Part Submission Warrant

312784

MAGNA GETRAG

Part Name:	Output Shaft 2	Cust. Part No.:	251.6.1242.35
Shown on Drawing No.:	251.6.1242.35	Org. Part No.:	251.6.1242.35
Engineering Change Level:	3 Index "d" (C008074_CP2)	Dated:	27/09/2017
Additional Engineering Changes:	na	Dated:	na
Safety and/or Government Regulation:	☐ Yes ☑ No Purchase Order No.:	Weight (kg):	1.580
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 251.6.1078.35).
- 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

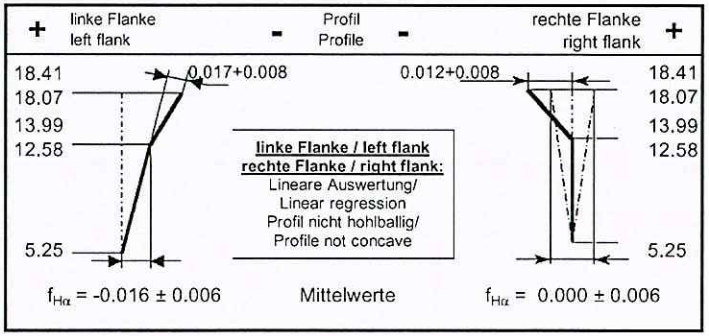
Print Name: F. SPEZZA CATONA Customer Tracking No.:

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

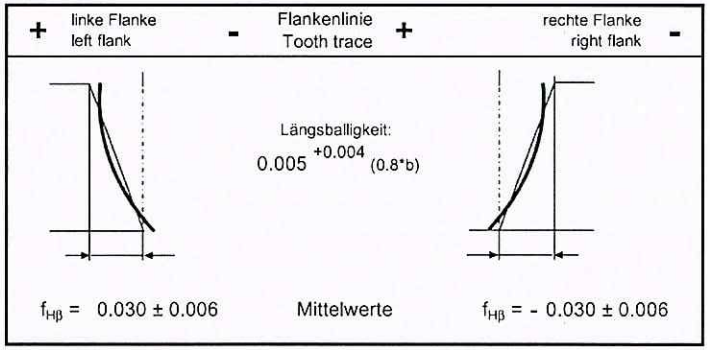
STIRNRAD / GEAR	außenverzahnt / external
Zähnezahl / Number of teeth z	17
Modul / Normal module m_n	2.600000
Eingriffswinkel / Normal pressure angle α_n	20° 0' 0"
Schrägungswinkel / Helix angle β	23° 21' 0"
Steigungsrichtung / Hand of helix	LINKS
Profilverschiebungsfaktor / Addendum modification coeff. x	0.973
Teilkreisdurchmesser / Pitch diameter d	48.143
Kopfkreisdurchmesser / Outside diameter d_a	58.40 $_{-0.20}$
Kopfnutzkreisd. theo. max. / Tip diam. usable theo. d_{Na}	57.95
Kopfnutzkreisd. theo. min. / Tip diam. usable theo. d_{Na}	57.52
Fußkreisdurchmesser / Root diameter d_f	43.20 $_{-0.35}$
Fußnutzkreisdurchmesser / Root diameter usable d_{Nf}	45.97
Grundkreisradius / Base circle radius r_b	22.377
Grundkreisdurchmesser / Base diameter d_b	44.754
Normalzahndicke / Normal tooth thickness max. s_n	5.925
Normalzahndicke / Normal tooth thickness min. s_n	5.895
Meßzähnezahl / Number of teeth spanned k	
Zahnweite / Base tangent length max. W_k	
Zahnweite / Base tangent length min. W_k	
Meßkugeldurchmesser / Ball diameter D_M	5.5000
Diam. Zweikugelmaß / Measurement o. balls max. M_{dK}	60.768
Diam. Zweikugelmaß / Measurement o. balls min. M_{dK}	60.717
Verdrehflankenspiel / Circumferential backlash theo.	0.064 0.170

