenti, Picerno, Pierro, Cacciapaglia, Sisto. Ditta:	Emesso: 13/01/2017 Modificato: 14/05/2018



Record Owner: Vicenti D.	Date Issued: 06.03.2017	GIS1 Item Number: 28.04	Page: 1 / 2
Dept.: WLP	Date Revised: 14.05.2018	GIS2 Classification: Confidential	Retention Start Date (Year): 2017

Actions ongoing for RPN > 100:

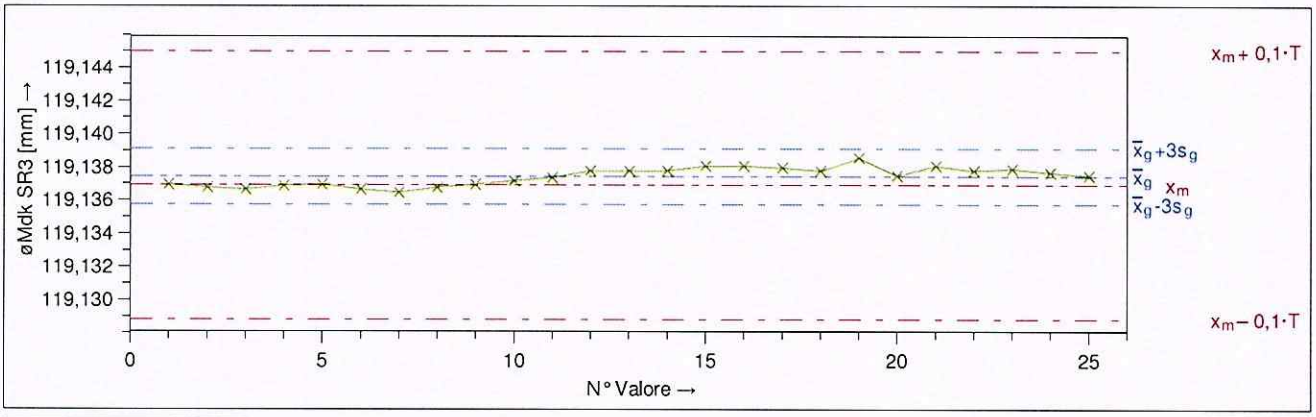
Chr. Classification	Project	Component	Operation	Chr. Description	Actual RPN				Action	Resp.	Due date	Min. RPN expected			
					S	O	D	RPN				S	O	D	RPN
<M>	DCT300	SG1	Hard Turning	Clutch body Height	7	4	4	112	Final drawing tolerance review + Dogbody height review on EP	Pierro	31-May-18	7	2	5	(70)
<M>	DCT300	SGRv	Hard Turning	Clutch body Height	7	3	5	105	Final drawing tolerance review + Dogbody height review on EP (100% Check --> Sampling check)	Pierro	30-Jun-18	7	2	5	(70)
std	DCT300	IS2	Diam. Grinding	Spline Fr	8	6	4	192	New operation implementation in order to ground new clamping surface for Diam. grinding operation (100% Check --> Sampling check)	Cacciapaglia	31-Jul-18	8	3	5	(120)
									New machine Junker implementation for Diam. grinding operation		31-Aug-18	8	2	5	(80)

Capacità strumenti di misura

Data/ora	26/04/2018	Nome oper.	mario.bozza	Reparto/Area/Prod.	WLQ	Posto di prova	Rettifica denti SR3

Calibro		Master		Caratteristica	
Desc. calibro	Banchetto in acciaio	Desc. mast.	Master Mdk SR3	Desc. Car.	øMdk SR3
N° calibro	MVZ 406001 016	N° master	MVZ 400661 002	N° Caratt.	2511124850_32C
Ris. calibro	0,0001	Valore reale mast.	119,137	Val. Nom. 119,1315 LSS	119,172 ≙ 0,0405
Caus. Pr.	Cg CgK	Unità di misura	mm	Unità di m mm LSI	119,091 ≙ -0,0405

Nota



i	x_i	i	x_i	i	x_i	i	x_i	i	x_i
1	119,1370	6	119,1367	11	119,1374	16	119,1381	21	119,1381
2	119,1368	7	119,1365	12	119,1378	17	119,1380	22	119,1378
3	119,1367	8	119,1368	13	119,1378	18	119,1378	23	119,1379
4	119,1369	9	119,1370	14	119,1378	19	119,1386	24	119,1377
5	119,1370	10	119,1372	15	119,1381	20	119,1375	25	119,1375

Valori a disegno			Valori Calcolati			Statistiche		
$x_m + 0,1 \cdot T$	=	119,145100	$x_{max\,g}$	=	119,1386	$\bar{x}_g + 3s_g$	=	119,139150
x_m	=	119,137000	$x_{min\,g}$	=	119,1365	$\bar{x}_g$	=	119,137460
$x_m - 0,1 \cdot T$	=	119,128900	R_g	=	0,0021	$\bar{x}_g - 3s_g$	=	119,135770
$0,2 \cdot T$	=	0,016200	n_{tot}	=	25	$6s_g$	=	0,003381
T	=	0,0810				s_g	=	0,000563
Unità di misura	=	mm				|Bi|	=	0,00046000
						n_{eff}	=	25

Test per Bias			Risultati del test : significativo ($\alpha \leq 0,1\%$)
Bias	=	0,57%	

Minimo riferimento per sistema di misura capace

Risoluzione	%RE =	0,12%	0 5	$T_{min\,(\%RE)}$	= 0,00200
$C_g = \frac{0,2 \cdot T}{4 \cdot s_g}$	=	$5,17 \leq \mathbf{7,19} \leq 9,21$	0 1 1,33	$T_{min\,(C_g)}$	= 0,0150
$C_{gk} = \frac{0,1 \cdot T - \lvert \bar{x}_g - x_m \rvert}{2 \cdot s_g}$	=	$4,86 \leq \mathbf{6,78} \leq 8,70$	0 1 1,33	$T_{min\,(C_{gk})}$	= 0,0196

Sistema di misura capace (%RE,min,C_g,C_{gk})

☐ GETRAG MSA 2017: Capability of measuring system (Type-1 Study)

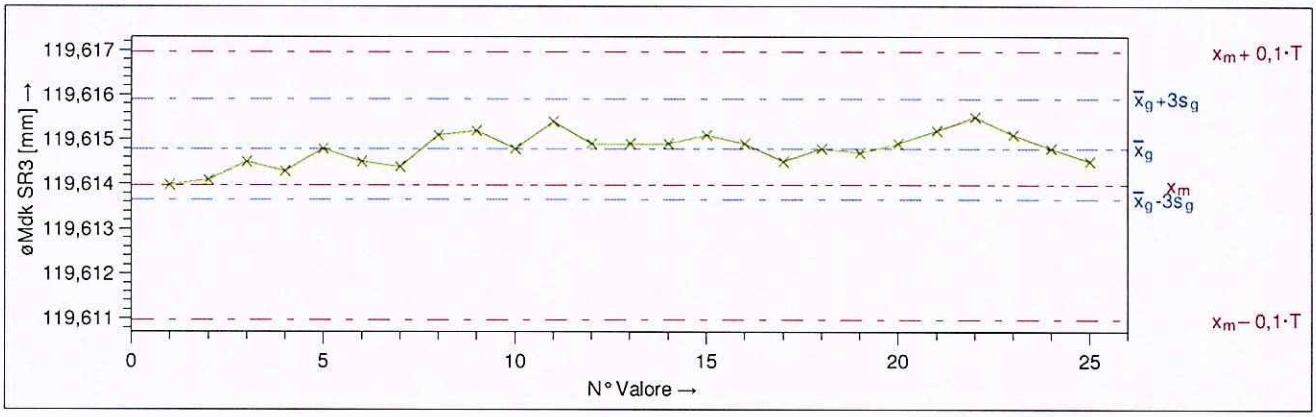
Data _____ Firma _____ Dipartimento _____

Capacità strumenti di misura

Data/ora	11/06/2018	Nome oper.	mario.bozza	Reparto/Area/Prod.	WLQ	Posto di prova	Dentatura SR3

Calibro		Master		Caratteristica	
Desc. calibro	Banchetto in acciaio	Desc. mast.	SR3	Desc. Car.	øMdk SR3
N° calibro	MVZ 406001 037	N° master	MVZ 400661 001	N° Caratt.	2511124850_32C
Ris. calibro	0,0001	Valore reale mast.	119,614	Val. Nom. 119,6200 LSS	119,635 ^= 0,0150
Caus. Pr.	Cg CgK	Unità di misura	mm	Unità di m mm LSI	119,605 ^= -0,0150

Nota



i	x_i	i	x_i	i	x_i	i	x_i	i	x_i
1	119,6140	6	119,6145	11	119,6154	16	119,6149	21	119,6152
2	119,6141	7	119,6144	12	119,6149	17	119,6145	22	119,6155
3	119,6145	8	119,6151	13	119,6149	18	119,6148	23	119,6151
4	119,6143	9	119,6152	14	119,6149	19	119,6147	24	119,6148
5	119,6148	10	119,6148	15	119,6151	20	119,6149	25	119,6145

Valori a disegno			Valori Calcolati			Statistiche		
$x_m + 0,1 \cdot T$	=	119,617000	$x_{max\,g}$	=	119,6155	$\bar{x}_g + 3s_g$	=	119,615921
x_m	=	119,614000	$x_{min\,g}$	=	119,6140	$\bar{x}_g$	=	119,614792
$x_m - 0,1 \cdot T$	=	119,611000	R_g	=	0,0015	$\bar{x}_g - 3s_g$	=	119,613663
$0,2 \cdot T$	=	0,006000	n_{tot}	=	25	$6s_g$	=	0,002258
T	=	0,0300				s_g	=	0,000376
Unità di misura	=	mm				|Bi|	=	0,00079200
						n_{eff}	=	25

Test per Bias			Risultati del test : significativo ($\alpha \leq 0,1\%$)
Bias	=	2,64%	

				Minimo riferimento per sistema di misura capace	
Risoluzione	%RE =	0,33%	0 5	$T_{min\,(\%RE)}$ =	0,00200
$C_g = \frac{0,2 \cdot T}{4 \cdot s_g}$	=	$2,87 \leq \mathbf{3,99} \leq 5,11$	0 1 1,33	$T_{min\,(C_g)}$ =	0,0100
$C_{gk} = \frac{0,1 \cdot T - \lvert \bar{x}_g - x_m \rvert}{2 \cdot s_g}$	=	$2,09 \leq \mathbf{2,93} \leq 3,77$	0 1 1,33	$T_{min\,(C_{gk})}$ =	0,0179
Sistema di misura capace (%RE,min,C_g,C_{gk})					

☐ GETRAG MSA 2017: Capability of measuring system (Type-1 Study)

Data _____ Firma _____ Dipartimento _____

GETRAG Production Part Approval

DIMENSIONAL TEST RESULTS

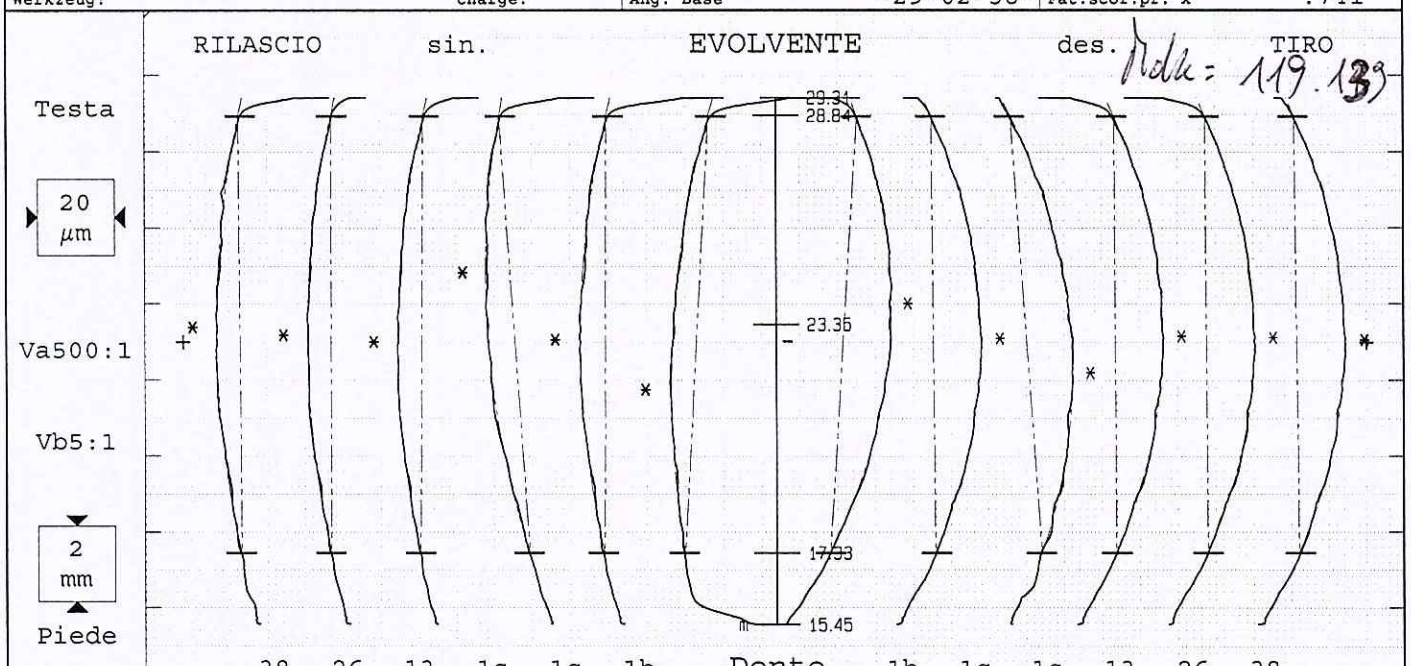
Organization:	GETRAG	Part Number:	251.1.1248.50
Supplier/Vendor Code:	GETRAG Modugno	Part Name:	Speed Gear 3
INSPECTION FACILITY:		Design Record Change Level:	3 Index "a"
NA		Engineering Change Documents:	C009912_MIP_1 - 27/06/2017

Item	Dimension/Specification	Specification / Limits		Classif.	Qty. Tested	Organization Measurement Results (Data) 1	2	3	4	5	controllo distruttivo	Ok	Not Ok
1	Teeth Profile & Lead, Pitch + Fourier Analysis	OK	NOK		5	OK	OK	OK	OK	OK		OK	
2	MdK	119.172	119.091	<M>	5	119.139	119.140	119.132	119.127	119.135		OK	
3	df	109.570	109.270		5	109.415	109.418	109.410	109.412	109.417		OK	
4	da	121.900	121.640		5	121.717	121.719	121.715	121.713	121.716		OK	
5	Fr	22	0	<M>	5	4.3	7.0	9.2	2.6	3.6		OK	

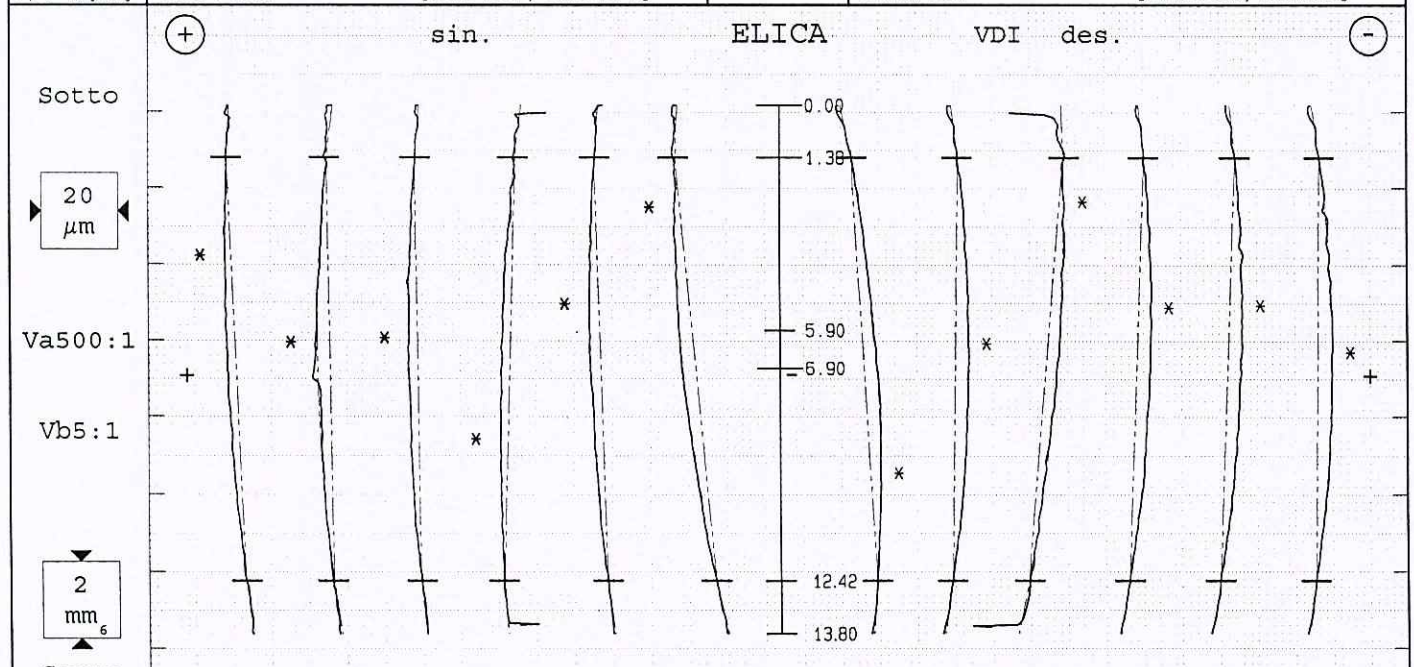
SIGNATURE	TITLE	DATE
Vicenti D.	ME	18/05/2018

Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416b04 0	P26 B7681	Controllore:	TURNO 06-12	Data:	22.04.2018 06:18
Denominazione:	SR3	Numero denti z	50	Largh.fasc.dent. b	13.8mm
Numero disegno.:	D51.1.1248.50-IF	Modulo m	1.95mm	Tratto evolv. La	11.51mm
Commessa/serie nr.:	pz n.1	Angolo pressione	17°30'00"	Tratto elica Lß	11.04mm
Masch.Nr.:	M001 Spindel: Formnext	Angolo elica	-30°36'00"	Inizio elab. M1	17.33mm
Untersuchungszweck:	Laufende Messung	ø Base db	106.3629mm	Palpatore ø	(#2) 1mm
Werkzeug:	Charge:	Ang. Base	-29°02'38"	Fat.scor.pr. x	.741



Tolerance		Medio	Val.misur [µm]						Qual	Tolerance		Val.misur [µm]						Medio	Qual
fHαm	±5	-0.1	Var a 1.6							±5		Var a 0.8						-0.8	
fHα	±8	-0.1	0.8	0.0	-0.8	8.0	-0.5	-6.2		±8		7.2	-0.8	-8.1	-0.4	-0.6	-1.2	-0.8	
Fα		2.2	2.1	1.8	2.4	8.1	2.6	7.3				7.2	2.5	9.0	2.6	2.5	3.0	2.7	
ffα	5	1.1	1.6	0.9	0.8	1.2	1.2	1.2		5		0.9	0.9	1.5	1.1	1.0	1.0	1.0	
Cα	5±2	6.3	6.1	6.2	6.4	7.0	6.5	6.2		11±2		12.4	12.5	11.8	12.6	12.6	12.7	12.6	
ffαf	3	0.9	1.1	0.8	0.8	1.2	0.7	0.6		3		0.2	0.4	1.0	0.3	0.1	0.4	0.3	
P/T-ø [mm]		109.415	[109.27/109.57]									121.717					[121.64/121.9]		



fHßm	±4	3.5	Var ß 4.4							±4		Var ß 3.8						-3.5	
fHß	±8	3.5	6.1	2.1	1.7	-3.8	4.0	13.0		±8		8.4	-2.1	-11.8	-5.2	-5.2	-1.4	-3.5	
Fß		4.2	5.9	4.2	2.9	3.6	3.9	11.7				6.9	3.6	9.7	5.3	5.7	3.7	4.6	
ffß	5	1.0	0.5	2.0	0.8	1.2	0.6	0.9		5		0.7	0.7	1.0	0.7	0.9	1.3	0.9	
Cß	1/5	2.7	2.3	3.4	2.4	2.3	2.6	3.4		1/5		3.4	3.5	3.0	3.6	3.5	3.8	3.6	
Rz	-15±8	-16.8								-15±8								-20.2	

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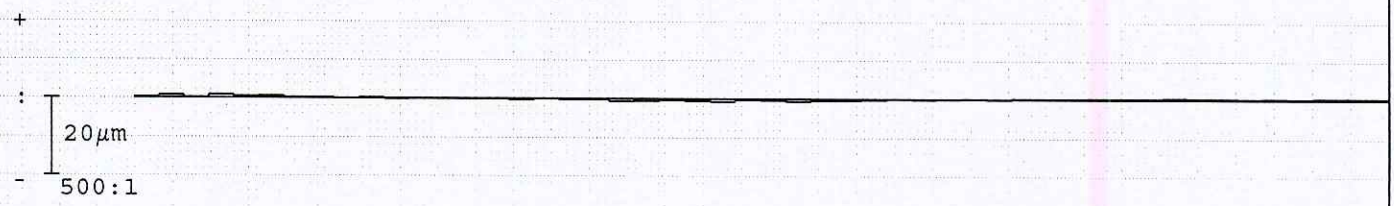
Ruota cilindrica Divisione

Nr. prog.: STI0416b04 0	P26 B7681	Controllore:	TURNO 06-12	Data:	22.04.2018 06:18
Denominazione:	SR3	Numero denti z	50	Angolo pressione	17°30'00"
Numero disegno.:	D51.1.1248.50-IF	Modulo m	1.95mm	Angolo elica	-30°36'00"
Commessa/serie nr.:	pz n.1	Untersuchungszweck:	Laufende Messung		
Masch.Nr.:	M001 Spindel: Formrect.1	Werkzeug:		Charge:	

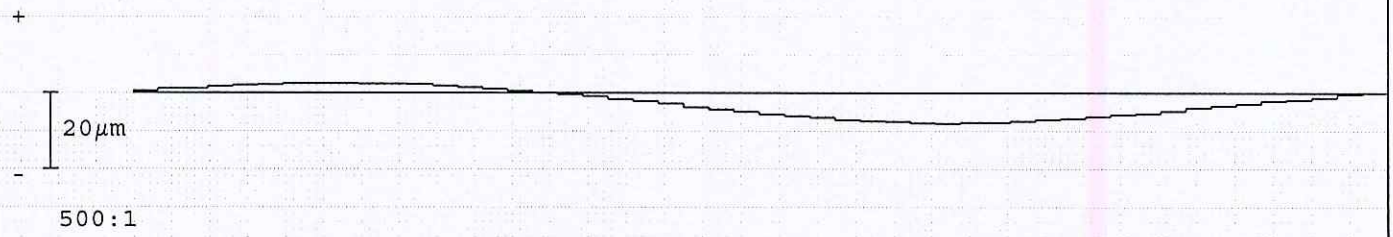
Errori singoli di divisione fp fianco sinistro



Errore somma di divisione Fp fianco sinistro

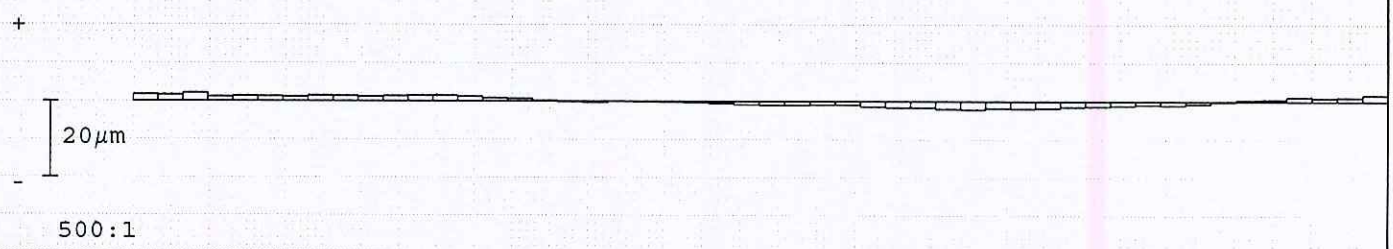
Errori singoli di divisione fp fianco destro

Errore somma di divisione Fp fianco destro



Corsa per misura divis.:116.163 z=5.9mm		fianco sinistro / RILASCIO				fianco destro / TIRO			
		Val.misur	Qual.	Val. amm	Qual.	Val.misur	Qual.	Val. amm	Qual.
Gr. err. singoli divisione	fp max	0.8		10.0		1.0		10.0	
Gr. salto di passo	fu max	0.7		12.0		0.7		12.0	
Scarto di divisione	Rp	1.6				2.0			
Err. globale di divisione	Fp	7.6		36.0		10.6		32.0	
Err. cordale di divisione	Fpz/8	3.4				4.2			

Centricità Fr (Ø-sfera =3mm) ◎ : 3.4µm



Err. di concentricitá	Fr	4.3	28.0	
Variaz. spessore dente	Rs			

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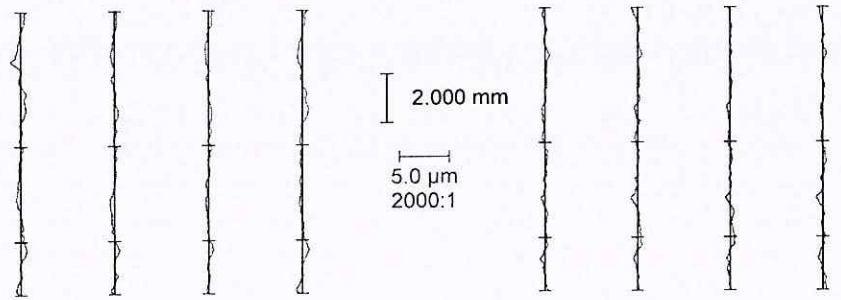
KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF | Denominazione: SR3 | 22.04.18
Serie nr: pz n.1 | Scopo: Laufende Messung | 06.18 / 06:22
Macchina: M001 | Mandrino: Formnest 1 | z= 50

Evolvente senza modifiche effettive

+/- sinistro — destro -/+

38 26 13 **1 b** — **1 b** 13 26 38



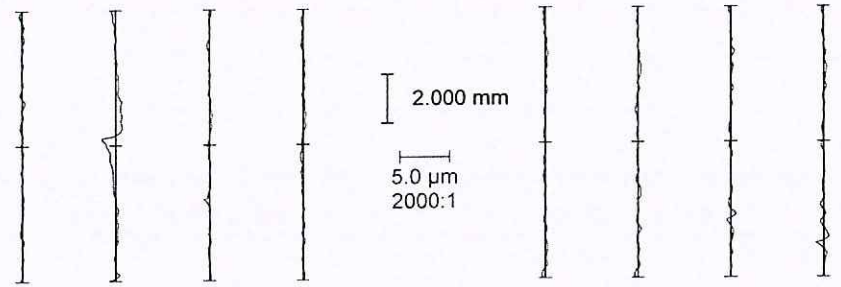
Valores medio

fhα	0.8	0.0	-0.8	-0.5	-0.2	-0.7	-0.8	-0.4	-0.6	-1.2
Fα	2.1	1.8	2.4	2.6	2.2	2.6	2.5	2.6	2.4	3.0
ffα	1.6	0.9	0.8	1.2	1.1	1.0	0.9	1.1	1.0	1.0
Cα	6.1	6.2	6.4	6.5	6.3	12.6	12.6	12.6	12.7	12.7

Elica senza modifiche effettive

+/- sinistro — destro -/+

38 26 13 **1 b** — **1 b** 13 26 38



Valores medio

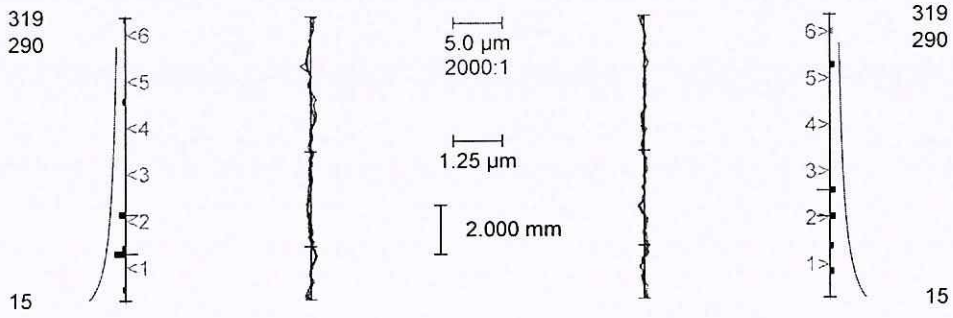
fhβ	-6.1	-2.1	-1.7	-4.0	-3.5	3.5	2.1	5.2	5.2	1.4
Fβ	5.2	4.5	3.2	4.1	4.2	4.9	3.9	5.7	5.9	4.0
ffβ	0.5	2.0	0.8	0.6	1.0	0.9	0.7	0.7	0.9	1.3
Cβ	3.5	5.3	3.7	4.1	4.2	5.6	5.5	5.6	5.5	6.0

KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF | Denominazione: SR3 | 22.04.18
Serie nr: pz n.1 | Scopo: Laufende Messung | 06.18 / 06:22
Macchina: M001 | Mandrino: Formnest 1 | z= 50

Evolvente senza modifiche effettive

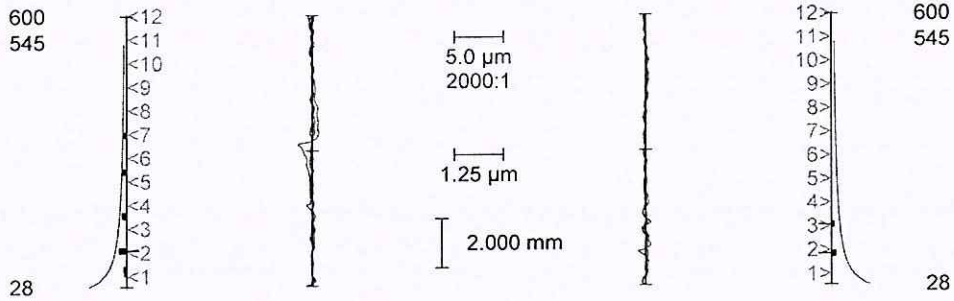
+/- sinistro — Spettro medio



A1	0.27	0.13
A2	0.15	0.13
O(1)	65	130
O(2)	107	102

Elica senza modifiche effettive

+/- sinistro — destro -/+



A1	0.19	0.11
A2	0.14	0.07
O(1)	105	93
O(2)	105	154

Spettro — tmpana_dat

KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF
Serie nr: pz n.1
Macchina: M001

Denominazione: SR3
Scopo: Laufende Messung
Mandrino: Formnest 1

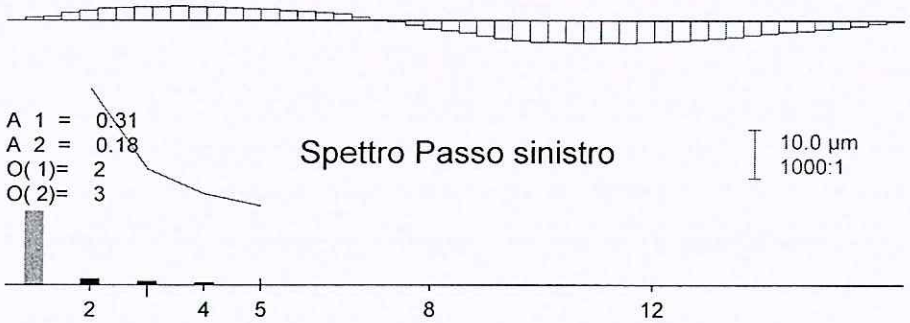
22.04.18
06:22
z= 50

Ondulazione Passo destro

Spettro Passo destro

Ondulazione Passo sinistro

2.50 µm

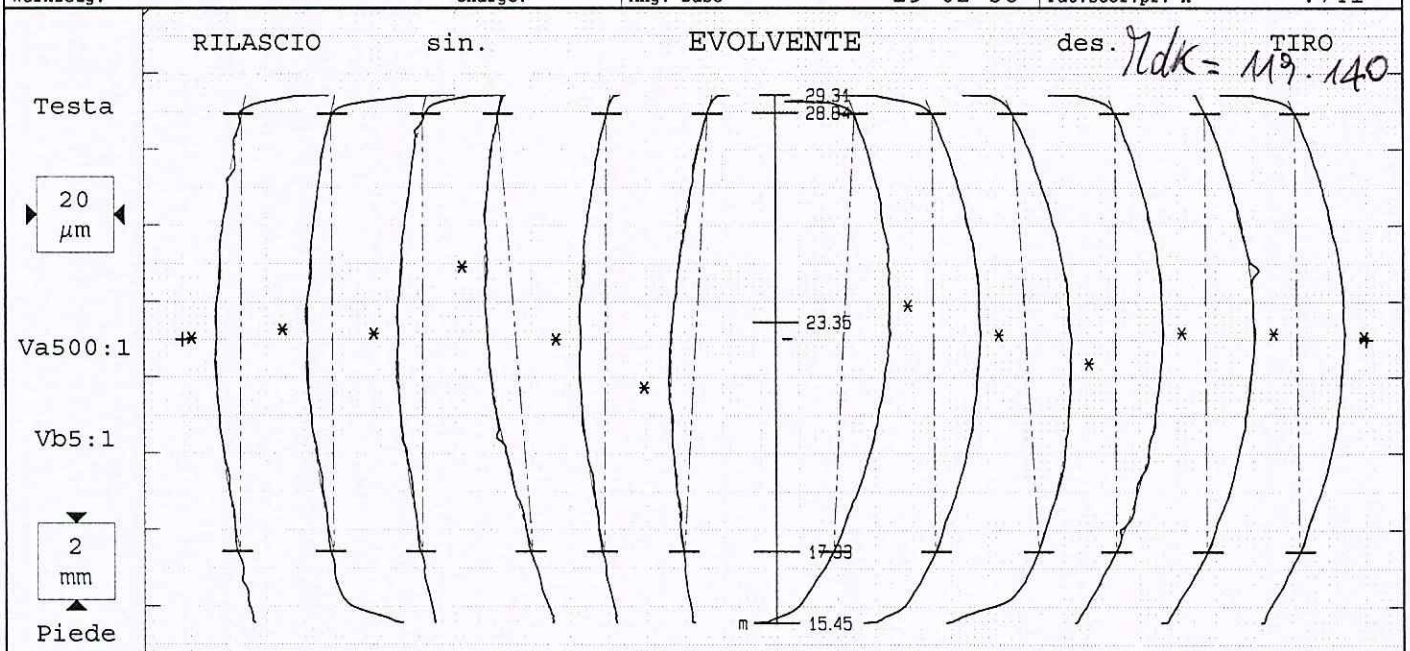


Spettro Passo sinistro

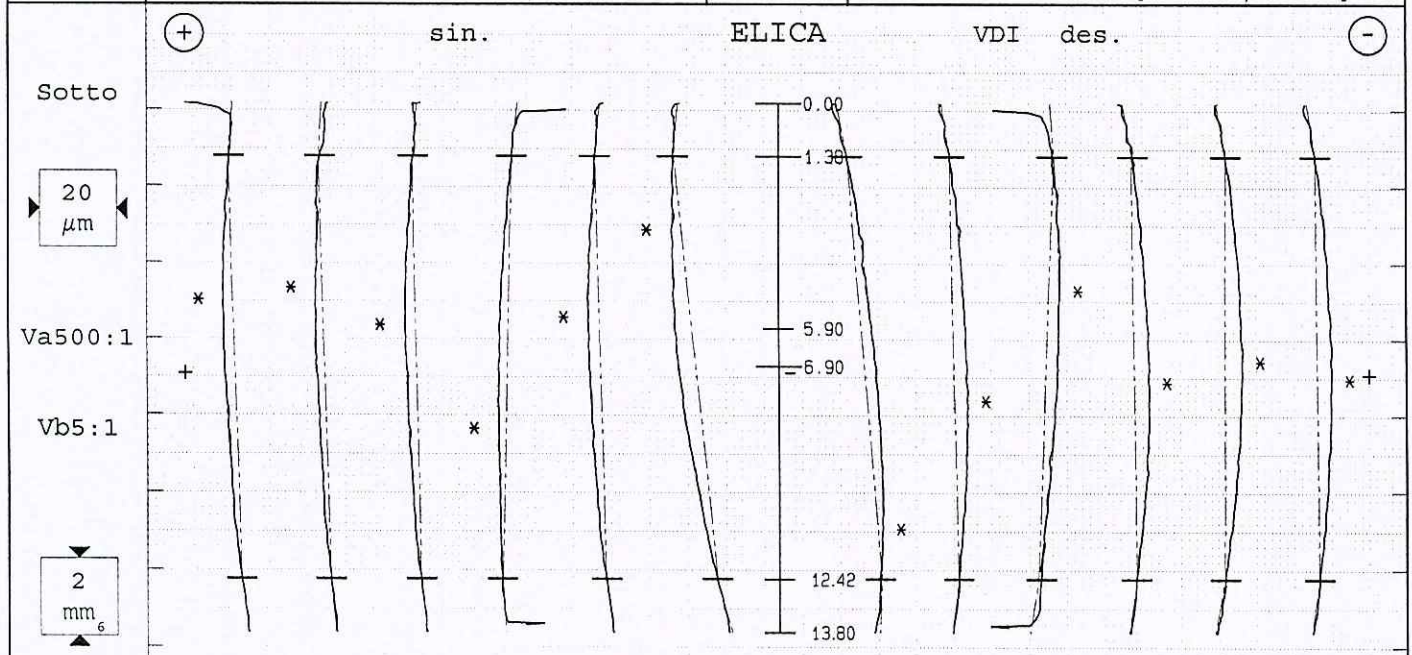
10.0 µm
1000:1

Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416b04 0	P26 B7681	Controllore:	TURNO 06-12	Data:	22.04.2018 06:28
Denominazione:	SR3	Numero denti z	50	Largh.fasc.dent. b	13.8mm
Numero disegno.:	D51.1.1248.50-IF	Modulo m	1.95mm	Tratto evolv. La	11.51mm
Commessa/serie nr.:	pz n.2	Angolo pressione	17°30'00"	Tratto elica Lß	11.04mm
Masch.Nr.:	M001 Spindel: Formnext	Angolo elica	-30°36'00"	Inizio elab. M1	17.33mm
Untersuchungszweck:	Laufende Messung	ø Base db	106.3629mm	Palpatore ø	(#2)1mm
Werkzeug:	Charge:	Ang. Base	-29°02'38"	Fat.scor.pr. x	.741



Tolerance		Medio	Val.misur [µm]						Qual	Tolerance	Val.misur [µm]						Medio	Qual
fHαm	±5	-0.4	Var a 1.2							±5	Var a 1.2						-0.5	
fHα	±8	-0.4	-0.7	0.4	-0.3	9.0	-0.8	-6.3		±8	5.9	-0.5	-6.7	0.0	-0.3	-1.2	-0.5	
Fα		2.7	2.7	2.3	3.0	8.7	2.6	6.6			5.8	2.1	6.8	2.7	4.0	2.4	2.8	
ffα	5	1.7	1.9	1.6	1.8	2.2	1.3	1.2		5	0.9	0.8	1.0	2.0	3.0	0.7	1.6	
Cα	5±2	6.6	6.5	6.6	6.5	7.4	6.6	6.2		11±2	12.0	12.3	11.9	12.4	12.7	12.5	12.5	
ffαf	3	1.5	1.4	1.3	1.8	2.1	1.7	1.6		3	0.0	0.2	0.0	0.0	0.2	0.1	0.2	
P/T-ø [mm]		109.418	[109.27/109.57]								121.719					[121.64/121.9]		



fHßm	±4	3.5	Var ß 1.6							±4	Var ß 3.2						1.2	
fHß	±8	3.5	4.2	3.7	2.6	-3.2	3.3	14.0		±8	11.2	2.7	-5.5	1.5	-0.5	1.1	1.2	
Fß		6.5	15.4	3.5	3.3	3.0	3.9	12.1			8.9	3.8	4.6	3.3	3.8	3.5	3.6	
ffß	5	0.8	0.8	0.9	0.8	0.6	0.7	0.9		5	1.1	0.9	1.4	0.9	0.6	0.6	0.8	
Cß	1/5	2.6	2.7	2.0	2.7	2.2	2.9	4.4		1/5	2.9	3.4	3.0	3.9	4.4	3.7	3.9	
Pd	-15±8	-17.2								-15±8							16.7	

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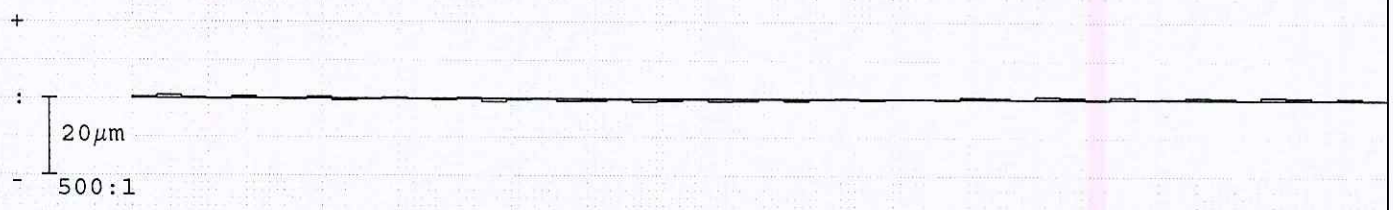
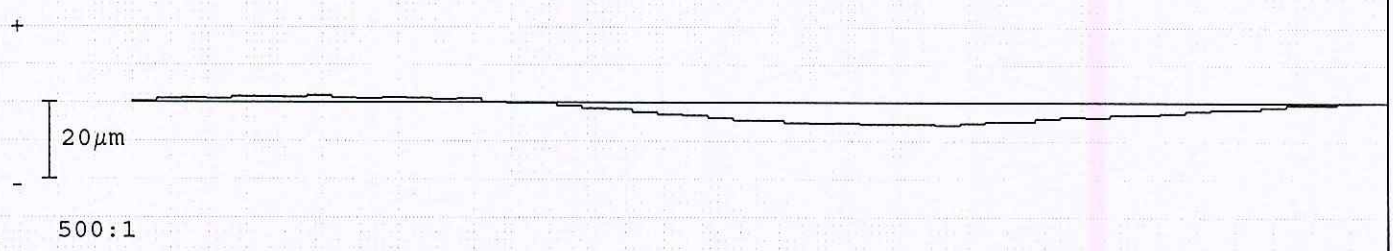
Ruota cilindrica Divisione

Nr. prog.: STI0416b04 0	P26 B7681	Controllore:	TURNO 06-12	Data:	22.04.2018 06:28
Denominazione:	SR3	Numero denti z	50	Angolo pressione	17°30'00"
Numero disegno.:	D51.1.1248.50-IF	Modulo m	1.95mm	Angolo elica	-30°36'00"
Commessa/serie nr.:	pz n.2	Untersuchungszweck:	Laufende Messung		
Masch.Nr.:	M001	Spindel: Formrecht 1	Werkzeug:	Charge:	

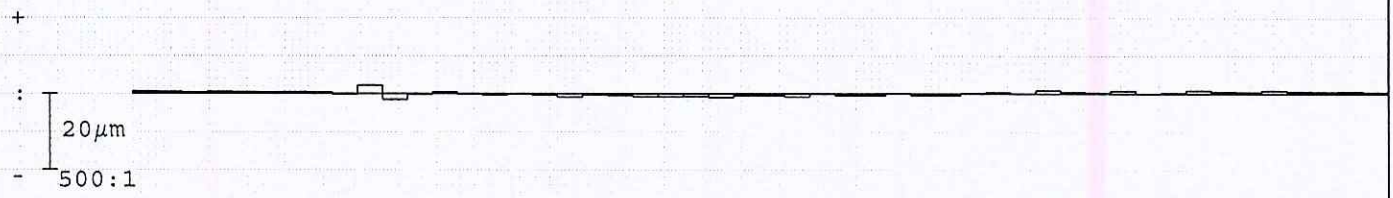
Errori singoli di divisione fp fianco sinistro



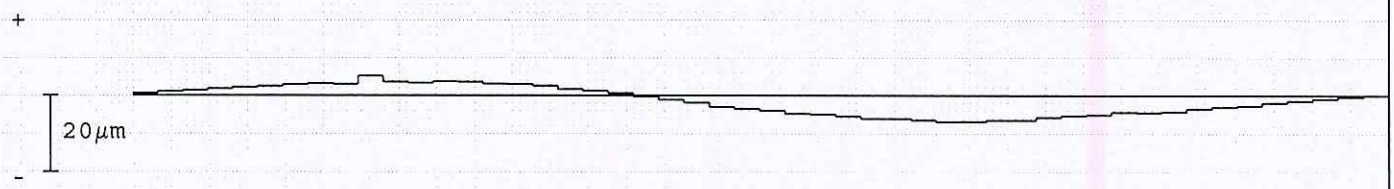
Errore somma di divisione Fp fianco sinistro



Errori singoli di divisione fp fianco destro

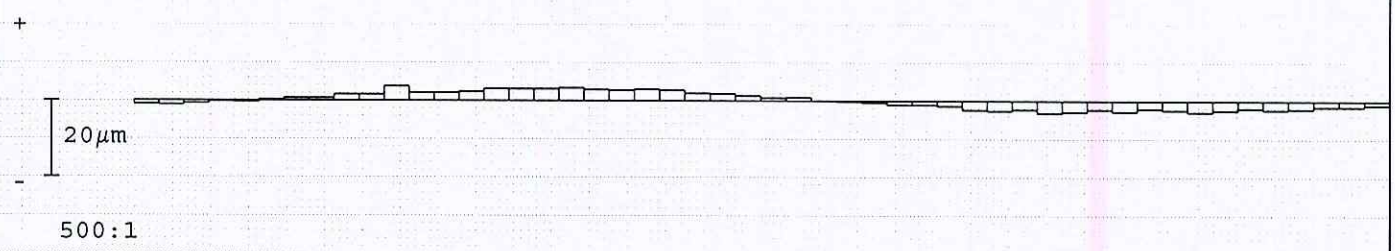


Errore somma di divisione Fp fianco destro



Corsa per misura divis.:116.163 z=5.9mm		fianco sinistro / RILASCIO				fianco destro / TIRO			
		Val.misur	Qual.	Val. amm	Qual.	Val.misur	Qual.	Val. amm	Qual.
Gr. err. singoli divisione	fp max	0.9		10.0		2.1		10.0	
Gr. salto di passo	fu max	1.1		12.0		3.7		12.0	
Scarto di divisione	Rp	1.7				3.7			
Err. globale di divisione	Fp	7.6		36.0		12.1		32.0	
Err. cordale di divisione	Fpz/8	3.2				4.7			

Centricità Fr (Ø-sfera =3mm) ◎ : 5.8µm



Err. di concentricitá	Fr	7.0	28.0	
Variaz. spessore dente	Rs			

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Docum.archiviato elettronicamente.Archiviazione cartacea non necessaria

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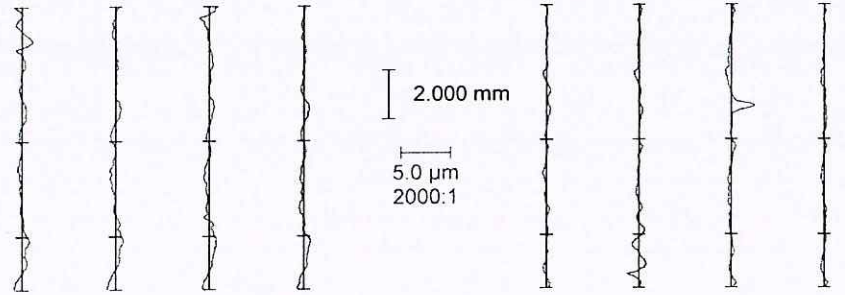
Numero di disegno: D51.1.1248.50-IF | Denominazione: SR3 | 22.04.18
Serie nr: pz n.2 | Scopo: Laufende Messung 08.28 / 06:32
Macchina: M001 | Mandrino: Formnest 1 | z= 50

Evolvente senza modifiche effettive

+/- sinistro — destro -/+

38 26 13 **1 b** **1 b** 13 26 38



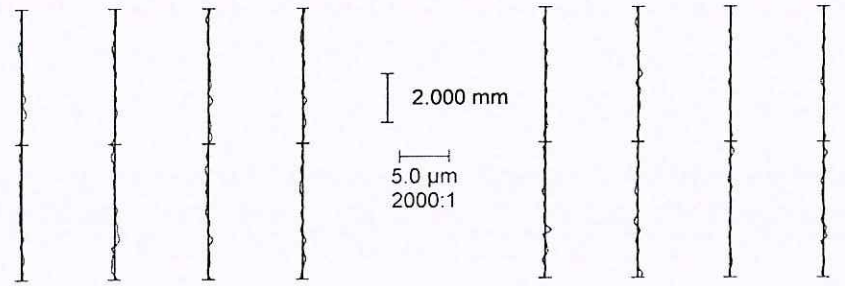
Valores medio

fhα	-0.7	0.4	-0.3	-0.8	-0.3	-0.5	-0.5	0.0	-0.3	-1.2
Fα	2.7	2.3	3.0	2.5	2.6	2.8	2.0	2.7	4.0	2.4
ffα	1.9	1.6	1.8	1.3	1.6	1.6	0.8	2.0	3.0	0.7
Cα	6.5	6.6	6.5	6.6	6.6	12.5	12.3	12.4	12.7	12.6