Toleranzen der Verzahnung (DIN 3961 vom Aug. 1978) gültig für Werte am Einzelzahn (8)
Tolerances of gearing (DIN 3961 of Aug. 1978) valid for values at individual tooth

	linke Fl. / left flank	rechte Fl. / right flank		
Profil-Formabweichung / Profile form error $f_{f\alpha}$	0.004		Eingriffsteilungs-Abweich. / Normal pitch error $f_{p\theta}$	0.014
Profil-Gesamtabweichung / Total profile error F_α			Teilungs-Einzelabweichung / Adjacent pitch error f_p	0.014
Profil-Winkelabweichung / Profile angle error $f_{H\alpha}$	-0.016 ± 0.012	0.000 ± 0.012	Teilungssprung / Diff. bet. adjacent pitches f_u	0.018
Flankenl.-Winkelabweich. / Tooth alignment error $f_{H\beta}$ (d)	0.030 ± 0.013	- 0.030 ± 0.013	Teilungs-Summenabweich. / Cumulative circ. pitch error F_{pk}	
Flankenl.-Gesamtabweich. / Total alignment error F_β			Rundlaufabweichung / Radial run-out F_r	0.032
Flankenl.-Formabweich. / Longitudinal alignment err. $f_{f\beta}$	0.004		Zahndickenschwankung / Range of tooth thickn. error R_s	
Teilungs-Gesamtabweich. / Cumulative pitch error F_p	0.040			
Einf.-Wälzabweichung / Tangential composite error $F_{i'}$			Zweifl.-Wälzabweichung / Radial composite error $F_{i''}$	0.036
Einflanken-Wälzsprung / Tang. tooth to tooth comp. err. $f_{i'}$			Zweifl.-Wälzsprung / Radial tooth to tooth comp. err. $f_{i''}$	0.014
Radbreite im Meßkreis d_M / Facewidth in meas. diam. b	33.98		Meßkreis Krümmungsradius / Radius of curvature meas. diam. ρ_{dM}	11.58



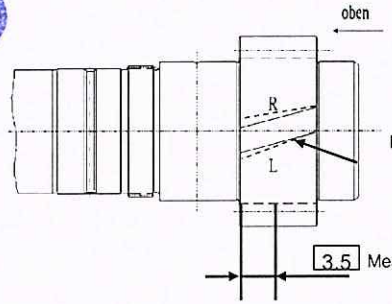
* Schreibbeginn
* Start of checking ∅ = 45.00 $_{-0.30}$ ≡ 2.35



* 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



left fl. = drive in forwards direction

Measurement plane for MOB

Hondurchmesser = 45.00 $_{-0.30}$ ≡ 2.35
honing diameter

#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)

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

Wkz-Profil siehe Werkzeugdatenblatt Nr. 251.6.1242.35
For Tooth profile, see tool data sheet number

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

Abbildungen sind unmaßstäblich.
Diagrams not to scale.

Ersatz für
Erstverwendung bei Getriebetype: 251

	Datum	Name
gez.	2016-08-04	Fabrizio, Cricent
gepr.		

Verzahnungsblatt Endkontrolle
Final Check Gear Data
Benennung:
Naming:
Abtriebswelle K2

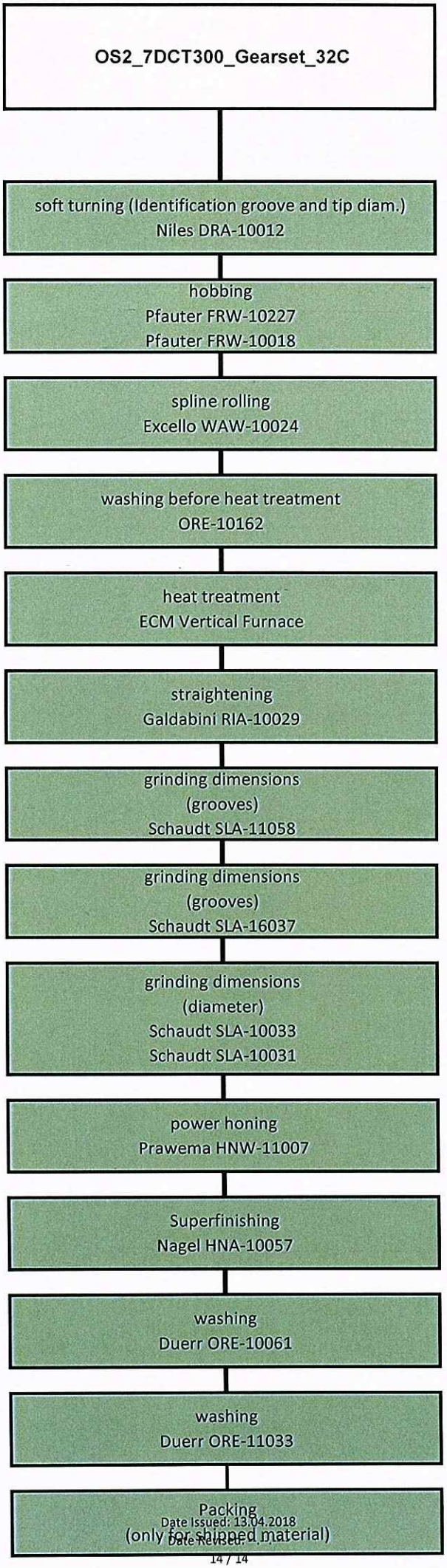
Verteiler:

Schutzvermerk nach ISO 16016 beachten
Protection per ISO 16016

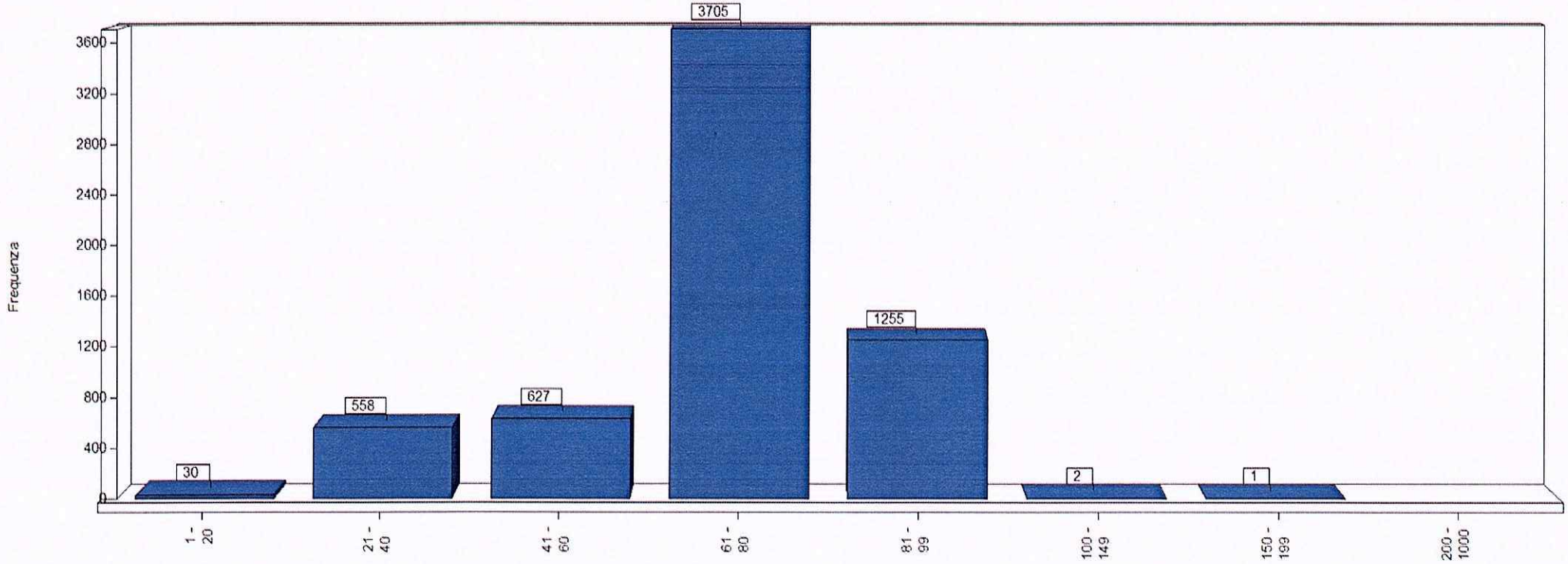
GETRAG
GETRAG Getriebe- und Zahnradfabrik Hermann Hagenmeyer GmbH & Cie KG

Remark:

Zeichnungsnummer:
Drawing number:
251.6.1242.35


OS2_7DCT300_Gearset_32C
soft turning (Identification groove and tip diam.)
Niles DRA-10012
hobbing
Pfauter FRW-10227
Pfauter FRW-10018
spline rolling
Excello WAW-10024
washing before heat treatment
ORE-10162
heat treatment
ECM Vertical Furnace
straightening
Galdabini RIA-10029
grinding dimensions
(grooves)
Schaudt SLA-11058
grinding dimensions
(grooves)
Schaudt SLA-16037
grinding dimensions
(diameter)
Schaudt SLA-10033
Schaudt SLA-10031
power honing
Prawema HNW-11007
Superfinishing
Nagel HNA-10057
washing
Duerr ORE-10061
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:

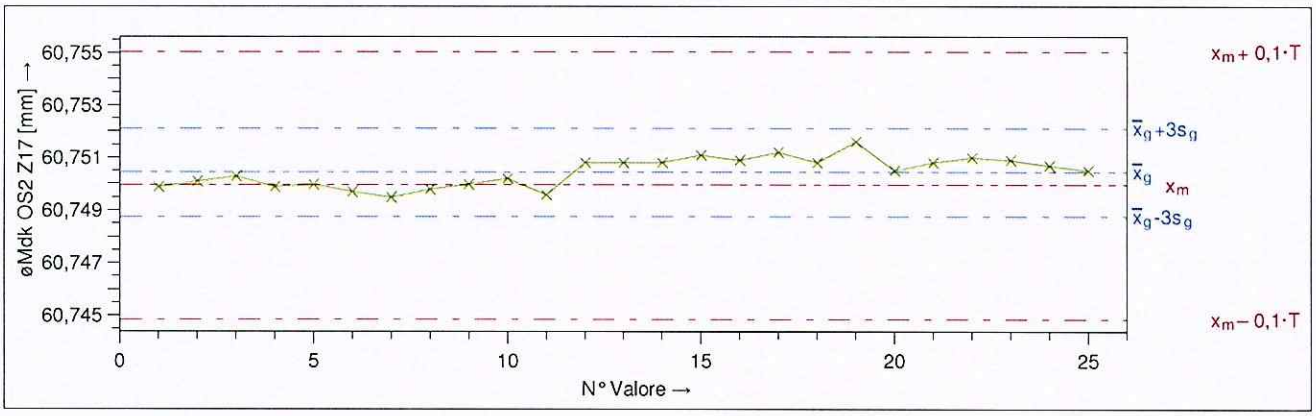
Chr. Classification	Project	Component	Operation	Chr. Description	Actual RPN				Action	Resp.	Due date	Min. RPN expected			
					S	O	D	RPN				S	O	D	RPN
<M>	DCT300	SG1	Hard Turning	Clutch body Height	7	4	4	112	Final drawing tolerance review + Dogbody height review on EP	Pierro	31-May-18	7	2	5	(70)
<M>	DCT300	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	26/05/2018	Nome oper.	mario.bozza	Reparto/Area/Prod.	WLQ	Posto di prova	Levigatura OS2

Calibro		Master		Caratteristica	
Desc. calibro	Calibro a forcella	Desc. mast.	Master OS2	Desc. Car.	øMdk OS2 Z17
N° calibro	MAR 402090 050	N° master	MVZ 400667 002	N° Caratt.	2516124235_32C
Ris. calibro	0,0001	Valore reale mast.	60,75	Val. Nom. 60,7425 LSS	60,7680 ≙ 0,0255
Caus. Pr.	Cg CgK	Unità di misura	mm	Unità di m mm LSI	60,7170 ≙ -0,0255

Nota



i	x_i	i	x_i	i	x_i	i	x_i	i	x_i
1	60,7499	6	60,7497	11	60,7496	16	60,7509	21	60,7508
2	60,7501	7	60,7495	12	60,7508	17	60,7512	22	60,7510
3	60,7503	8	60,7498	13	60,7508	18	60,7508	23	60,7509
4	60,7499	9	60,7500	14	60,7508	19	60,7516	24	60,7507
5	60,7500	10	60,7502	15	60,7511	20	60,7505	25	60,7505