Elica senza modifiche effettive

+/- sinistro — destro -/+

38 26 13 **1 b** **1 b** 13 26 38



Valores medio

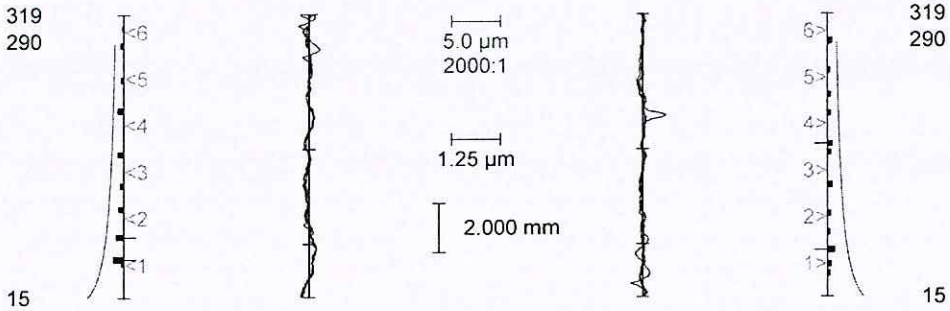
fhβ	-4.2	-3.7	-2.6	-3.3	-3.5	-1.2	-2.7	-1.5	0.5	-1.1
Fβ	4.2	3.6	3.6	4.2	3.9	4.0	4.1	3.6	4.2	3.9
ffβ	0.8	0.9	0.8	0.7	0.8	0.7	0.9	0.9	0.6	0.6
Cβ	4.1	3.1	4.2	4.5	4.0	6.0	5.3	6.1	6.9	5.8

KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF | Denominazione: SR3 | 22.04.18
Serie nr: pz n.2 | Scopo: Laufende Messung 08.28 / 06:32
Macchina: M001 | Mandrino: Formnest 1 | z= 50

Evolvente senza modifiche effettive

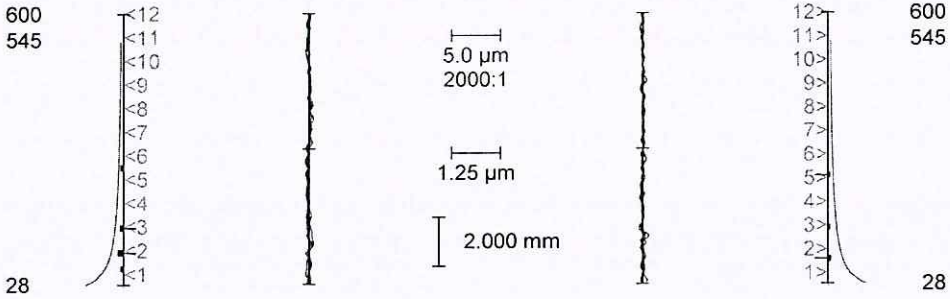
+/- sinistro — Spettro medio



A1	0.27	0.18
A2	0.20	0.12
O(1)	56	65
O(2)	80	179

Elica senza modifiche effettive

+/- sinistro — destro -/+



A1	0.14	0.08
A2	0.08	0.05
O(1)	96	80
O(2)	148	256

Spettro — tmpana_dat

KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF
Serie nr: pz n.2
Macchina: M001

Denominazione: SR3
Scopo: Laufende Messung
Mandrino: Formnest 1

22.04.18
06:28 / 06:32
z= 50

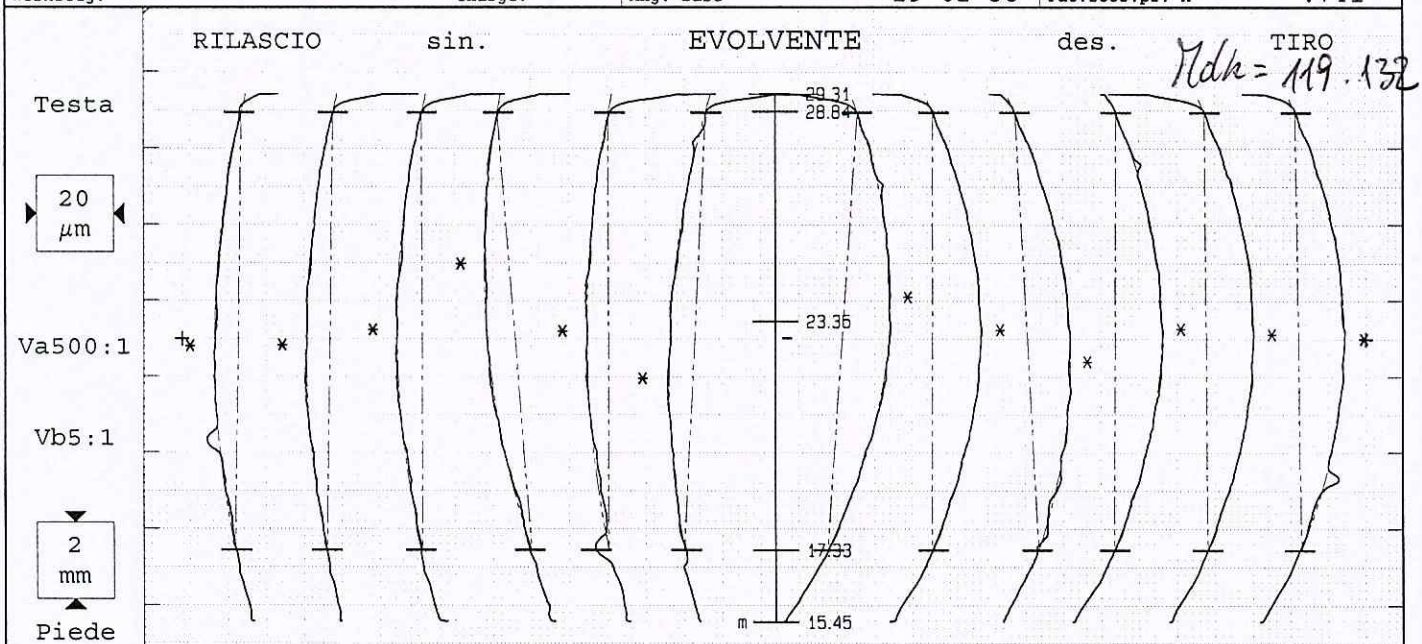
Ondulazione Passo destro

Ondulazione Passo sinistro

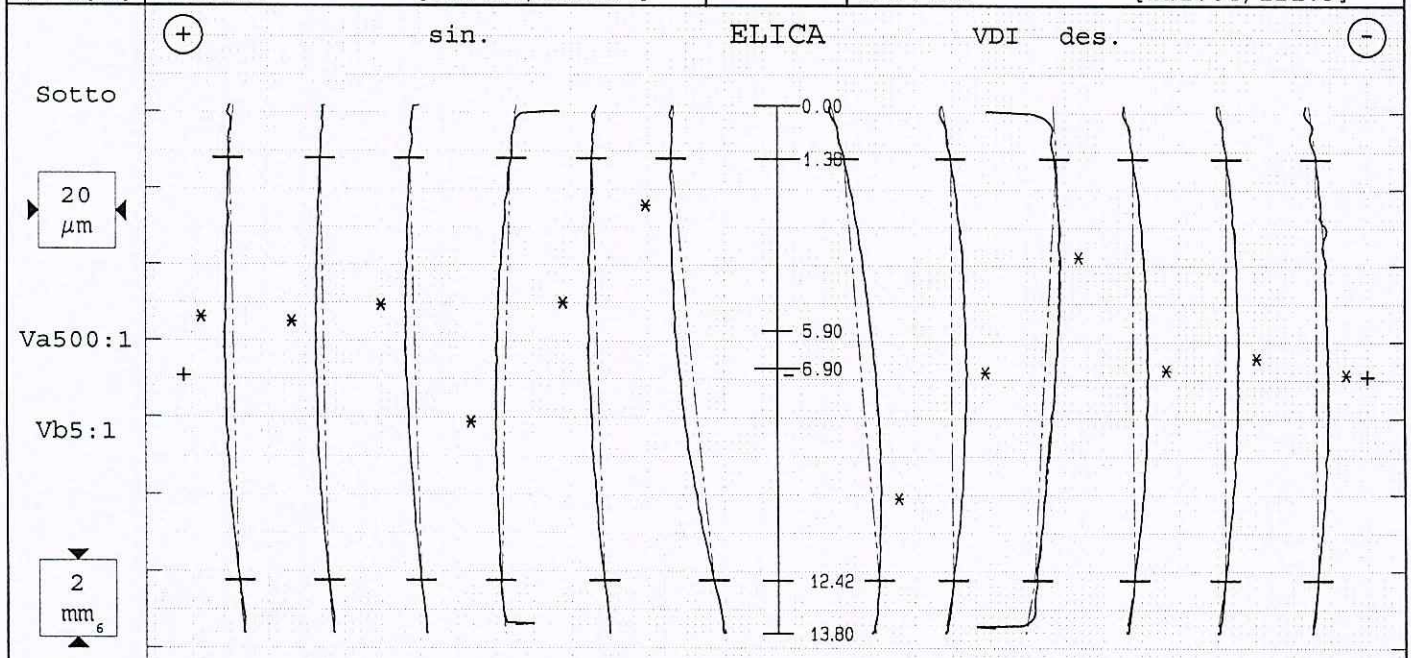
2.50 µm

Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416b04 0	P26 B7681	Controllore:	TURNO 06-12	Data:	22.04.2018 06:36
Denominazione:	SR3	Numero denti z	50	Largh.fasc.dent. b	13.8mm
Numero disegno.:	D51.1.1248.50-IF	Modulo m	1.95mm	Tratto evolv. La	11.51mm
Commessa/serie nr.:	pz n.3	Angolo pressione	17°30'00"	Tratto elica Lß	11.04mm
Masch.Nr.:	M001 Spindel: Formnestl	Angolo elica	-30°36'00"	Inizio elab. M1	17.33mm
Untersuchungszweck:	Laufende Messung	Ø Base db	106.3629mm	Palpatore Ø	(#2)1mm
Werkzeug:	Charge:	Ang. Base	-29°02'38"	Fat.scor.pr. x	.741



Tolerance		Medio	Val.misur [µm]						Qual	Tolerance	Val.misur [µm]						Medio	Qual
fHαm	±5	-0.8	Var a 1.9							±5	Var a 2.1						-0.4	
fHα	±8	-0.8	-1.7	-1.6	0.2	8.9	0.1	-5.5		±8	7.9	0.3	-6.2	0.5	-0.7	-1.6	-0.4	
Fα		3.6	5.1	2.8	2.1	8.7	4.2	6.4			8.5	2.1	7.1	2.3	2.3	5.8	3.1	
ffα	5	2.6	3.8	1.0	1.2	1.4	4.4	2.0		5	1.7	0.8	1.8	1.9	0.7	4.4	2.0	
Cα	5±2	6.2	6.3	6.3	6.7	7.2	5.6	6.5		11±2	12.3	12.7	11.3	12.3	12.5	12.2	12.4	
ffαf	3	1.5	0.3	1.3	1.1	2.0	**3.4**	1.1		3	0.2	0.3	0.0	0.1	0.3	0.0	0.2	
P/T-ø [mm]		109.410	[109.27/109.57]								121.715					[121.64/121.9]		



fHßm	±4	3.0	Var ß 1.2							±4	Var ß 1.4						0.1
fHß	±8	3.0	2.7	2.3	3.5	-3.1	3.5	13.4		±8	11.4	0.4	-7.6	0.2	-0.9	0.5	0.1
Fß		3.1	3.5	2.4	3.1	3.4	3.4	11.7			9.1	3.3	5.9	3.1	2.8	2.4	2.9
ffß	5	0.7	0.9	0.6	0.6	0.7	0.6	0.5		5	0.5	0.5	1.3	0.4	0.7	1.7	0.8
Cß	1/5	2.2	2.2	2.1	2.3	2.4	2.3	3.5		1/5	3.7	3.9	2.9	3.9	3.4	3.1	3.6
Rd	-15±8	-16.5								-15±8							-18.0

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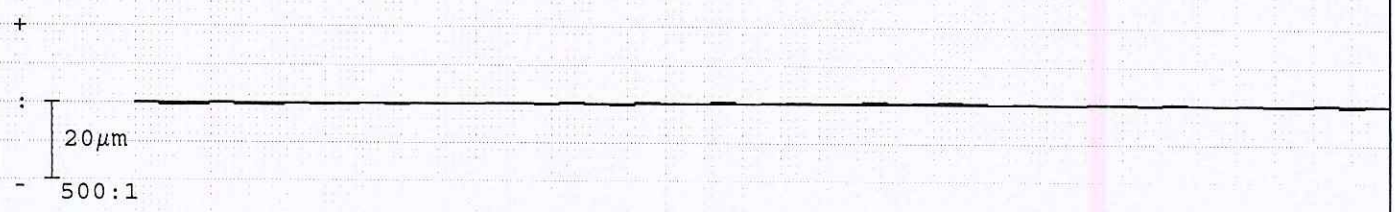
Ruota cilindrica Divisione

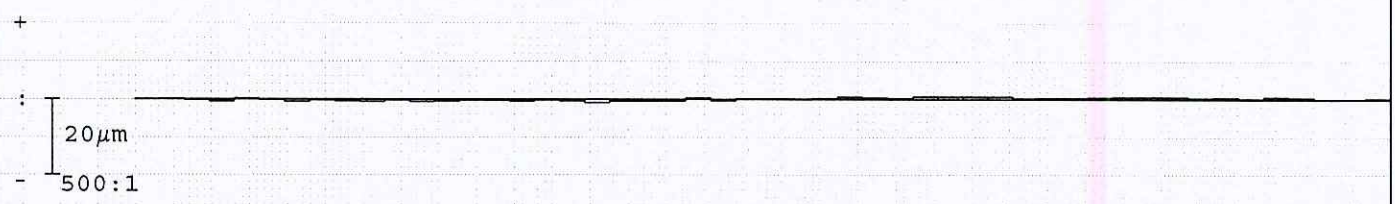
Nr. prog.: STI0416b04 0	P26 B7681	Controllore:	TURNO 06-12	Data:	22.04.2018 06:36
Denominazione:	SR3	Numero denti z	50	Angolo pressione	17°30'00"
Numero disegno.:	D51.1.1248.50-IF	Modulo m	1.95mm	Angolo elica	-30°36'00"
Commessa/serie nr.:	pz n.3	Untersuchungszweck:	Laufende Messung		
Masch.Nr.:	M001 Spindel: Formnestel	Werkzeug:		Charge:	

Errori singoli di divisione fp fianco sinistro

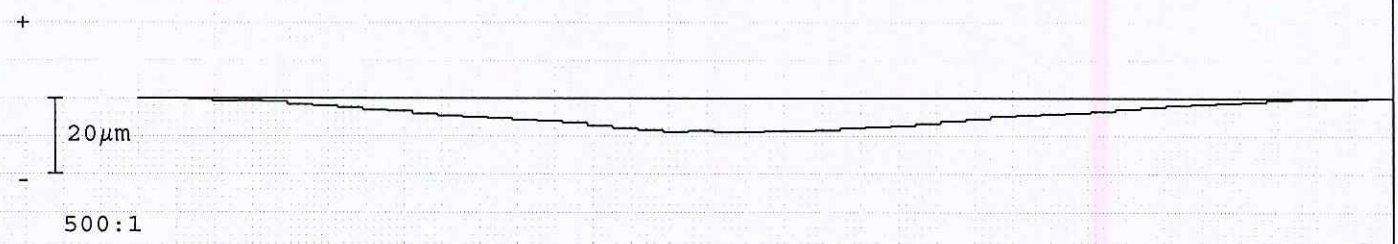


Errore somma di divisione Fp fianco sinistro

Errori singoli di divisione fp fianco destro

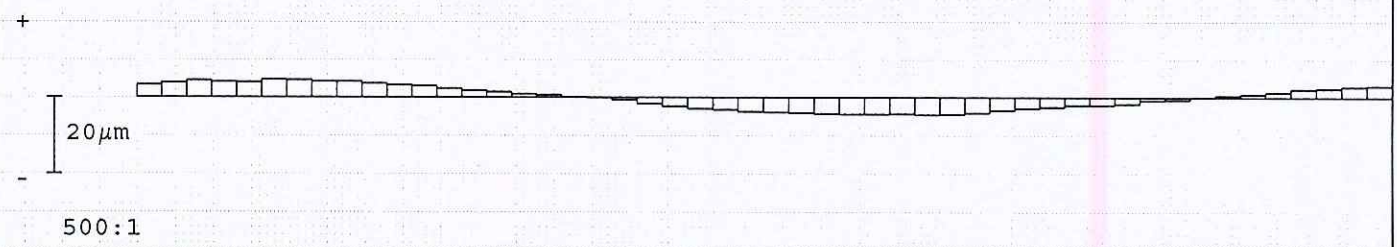


Errore somma di divisione Fp fianco destro



Corsa per misura divis.:116.163 z=5.9mm		fianco sinistro / RILASCIO				fianco destro / TIRO			
		Val.misur	Qual.	Val. amm	Qual.	Val.misur	Qual.	Val. amm	Qual.
Gr. err. singoli divisione	fp max	0.6		10.0		0.9		10.0	
Gr. salto di passo	fu max	0.8		12.0		0.7		12.0	
Scarto di divisione	Rp	1.2				1.6			
Err. globale di divisione	Fp	4.9		36.0		9.0		32.0	
Err. cordale di divisione	Fpz/8	2.5				3.2			

Centricità Fr (Ø-sfera =3mm) ◎ : 8.7µm



Err. di concentricitá	Fr	9.2	28.0	
Variaz. spessore dente	Rs			

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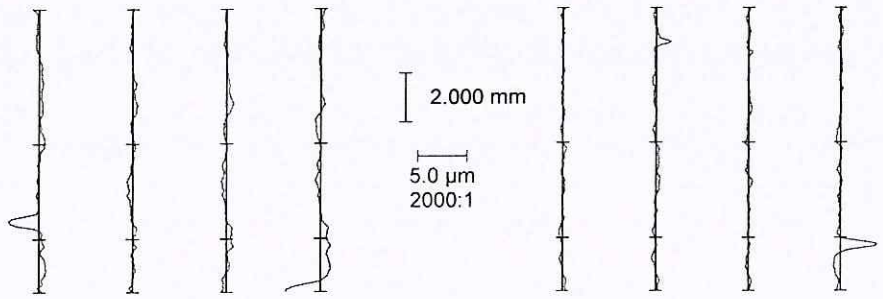
Numero di disegno: D51.1.1248.50-IF | Denominazione: SR3 | 22.04.18
Serie nr: pz n.3 | Scopo: Laufende Messung 36 / 06:40
Macchina: M001 | Mandrino: Formnest 1 | z= 50

+/- sinistro **Evolvente senza modifiche effettive** destro -/+

38 26 13 **1 b** **1 b** 13 26 38

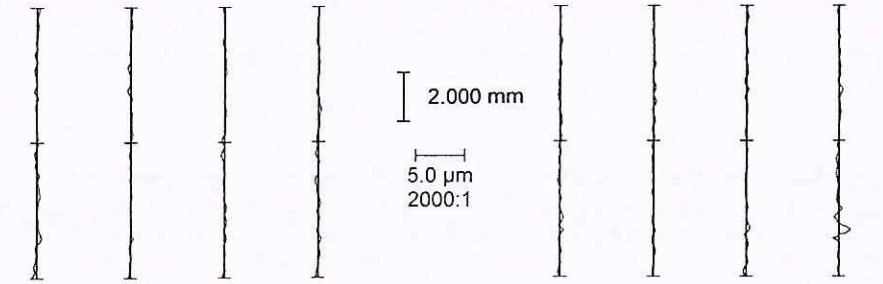


Valores medio

fhα	-1.7	-1.6	0.2	0.1	-0.8	-0.4	0.3	0.5	-0.7	-1.6
Fα	5.1	2.8	2.1	4.2	3.6	3.1	2.1	2.3	2.3	5.7
ffα	3.8	1.0	1.2	4.4	2.6	2.0	0.8	1.9	0.7	4.4
Cα	6.3	6.3	6.7	5.6	6.2	12.5	12.8	12.3	12.5	12.3

+/- sinistro **Elica senza modifiche effettive** destro -/+

38 26 13 **1 b** **1 b** 13 26 38



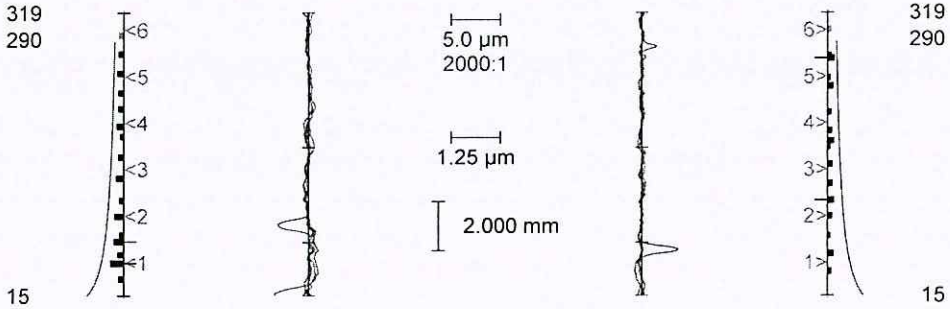
Valores medio

fhβ	-2.7	-2.3	-3.5	-3.5	-3.0	0.0	-0.4	-0.2	0.9	-0.5
Fβ	3.2	2.7	3.4	3.6	3.3	3.3	3.7	3.4	3.2	2.7
ffβ	0.9	0.6	0.6	0.6	0.7	0.8	0.5	0.4	0.7	1.7
Cβ	3.4	3.2	3.6	3.5	3.4	5.6	6.0	6.1	5.4	4.9

KLINGELNBERG

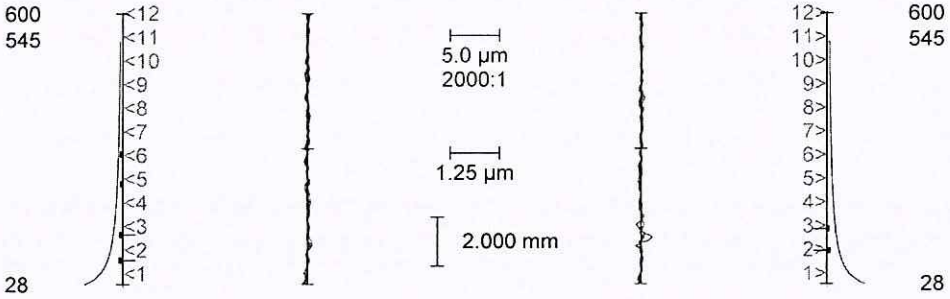
Numero di disegno: D51.1.1248.50-IF | Denominazione: SR3 | 22.04.18
Serie nr: pz n.3 | Scopo: Laufende Messung 36 / 06:40
Macchina: M001 | Mandrino: Formnest 1 | z= 50

+/- sinistro **Evolvente senza modifiche effettive** Spettro medio



A1	0.34	0.17
A2	0.24	0.16
O(1)	50	270
O(2)	73	117

+/- sinistro **Elica senza modifiche effettive** destro -/+



A1	0.09	0.08
A2	0.08	0.06
O(1)	79	98
O(2)	133	144

Spettro | tmpana_dat

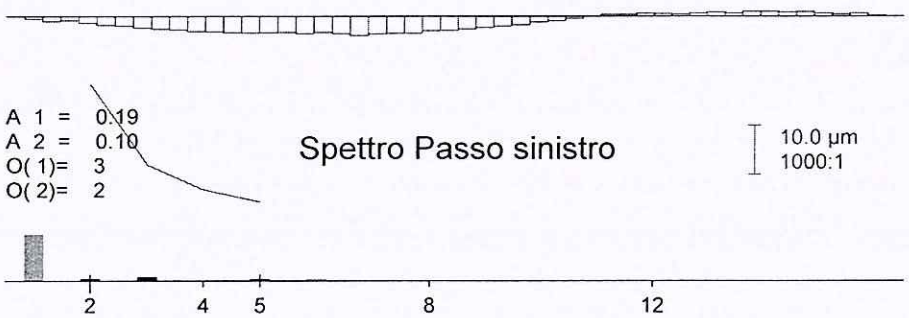
KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF | Denominazione: SR3 | 22.04.18
Serie nr: pz n.3 | Scopo: Laufende Messung 36 | / 06:40
Macchina: M001 | Mandrino: Formnest 1 | z= 50

Ondulazione Passo destro

Ondulazione Passo sinistro

2.50 µm



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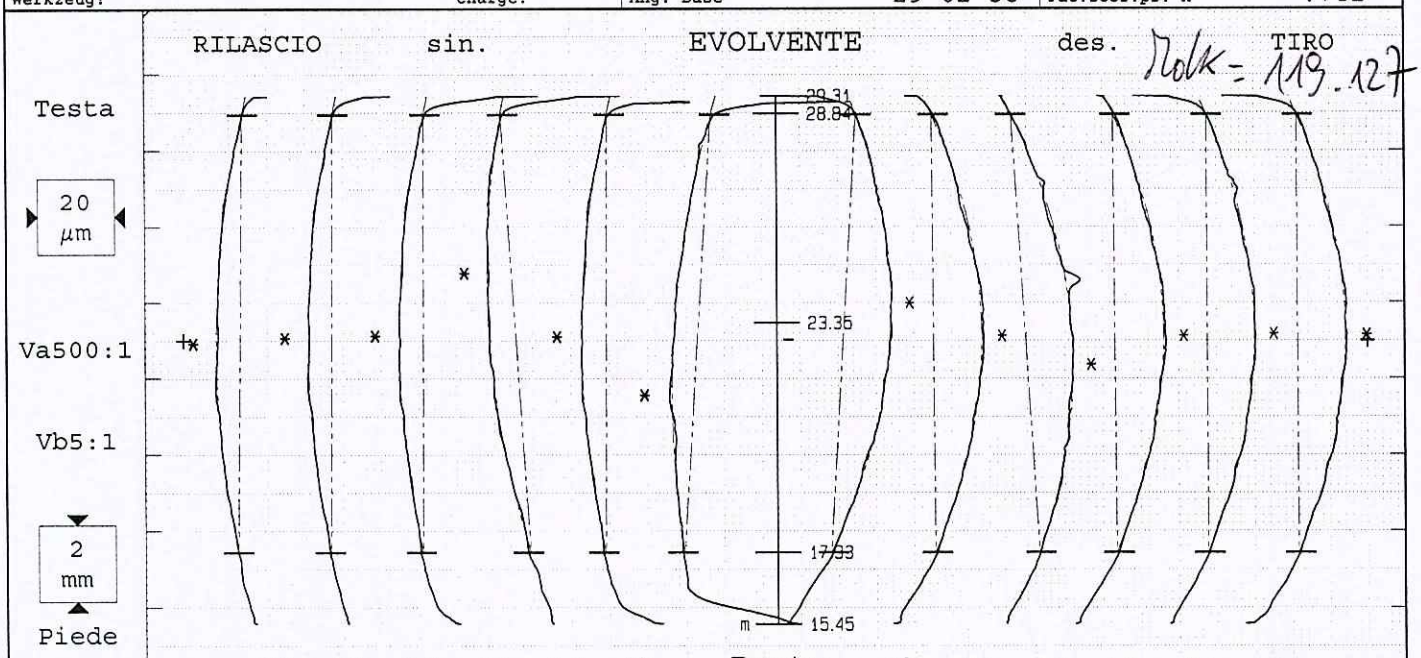
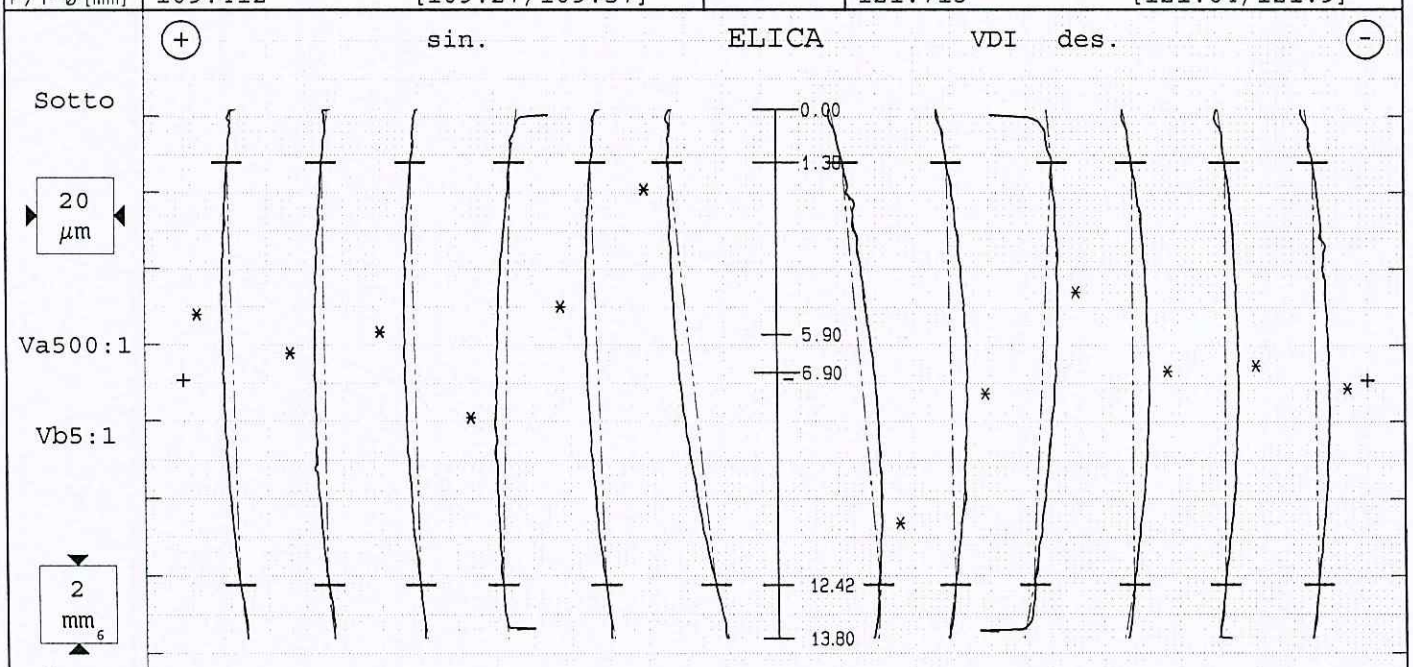
Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416b04 0	P26 B7681	Controllore:	TURNO 06-12	Data:	22.04.2018 06:45
Denominazione:	SR3	Numero denti z	50	Largh.fasc.dent. b	13.8mm
Numero disegno.:	D51.1.1248.50-IF	Modulo m	1.95mm	Tratto evolv. La	11.51mm
Commessa/serie nr.:	pz n.4	Angolo pressione	17°30'00"	Tratto elica Lß	11.04mm
Masch.Nr.:	M001 Spindel: Formmaster	Angolo elica	-30°36'00"	Inizio elab. M1	17.33mm
Untersuchungszweck:	Laufende Messung	Ø Base db	106.3629mm	Palpatore Ø	(#2)1mm
Werkzeug:	Charge:	Ang. Base	-29°02'38"	Fat.scor.pr. x	.741



Tolerance	Medio	Val.misur [µm]						Qual	Tolerance	Val.misur [µm]						Medio	Qual
fHαm ±5	-0.7	Var a 0.8							±5	Var a 0.6						-0.4	
fHα ±8	-0.7	-1.2	-0.6	-0.4	7.6	-0.5	-7.1		±8	6.8	-0.7	-7.1	-0.6	-0.1	-0.3	-0.4	
Fα	2.5	2.6	2.2	2.4	7.4	2.7	8.7			6.5	2.4	7.9	2.3	2.0	2.2	2.2	
ffα 5	1.1	1.0	0.8	1.1	1.3	1.3	1.9		5	1.2	1.7	4.8	1.4	1.8	1.3	1.6	
Cα 5±2	6.3	6.3	6.2	6.3	6.9	6.4	6.3		11±2	12.3	12.8	12.3	12.8	12.4	12.7	12.7	
ffαf 3	0.6	0.7	0.4	0.7	1.1	0.7	1.0		3	0.5	0.5	0.3	0.7	0.4	0.4	0.5	
P/T-ø [mm]	109.412	[109.27/109.57]								121.713	[121.64/121.9]						



fHßm ±4	3.0	Var ß 3.3							±4	Var ß 2.7						0.7
fHß ±8	3.0	3.7	1.2	2.6	-2.9	4.5	14.5		±8	12.0	2.2	-6.7	-0.2	-0.5	1.3	0.7
Fß	3.4	3.7	2.7	3.1	3.3	4.2	13.0			9.4	4.4	6.0	3.6	2.9	3.3	3.6
ffß 5	0.7	0.6	1.2	0.5	0.8	0.4	0.7		5	1.7	0.9	1.0	0.8	0.6	1.4	0.9
Cß 1/5	2.8	2.7	2.7	2.7	2.7	2.9	3.4		1/5	3.4	4.2	3.5	4.3	3.4	3.5	3.9
[illegible]	17.4								-15±8							18.7