Valori a disegno			Valori Calcolati			Statistiche		
$x_m + 0,1 \cdot T$	=	60,755100	$x_{max\,g}$	=	60,7516	$\bar{x}_g + 3s_g$	=	60,752135
x_m	=	60,750000	$x_{min\,g}$	=	60,7495	$\bar{x}_g$	=	60,750456
$x_m - 0,1 \cdot T$	=	60,744900	R_g	=	0,0021	$\bar{x}_g - 3s_g$	=	60,748777
$0,2 \cdot T$	=	0,010200	n_{tot}	=	25	$6s_g$	=	0,003359
T	=	0,0510				s_g	=	0,000560
Unità di misura	=	mm				$\lvert Bi \rvert$	=	0,00045600
						n_{eff}	=	25

Test per Bias			Risultati del test : significativo ($\alpha \leq 0,1\%$)
Bias	=	0,89%	

				Minimo riferimento per sistema di misura capace		
Risoluzione	%RE =	0,20%	0 5	$T_{min\,(\%RE)}$	=	0,00200
$C_g = \frac{0,2 \cdot T}{4 \cdot s_g}$	=	3,27 ≤ **4,56** ≤ 5,83	0 1 1,33	$T_{min\,(C_g)}$	=	0,0149
$C_{gk} = \frac{0,1 \cdot T - \lvert \bar{x}_g - x_m \rvert}{2 \cdot s_g}$	=	2,97 ≤ **4,15** ≤ 5,33	0 1 1,33	$T_{min\,(C_{gk})}$	=	0,0195

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

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

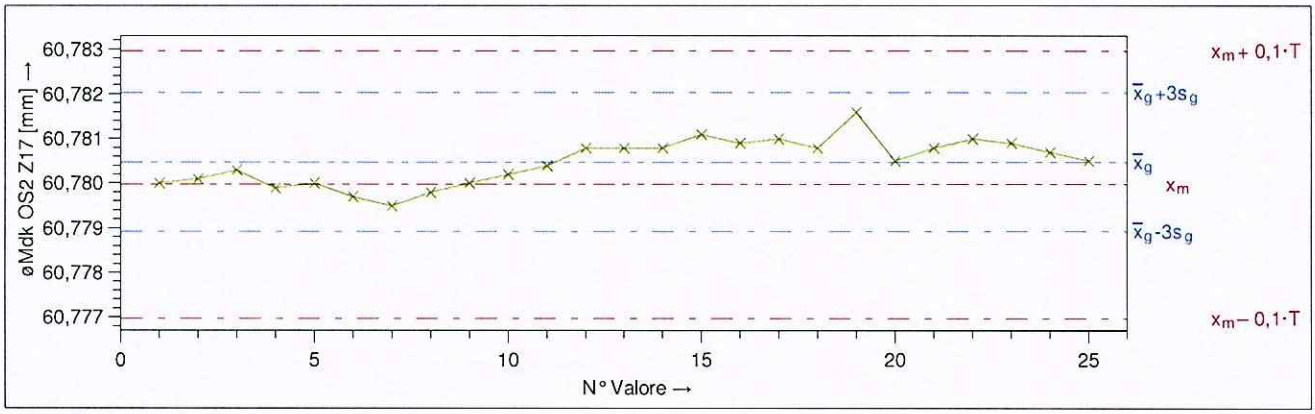
Data _____ Firma _____ Dipartimento _____

Capacità strumenti di misura

Data/ora	26/05/2018	Nome oper.	mario.bozza	Reparto/Area/Prod.	WLQ	Posto di prova	Dentatura OS2

Calibro		Master		Caratteristica	
Desc. calibro	Calibro a forcella	Desc. mast.	Master OS2	Desc. Car.	øMdk OS2 Z17
N° calibro	MAR 402090 047	N° master	MVZ 400667 001	N° Caratt.	2516124235_32C
Ris. calibro	0,0001	Valore reale mast.	60,78	Val. Nom. 60,9200 LSS	60,9350 ≙ 0,0150
Caus. Pr.	Cg CgK	Unità di misura	mm	Unità di π mm LSI	60,9050 ≙ -0,0150

Nota



i	x_i	i	x_i	i	x_i	i	x_i	i	x_i
1	60,7800	6	60,7797	11	60,7804	16	60,7809	21	60,7808
2	60,7801	7	60,7795	12	60,7808	17	60,7810	22	60,7810
3	60,7803	8	60,7798	13	60,7808	18	60,7808	23	60,7809
4	60,7799	9	60,7800	14	60,7808	19	60,7816	24	60,7807
5	60,7800	10	60,7802	15	60,7811	20	60,7805	25	60,7805