GCG 808006

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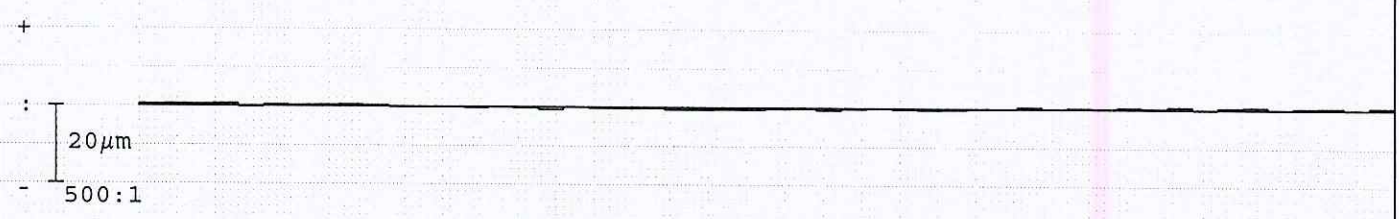
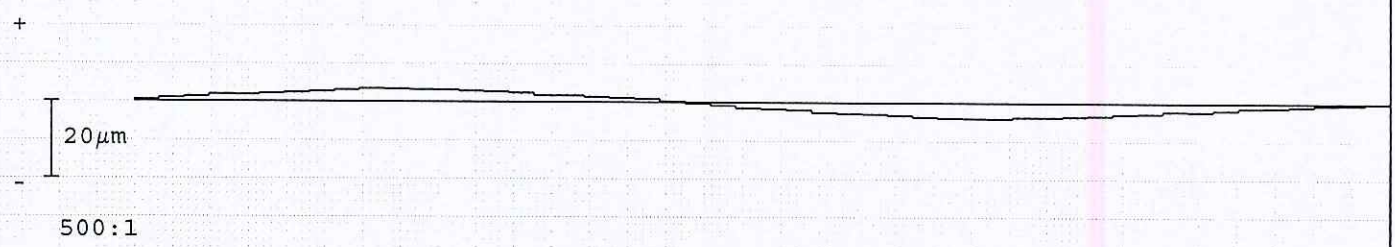
Ruota cilindrica Divisione

Nr. prog.: STI0416b04 0 P26 B7681	Controllore: TURNO 06-12	Data: 22.04.2018 06:45	
Denominazione: SR3	Numero denti z 50	Angolo pressione 17°30'00"	
Numero disegno.: D51.1.1248.50-IF	Modulo m 1.95mm	Angolo elica -30°36'00"	
Commessa/serie nr.: pz n.4	Untersuchungszweck: Laufende Messung		
Masch.Nr.: M001 Spindel: Formneat 1	Werkzeug:	Charge:	

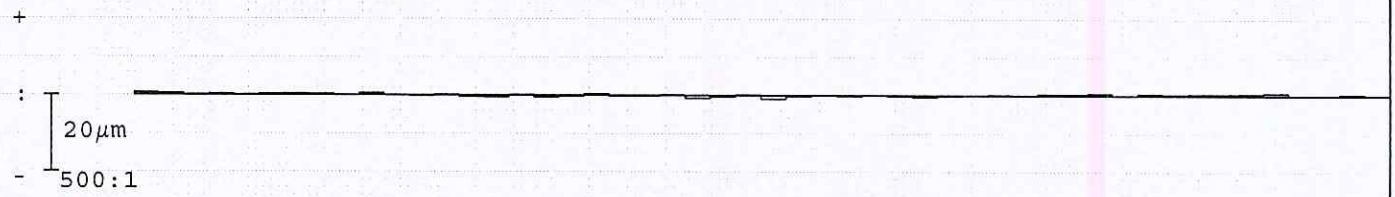
Errori singoli di divisione fp fianco sinistro



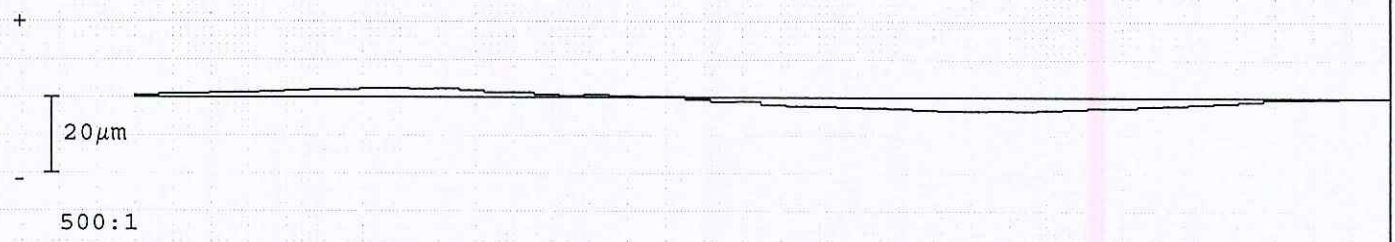
Errore somma di divisione Fp fianco sinistro



Errori singoli di divisione fp fianco destro



Errore somma di divisione Fp fianco destro



Corsa per misura divis.:116.163 z=5.9mm		fianco sinistro / RILASCIO		fianco destro / TIRO	
		Val.misur Qual.	Val. amm Qual.	Val.misur Qual.	Val. amm Qual.
Gr. err. singoli divisione	fp max	0.7	10.0	0.9	10.0
Gr. salto di passo	fu max	0.7	12.0	1.0	12.0
Scarto di divisione	Rp	1.3		1.6	
Err. globale di divisione	Fp	7.5	36.0	6.0	32.0
Err. cordale di divisione	Fpz/8	2.9		2.6	

Centricità Fr (Ø-sfera =3mm) ◎ : 1.7µm

Err. di concentricitá	Fr	2.6	28.0	
Variaz. spessore dente	Rs			

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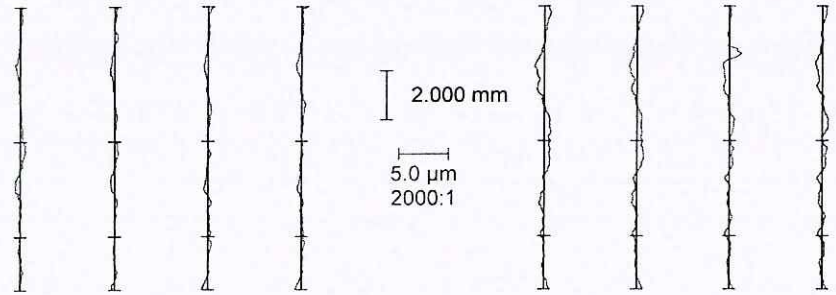
Numero di disegno: D51.1.1248.50-IF | Denominazione: SR3 | 22.04.18
Serie nr: pz n.4 | Scopo: Laufende Messung 45 / 06:49
Macchina: M001 | Mandrino: Formnest 1 | z= 50

Evolvente senza modifiche effettive

+/- sinistro — destro -/+

38 26 13 **1 b** **1 b** 13 26 38



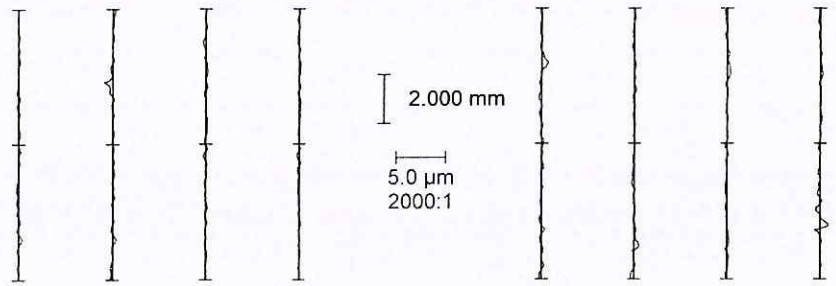
Valores medio

fhα	-1.2	-0.6	-0.4	-0.5	-0.7	-0.4	-0.7	-0.6	-0.1	-0.3
Fα	2.6	2.2	2.4	2.7	2.5	2.2	2.4	2.3	2.0	2.1
ffα	1.0	0.8	1.1	1.3	1.1	1.6	1.7	1.4	1.8	1.3
Cα	6.3	6.3	6.4	6.5	6.3	12.7	12.8	12.8	12.4	12.7

Elica senza modifiche effettive

+/- sinistro — destro -/+

38 26 13 **1 b** **1 b** 13 26 38



Valores medio

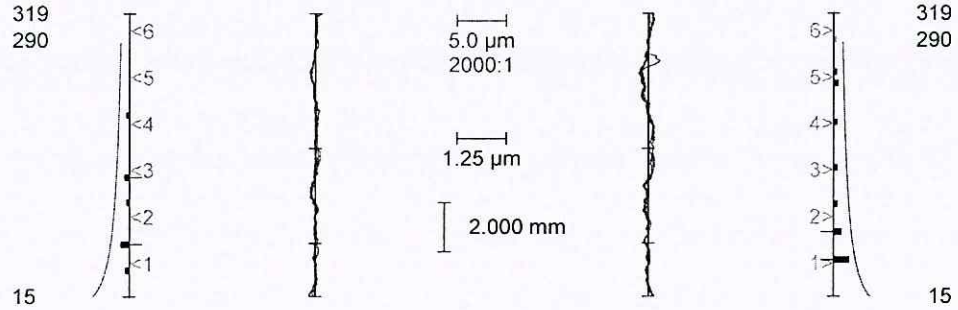
fhβ	-3.7	-1.2	-2.6	-4.5	-3.0	-0.7	-2.2	0.2	0.5	-1.3
Fβ	4.0	3.0	3.5	4.5	3.8	3.9	4.8	3.9	3.2	3.6
ffβ	0.6	1.2	0.5	0.4	0.7	0.9	0.9	0.8	0.6	1.4
Cβ	4.2	4.2	4.2	4.5	4.3	6.0	6.5	6.7	5.3	5.5

KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF | Denominazione: SR3 | 22.04.18
Serie nr: pz n.4 | Scopo: Laufende Messung 45 / 06:49
Macchina: M001 | Mandrino: Formnest 1 | z= 50

Evolvente senza modifiche effettive

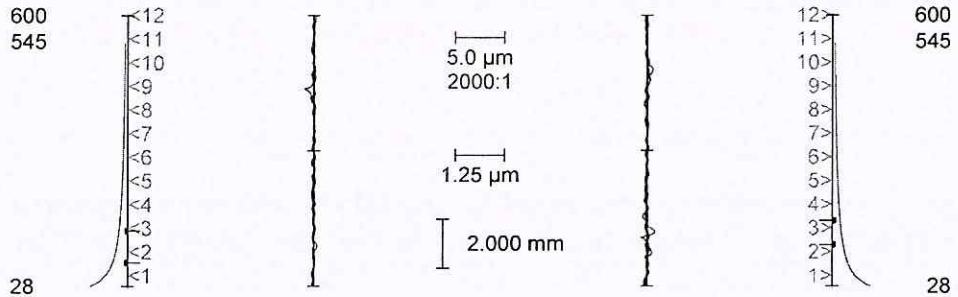
+/- sinistro — Spettro medio



A1	0.21	0.38
A2	0.11	0.20
O(1)	71	54
O(2)	143	84

Elica senza modifiche effettive

+/- sinistro — destro -/+



A1	0.07	0.09
A2	0.06	0.07
O(1)	78	166
O(2)	145	115

Spettro — tmpana_dat

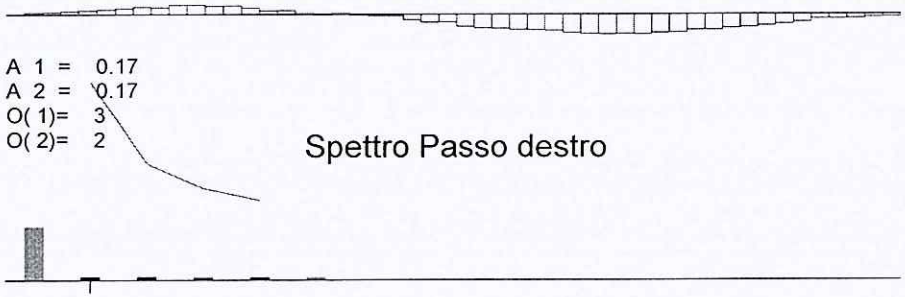
KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF
Serie nr: pz n.4
Macchina: M001

Denominazione: SR3
Scopo: Laufende Messung
Mandrino: Formnest 1

22.04.18
03:45 / 06:49
z= 50

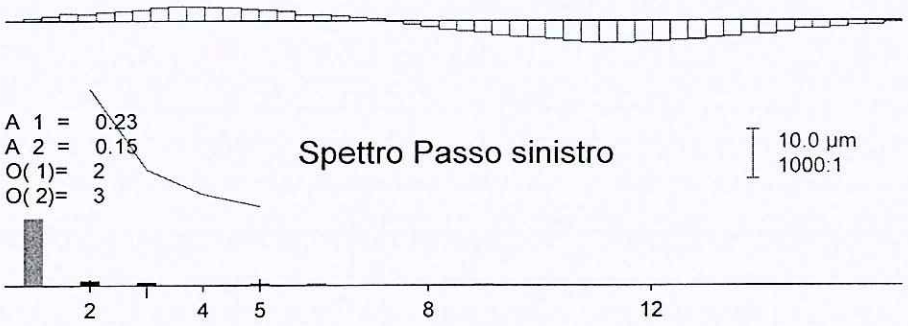
Ondulazione Passo destro



Spettro Passo destro

Ondulazione Passo sinistro

2.50 µm

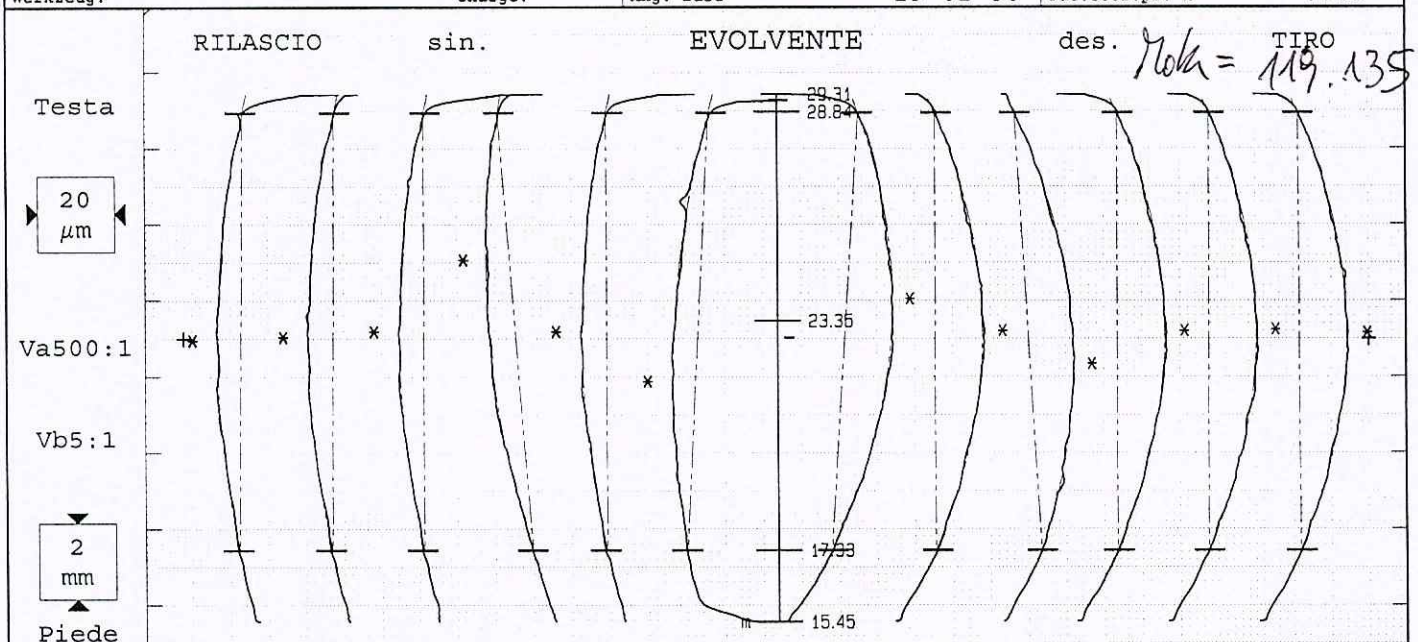


Spettro Passo sinistro

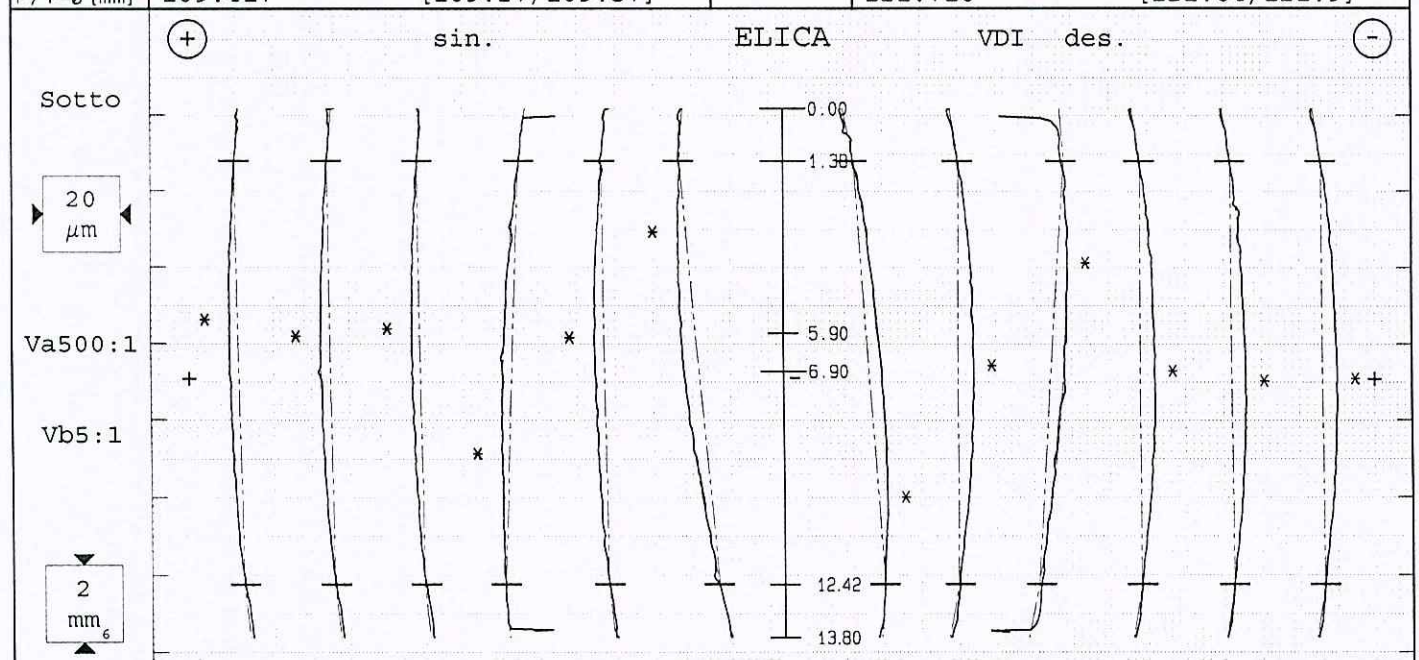
10.0 µm
1000:1

Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416b04 0	P26 B7681	Controllore:	turno B	Data:	23.04.2018 16:10
Denominazione:	SR3	Numero denti z	50	Largh.fasc.dent. b	13.8mm
Numero disegno.:	D51.1.1248.50-IF	Modulo m	1.95mm	Tratto evolv. La	11.51mm
Commessa/serie nr.:	5[illegible]	Angolo pressione	17°30'00"	Tratto elica Lß	11.04mm
Masch.Nr.:	M001 Spindel: Formnext	Angolo elica	-30°36'00"	Inizio elab. M1	17.33mm
Untersuchungszweck:	Laufende Messung	ø Base db	106.3629mm	Palpatore ø	(#2)1mm
Werkzeug:	Charge:	Ang. Base	-29°02'38"	Fat.scor.pr. x	.741



Tolerance		Medio	Val.misur[µm]						Qual	Tolerance	Val.misur[µm]						Medio	Qual
fHam	±5	-0.5	Var a 1.0							±5	Var a 0.7						0.0	
fHa	±8	-0.5	-1.0	-0.7	-0.1	9.0	0.0	-5.8		±8	7.3	0.0	-6.8	0.2	0.3	-0.4	0.0	
Fa		2.5	2.4	2.6	2.5	9.1	2.3	6.8			7.5	2.0	6.9	2.1	2.3	2.4	2.2	
ffa	5	1.1	1.2	0.9	1.1	1.1	1.0	2.9		5	1.4	1.5	1.4	1.3	1.4	1.3	1.4	
Ca	5±2	6.4	6.1	6.6	6.5	6.9	6.4	6.2		11±2	12.3	12.5	11.6	12.5	12.5	12.6	12.5	
ffaf	3	0.7	0.4	0.7	1.2	1.0	0.5	0.3		3	0.2	0.4	0.0	0.3	0.2	0.3	0.3	
P/T-ø [mm]		109.417	[109.27/109.57]								121.716	[121.64/121.9]						



fHßm	±4	2.3	Var ß 0.8							±4	Var ß 1.4						0.2	
fHß	±8	2.3	2.8	2.1	2.2	-4.6	2.0	12.6		±8	9.8	-0.6	-8.7	0.0	0.8	0.7	0.2	
Fß		3.0	3.2	3.3	2.8	4.2	2.8	10.6			8.4	3.3	7.0	3.1	3.2	3.6	3.3	
ffß	5	0.9	0.6	1.0	0.7	1.2	1.1	1.4		5	0.8	0.8	1.4	0.6	1.5	0.5	0.9	
Cß	1/5	2.4	2.3	2.5	2.2	2.4	2.5	3.8		1/5	3.3	4.1	3.4	3.9	3.6	3.8	3.9	

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GCG 808006
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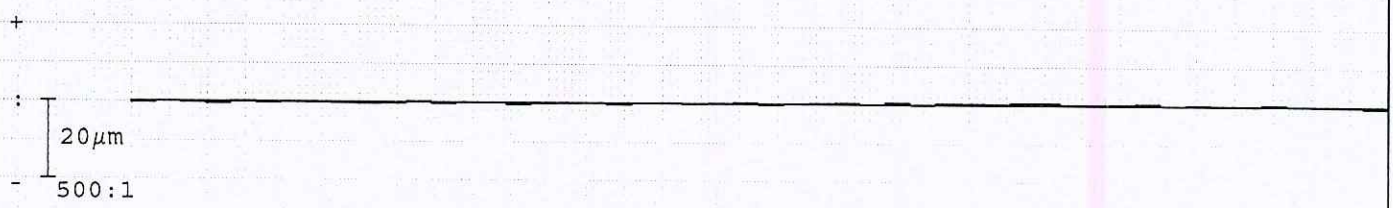
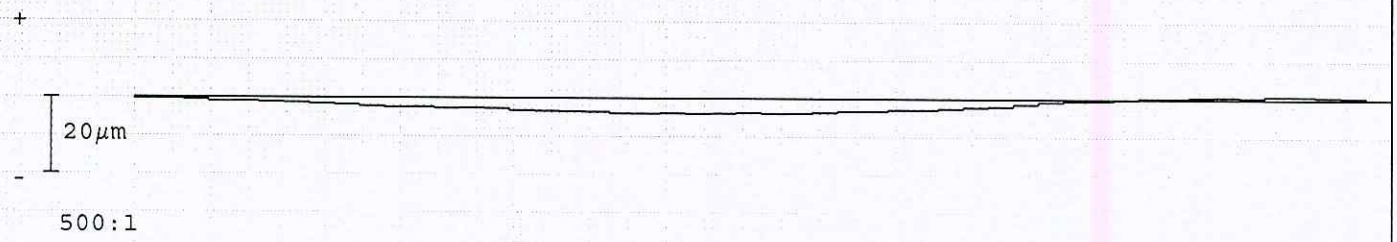
Ruota cilindrica Divisione

Nr. prog.: STI0416b04 0 P26 B7681	Controllore: turno B	Data: 23.04.2018 16:10	
Denominazione: SR3	Numero denti z 50	Angolo pressione 17°30'00"	
Numero disegno.: D51.1.1248.50-IF	Modulo m 1.95mm	Angolo elica -30°36'00"	
Commessa/serie nr.: 5[illegible]	Untersuchungszweck: Laufende Messung		
Masch.Nr.: M001 Spindel: Formrectifier	Werkzeug:	Charge:	

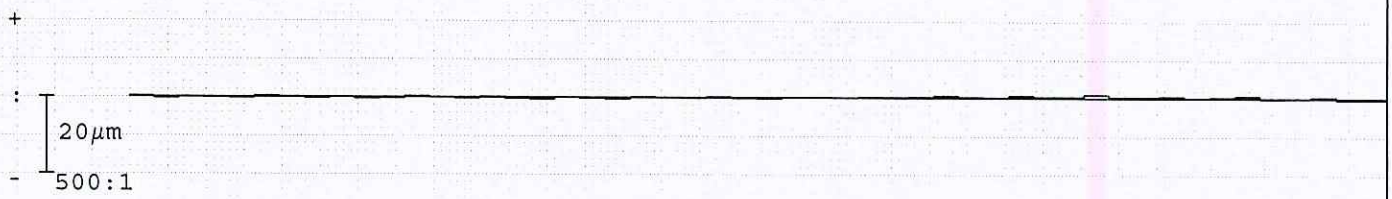
Errori singoli di divisione fp fianco sinistro



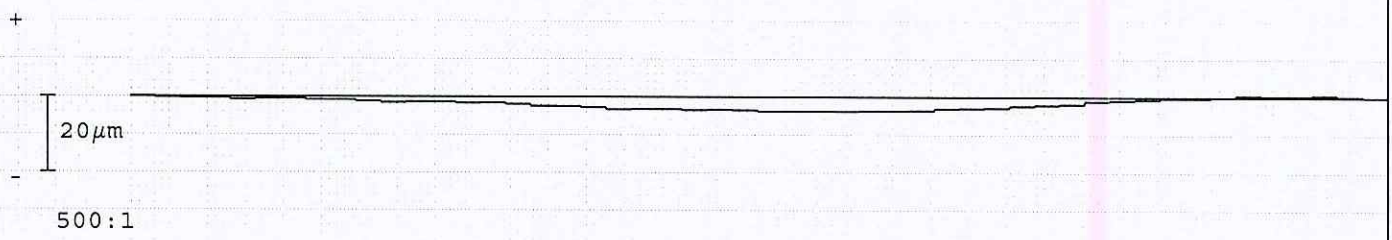
Errore somma di divisione Fp fianco sinistro



Errori singoli di divisione fp fianco destro



Errore somma di divisione Fp fianco destro



Corsa per misura divis.:116.163 z=5.9mm

		fianco sinistro / RILASCIO				fianco destro / TIRO			
		Val.misur	Qual.	Val. amm	Qual.	Val.misur	Qual.	Val. amm	Qual.
Gr. err. singoli divisione	fp max	0.6		10.0		0.8		10.0	
Gr. salto di passo	fu max	0.6		12.0		0.7		12.0	
Scarto di divisione	Rp	1.1				1.3			
Err. globale di divisione	Fp	4.9		36.0		4.4		32.0	
Err. cordale di divisione	Fpz/8	2.4				2.2			

Centricità Fr (Ø-sfera =3mm) ◎ : 2.9µm

Err. di concentricitá	Fr	3.6	28.0	
Variaz. spessore dente	Rs			

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KLINGELNBERG

KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF
Serie nr: 50
Macchina: M001

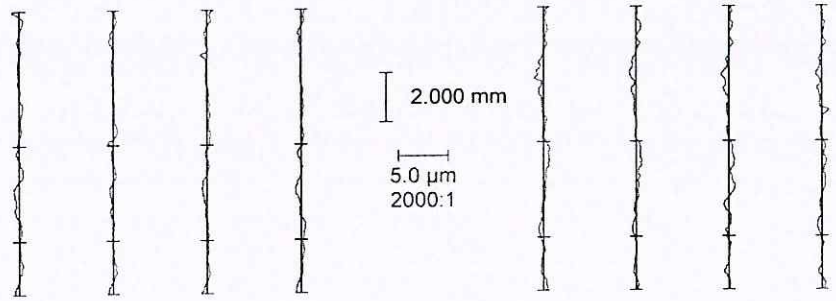
Denominazione: SR3
Scopo: Laufende Messung
Mandrino: Formnest 1

23.04.18 / 16:14
z= 50

Evolvente senza modifiche effettive

+/- sinistro — destro -/+

38 26 13 **1 b** **1 b** 13 26 38



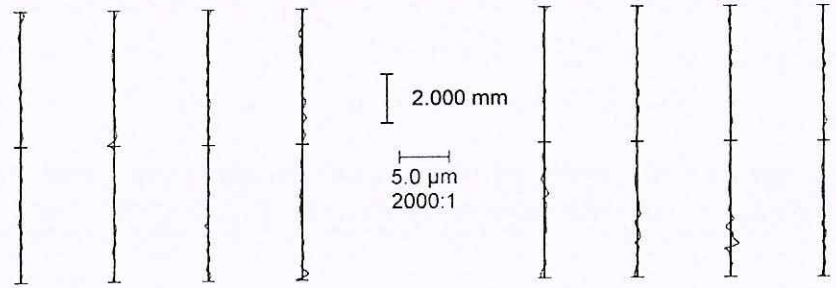
Valores medio

fhα	-1.0	-0.7	-0.1	0.0	-0.5	0.0	0.0	0.2	0.3	-0.4
Fα	2.4	2.6	2.5	2.3	2.5	2.2	2.0	2.1	2.3	2.4
ffα	1.2	0.9	1.1	1.0	1.0	1.4	1.5	1.3	1.4	1.3
Cα	6.2	6.6	6.5	6.4	6.4	12.6	12.5	12.5	12.6	12.7

Elica senza modifiche effettive

+/- sinistro — destro -/+

38 26 13 **1 b** **1 b** 13 26 38



Valores medio

fhβ	-2.8	-2.1	-2.2	-2.0	-2.3	-0.2	0.6	0.0	-0.8	-0.7
Fβ	3.4	3.7	3.0	3.1	3.3	3.7	3.7	3.5	3.6	3.9
ffβ	0.6	1.0	0.7	1.1	0.8	0.9	0.8	0.6	1.5	0.5
Cβ	3.7	3.9	3.4	3.8	3.7	6.0	6.5	6.0	5.7	6.0

KLINGELNBERG

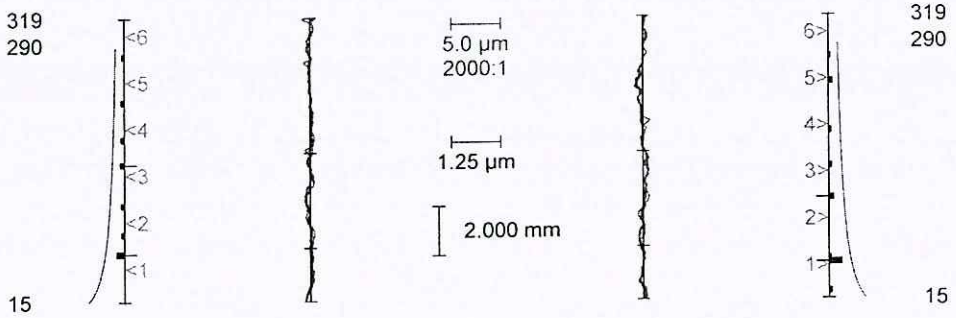
Numero di disegno: D51.1.1248.50-IF
Serie nr: 50
Macchina: M001