Valori a disegno			Valori Calcolati			Statistiche		
$x_m + 0,1 \cdot T$	=	60,783000	$x_{max\,g}$	=	60,7816	$\bar{x}_g + 3s_g$	=	60,782035
x_m	=	60,780000	$x_{min\,g}$	=	60,7795	$\bar{x}_g$	=	60,780484
$x_m - 0,1 \cdot T$	=	60,777000	R_g	=	0,0021	$\bar{x}_g - 3s_g$	=	60,778933
$0,2 \cdot T$	=	0,006000	n_{tot}	=	25	$6s_g$	=	0,003102
T	=	0,0300				s_g	=	0,000517
Unità di misura	=	mm				|Bi|	=	0,00048400
						n_{eff}	=	25

Test per Bias			Risultati del test : significativo ($\alpha \leq 0,1\%$)
Bias	=	1,61%	

Minimo riferimento per sistema di misura capace

Risoluzione	%RE =	0,33%	0 5	$T_{min\,(\%RE)}$	= 0,00200
$C_g = \frac{0,2 \cdot T}{4 \cdot s_g}$	=	$2,09 \leq \mathbf{2,90} \leq 3,72$	0 1 1,33	$T_{min\,(C_g)}$	= 0,0138
$C_{gk} = \frac{0,1 \cdot T - \lvert \bar{x}_g - x_m \rvert}{2 \cdot s_g}$	=	$1,73 \leq \mathbf{2,43} \leq 3,13$	0 1 1,33	$T_{min\,(C_{gk})}$	= 0,0186

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:	251.1.1242.35
Supplier/Vendor Code:	GETRAG Modugno	Part Name:	Output Shaft 2
INSPECTION FACILITY:		Design Record Change Level:	3 Index "d"
NA		Engineering Change Documents:	C008074_CP2 - 27/09/2017

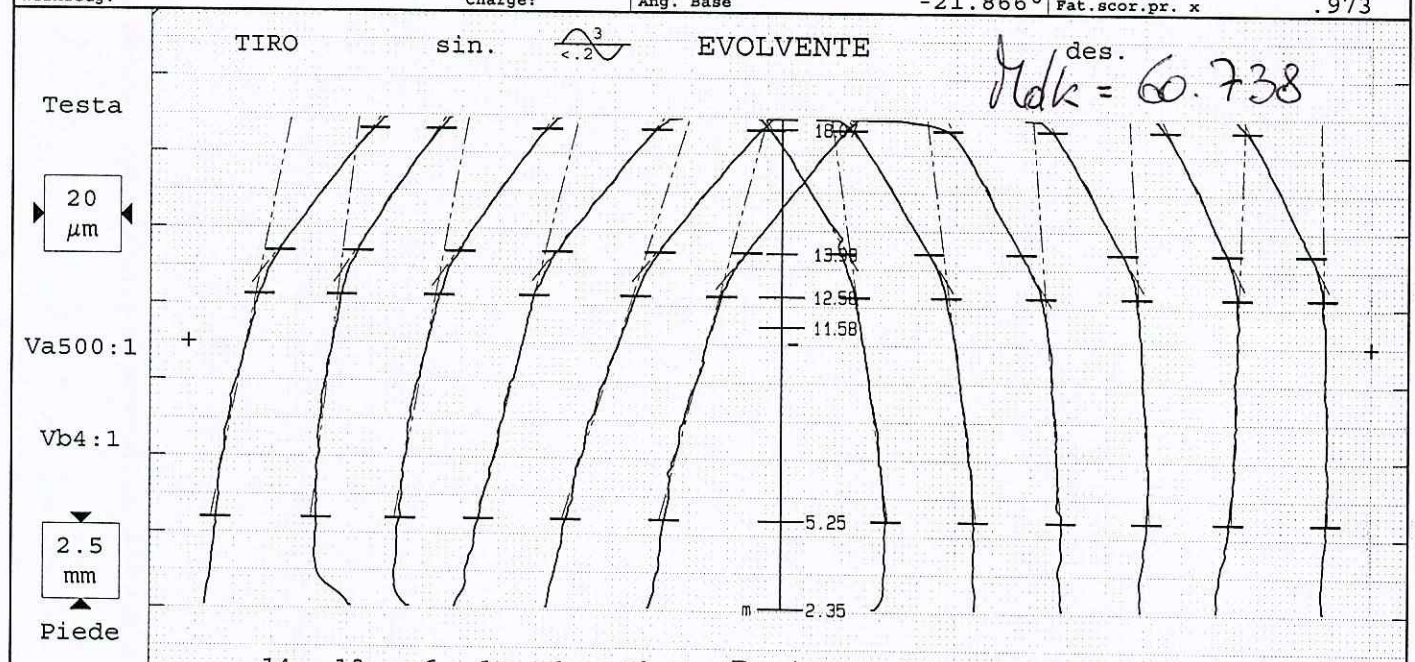
Organization Measurement Results (Data)