Denominazione: SR3
Scopo: Laufende Messung
Mandrino: Formnest 1

23.04.18 / 16:14
z= 50

Evolvente senza modifiche effettive

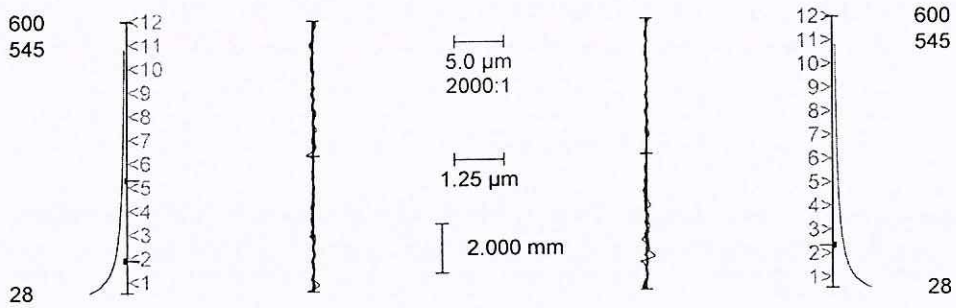
+/- sinistro — Spettro medio



A1	0.20	0.32
A2	0.11	0.12
O(1)	66	54
O(2)	162	123

Elica senza modifiche effettive

+/- sinistro — destro -/+



A1	0.08	0.08
A2	0.05	--
O(1)	96	117
O(2)	266	--

Spettro — tmpana_dat

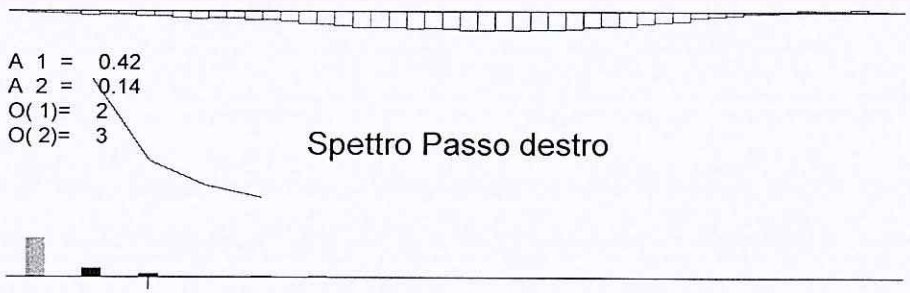
KLINGELNBERG

Numero di disegno: D51.1.1248.50-IF
Serie nr: 50
Macchina: M001

Denominazione: SR3
Scopo: Laufende Messung 10
Mandrino: Formnest 1

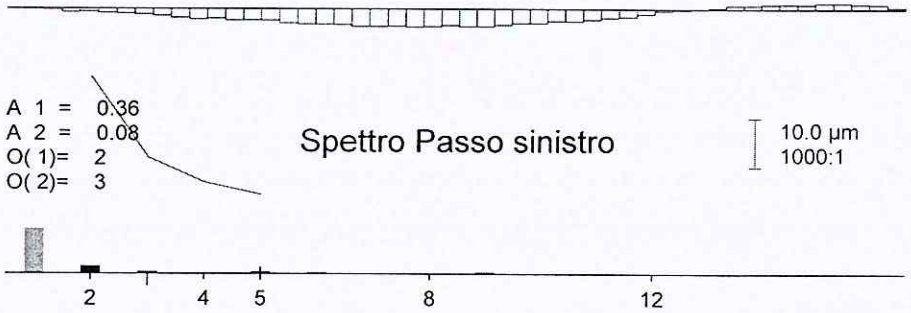
23.04.18
/ 16:14
z= 50

Ondulazione Passo destro



Ondulazione Passo sinistro

2.50 µm



MAGNA GETRAG

REPORT 18/078

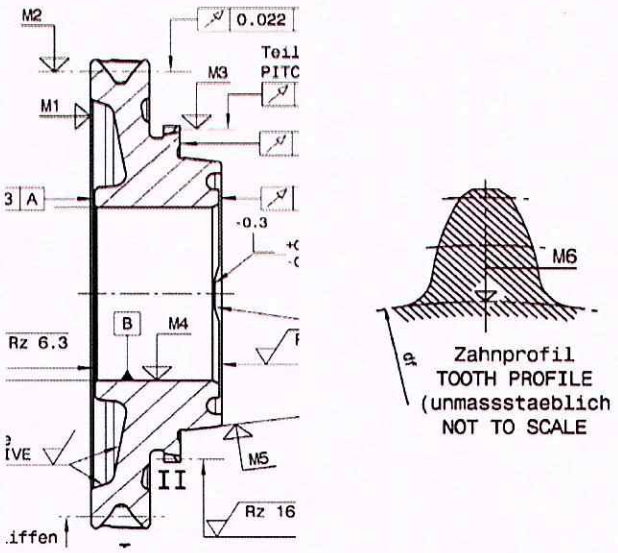
Date: 15/05/2018
Author: F. Abbaticchio

Reason for analysis: *Motivo dell'indagine:*	PPAP	**Requester:** *Richiedente:*	ME - M. Vicenti

Part Name: *Nome particolare:*	SG3	**P/N:**	251.1.1248.50
Material: *Materiale:*	GCG_805000 Part 2	**S/N:**	-
State of part: *Stato del particolare:*	Finito	**Customer:** *Cliente:*	-

Result: *Risultato:*	**OK**	**Distribution list:** *Lista di distribuzione:*	ME - M. Vicenti
Notes: *Note:*	Gearset 32C		

Drawing *(disegno)*



Picture 1: posizioni di misura a disegno.

Surface hardness verification *(verifica durezza superficiale)*

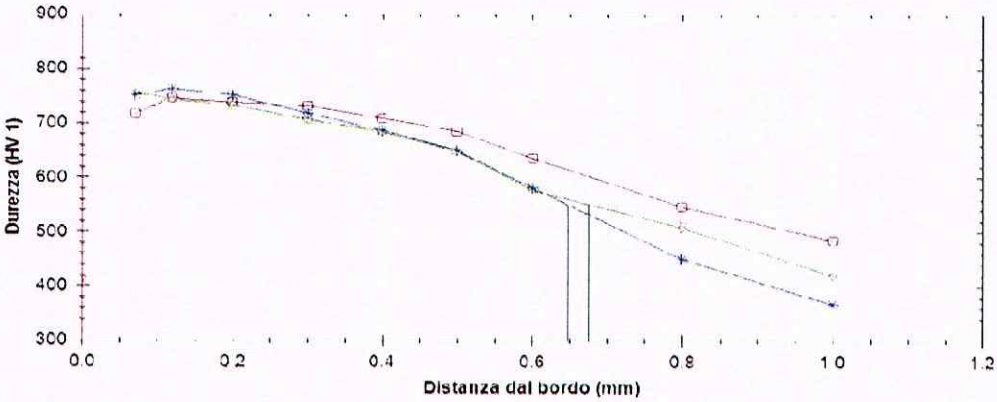
Component	Scale	Position	Measured Value	Range
Gear	HRC	M1	61.4	-
Gear	HRA	M1	81.5	80.5 + 2.5

REPORT 18/078

Date: 15/05/2018
Author: F. Abbaticchio

CHD and core hardness verification *(verifica CHD e durezza a cuore)*

Scale	Sample #	Position	Measured Value	Range
CHD 550 HV1	2177/18	M2 (tooth flank)	0.71	0.5 + 0.4
CHD 550 HV1	2177/18	M3 (clutch ring tooth flank)	0.80	0.5 min
CHD 550 HV1	2177/18	M4 (bore)	0.68	0.3 min
CHD 550 HV1	2177/18	M5 (cone)	0.65	0.4 min
Core hardness HV10	2177/18	M6 (tooth core)	410	>300



Picture 2: profili di durezza

Microstructure analysis *(analisi della microstruttura)*

Sample # 2177/18	
Gear - Tooth flank surface structure:	Martensite e austenite residua (5%)
Gear - Tooth base core structure:	Martensite, bainite

Picture 3: Microstruttura sul fianco dente (a sinistra) ed a cuore sulla base dente (a destra).

GETRAG

Analisi di similitudine Ppk

Formular Nr:
Datum:
Status: Entwurf
Formular Eigner / Fachbereich:
Prozess-/VA-verweis:

Macchina da confrontare: **SLW11046**
Capability da confrontare Nr.: **22/02/2017**

Data: **18/05/2018**
Owner: **G.Sette**
Abt.: **WLQ1**

Codice Pezzo di riferimento: **251.1.1086.50**

Partnumber in esame: **251.1.1248.50**

Esito Correlazione: **Il processo è paragonabile capacità di processo confermata**

	Si	No	
Il grezzo è uguale?	X		Stesso grezzo
Stesso processo di TT?	X		Stesso processo di trattamento termico
Stesso clamping system?	X		Stesso sistema di serraggio
Gli uomini sono gli stessi?	X		Stessi uomini
Il metodo è uguale?	X		Stesso metodo applicato
MSA eseguita e ok?	X		MSA eseguita e ok
Condizioni ambientali ok?	X		Condizioni ambientali adeguate

Deviazione Std. Ammessa: ± 25 %

Componente di riferimento					Componente in esame					
DIMENSIONEN					DIMENSIONEN					
Merkmal	Einheit	**Nominale**		**Deviazione ammessa in %**	**Nominale**		**Deviazione %**	**i.O./n.i.O.**		
numero denti Z	---	51			50			**i.O.**		
diam.primitivo - Ø	mm	108.49			106.363			**i.O.**		
Altezza dentatura	mm	6.475			6.165			**i.O.**		
diam.testa - Ø (da)	mm	123.90			121.90			**i.O.**		

Studio delle specifiche						Studio delle specifiche					
Merkmal	Einheit	**Nominale**	**Toleranz T_1**	**P_p**	**P_{Pk} (solo per caratteristiche unilaterali)**	**Nominale**	**Toleranz T_2**	**Taregt (1,00/1,33/1,67)**	**i.O./n.i.O.**	**Min. P_p**	**Min. P_{pk}**
Mdk - Ø	mm	120.92	0.084	3.67		119.091	0.081	1.67	i.O	3.54	
Fr (Eccentricità)	µm	0	22	1.67		0	22	1.67	i.O	1.67	
	µm								---		
	µm								---		
	µm								---		
	µm								---		
	µm								---		
...									---		

Part Submission Warrant

PSWNr.: 003/18

GETRAG

Part Name	Speed Gear 3rd	Cust. Part Number	251.1.1248.80
Shown on Drawing No.	251.1.1248.80	Org. Part Number	25.5.00651.00
Engineering Change Level	-/16.10.2017	Dated	16.10.2017
Additional Engineering Changes	n/a	Dated	n/a
Safety and/or Government Regulation	☐ Yes ☑ No	Purchase Order No. 5500040223	Weight (kg) 1,1600
Checking Aid No.	Höhenreißer	Checking Aid Engineering Change Level n/a	Dated 01.05.2016
	Std. Messmittel		01.05.2017
	Contour measuring		20.03.2017
	Sirio 688		09.03.2017

ORGANIZATION MANUFACTURING INFORMATION

Cotarko GmbH — DCZSA
Organization Name & Supplier/Vendor Code

Henry-Ford-Str. 1
Street Address

Köln — NRW — 50725 — Germany
City — Region — Postal Code — Country

CUSTOMER SUBMITTAL INFORMATION

Getrag Ford Transmission GmbH
Customer Name/Division

Petra Braun
Buyer/Buyer Code

DCT 300
Application

MATERIALS REPORTING

Has customer-required Substances of Concern information been reported? ☐ Yes ☑ No ☐ n/a

Submitted by IMDS or other customer format: IMDS-Nr.: 727193936 / 1

Are polymeric parts identified with appropriate ISO marking codes? ☐ Yes ☐ No ☑ n/a

REASON FOR SUBMISSION (Check at least one)

- ☑ Initial Submission
- ☐ Engineering Change(s)
- ☐ Tooling: Transfer, Replacement, Refurbishment, or additional
- ☐ Correction of Discrepancy
- ☐ Tooling Inactive > than 1 year
- ☐ Change to Optional Construction or Material
- ☐ Supplier or Material Source Change
- ☐ Change in Part Processing
- ☐ Parts Produced at Additional Location
- ☐ Other - please specify below

REQUESTED SUBMISSION LEVEL (Check one)

- ☐ Level 1 - Warrant only (and for designated appearance items, an Appearance Approval Report) submitted to customer.
- ☐ Level 2 - Warrant with product samples and limited supporting data submitted to customer.
- ☑ Level 3 - Warrant with product samples and complete supporting data submitted to customer.
- ☐ Level 4 - Warrant and other requirements as defined by customer.
- ☐ Level 5 - Warrant with product samples and complete supporting data reviewed at organization's manufacturing location.

SUBMISSION RESULTS

The results for ☑ dimensional measurements ☑ material and functional tests ☐ appearance criteria ☑ statistical process package

These results meet all drawing and specification requirements: ☑ Yes ☐ No (If "NO" - Explanation Required)

Mold / Cavity / Production Process External Machining

DECLARATION

I hereby affirm that the samples represented by this warrant are representative of our parts which were made by a process that meets all Production Part Approval Process Manual 4th Edition Requirements. I further affirm that these samples were produced at the production rate of 200 / 8 hours.

I also certify that documented evidence of such compliance is on file and available for review. I have noted any deviations from the declaration below.

EXPLANATION/COMMENTS: Full PSW Neuteil - externe Zerspanung

Is each Customer Tool properly tagged and numbered? ☐ Yes ☐ No ☑ n/a Photo attached ☐ Yes

Organization Authorized Signature i.V. [signature] Date 06. Mrz 18

Print Name Gerd Nöthen Phone No. +49 221 90 10337 Fax No. +49-221-76803205

Title QS Manager E-mail gnoethel@cotarko.com

FOR CUSTOMER USE ONLY (IF APPLICABLE)

Part Warrant Disposition: ☒ Approved ☐ Rejected ☐ Other

Customer Signature [signature] Date 13.3.18

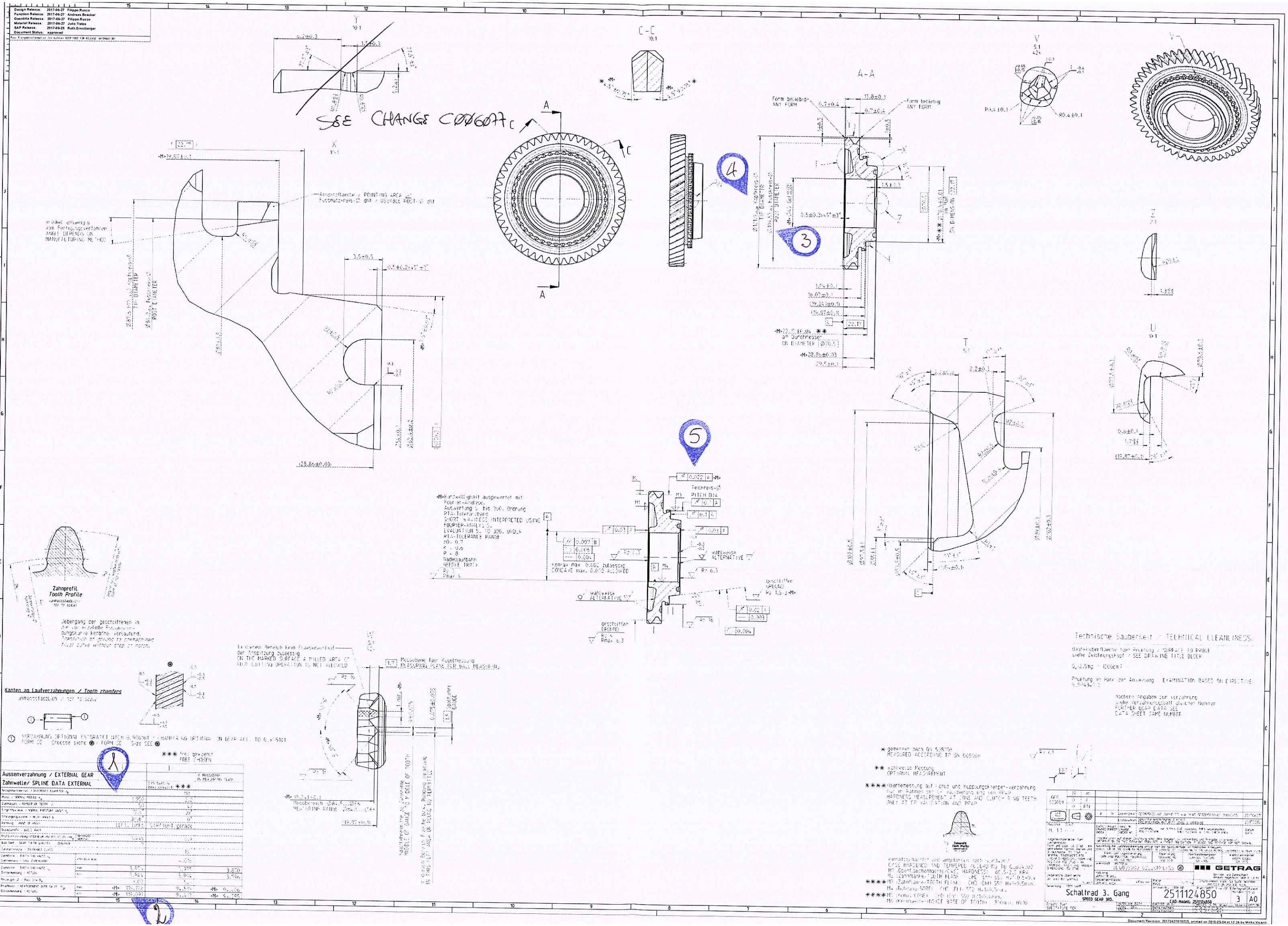
Print Name Wladim Teffer MAGNA GETRAG Customer Tracking Number (optional) 18-00219

based on CFG-1001 PPAP Vesion 4

Design Release:	2017-06-27	Filippo.Russo
Function Release:	2017-06-27	Andreas.Becker
Geométrie Release:	2017-06-27	Filippo.Russo
Material Release:	2017-06-27	Julia.Tietze
SAP Release:	2017-06-28	Ruth.Ernstberger
Document Status:	approved	

Fur Freigabeinformation (exclusive) SEE FREE FOR RELEASE INFORMATION

SEE CHANGE CONCEPT



Document Revision: 20170627070255, printed on 2018-05-04 at 12:26 by Mirko Vicari