Item	Dimension/Specification	Specification / Limits		Classif.	Qty. Tested	1	2	3	4	5	controllo distruttivo	Ok	Not Ok
1	Teeth Profile & Lead, Pitch	OK	NOK		5	OK	OK	OK	OK	OK		OK	
2	MdK	60.768	60.717	<M>	5	60.738	60.745	60.749	60.748	60.738		OK	
3	df	43.200	42.850		5	43.113	43.114	43.110	43.108	43.113		OK	
4	da	58.400	58.200		5	58.291	58.300	58.295	58.288	58.297		OK	
5	Fr	32	0	<M>	5	17.0	16.8	16.5	16.7	16.9		OK	

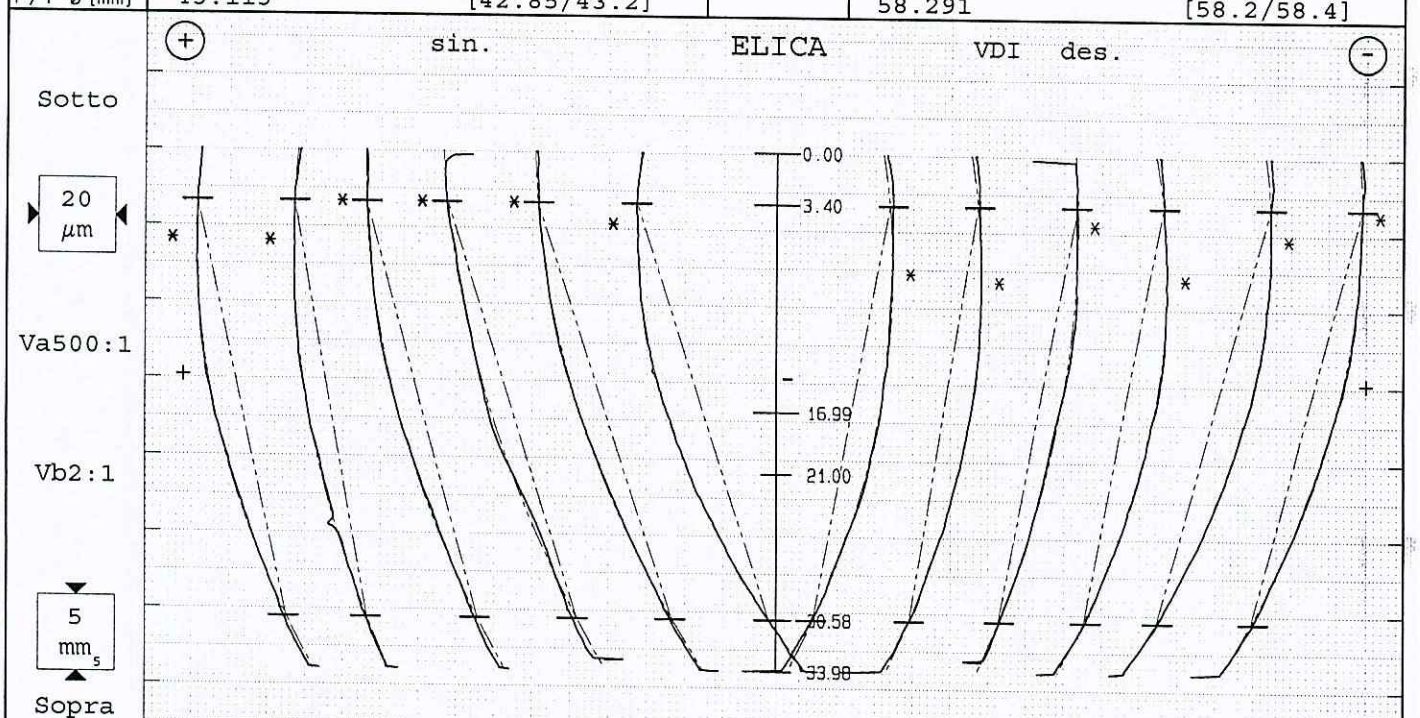
SIGNATURE	TITLE	DATE
Vicenti D.	ME	18/05/2018

Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416a04 0	PNC35 B4784	Controllore:	turno c	Data:	24.04.2018 12:27
Denominazione:	Output Shaft 2	Numero denti z	17	Largh.fasc.dent. b	33.98mm
Numero disegno.:	D51.6.1242.35-IF	Modulo m	2.6mm	Tratto evolv. La	7.33mm
Commessa/serie nr.:	20 ~ 1	Angolo pressione	20°	Tratto elica Lß	27.18mm
Masch.Nr.:	M001 Spindel: Formnest	Angolo elica	-23.35°	Inizio elab. M1	5.25mm
Untersuchungszweck:	Laufende Messung	Ø Base db	44.7543mm	Palpatore Ø	(#2)1mm
Werkzeug:	Charge:	Ang. Base	-21.866°	Fat.scor.pr. x	.973



Tolerance	Medio	Val.misur[µm]						Qual	Tolerance	Val.misur[µm]						Medio	Qual
fHαm -16±6	-20.7	Var a 20.0							±6	Var a 16.1						-4.4	
fHα -16±12	-20.7	-20.2	-12.0	-18.7	-25.5	**-32.0**	-27.1		±12	-14.8	**-13.0**	-7.5	-5.6	3.1	-1.9	-4.4	
Fα	4.7	3.3	3.6	2.9	5.5	8.8	6.5			8.4	7.4	5.8	3.3	2.7	1.6	3.8	
ffα 4	2.5	2.5	2.4	2.6	1.1	2.3	2.3		4	1.3	1.3	1.8	1.3	1.3	1.1	1.3	
Cα -25/-17	-20.9	-22.1	-21.4	-20.8	-20.6	-19.4	-21.4		-20/-12	-16.1	-19.7	-21.6	-20.0	**-20.4**	-19.2	-19.8	
ffαf 3	0.0	0.0	0.0	0.0	0.5	0.0	0.0		3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
P/T-ø [mm]	43.113	[42.85/43.2]								58.291	[58.2/58.4]						



fHßm 30±6	33.7	Bd -0.Var ß 20.0							-30±6	Bd -0.Var ß 14.8						-30.8	
fHß 30±13	33.7	29.5	24.2	37.0	42.7	**44.2**	43.3		-30±13	-25.2	-22.7	-26.1	-26.1	-37.5	-36.8	-30.8	
Fß	6.2	2.9	6.2	4.9	9.7	10.9	11.7			4.5	5.9	4.0	4.7	7.3	5.8	5.9	
ffß 4	1.5	1.2	2.3	1.4	2.3	1.0	1.1		4	1.3	0.7	1.2	0.8	0.7	1.0	0.8	
Cß 5/9	6.7	7.3	6.1	6.4	5.8	6.8	9.7		5/9	7.6	7.2	5.8	8.1	8.9	7.7	8.0	

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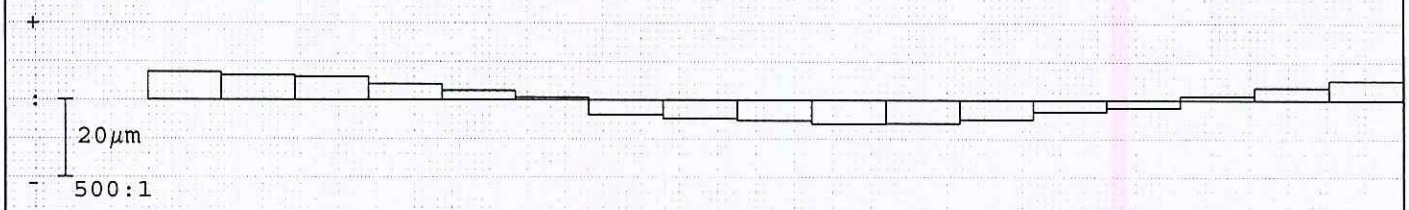
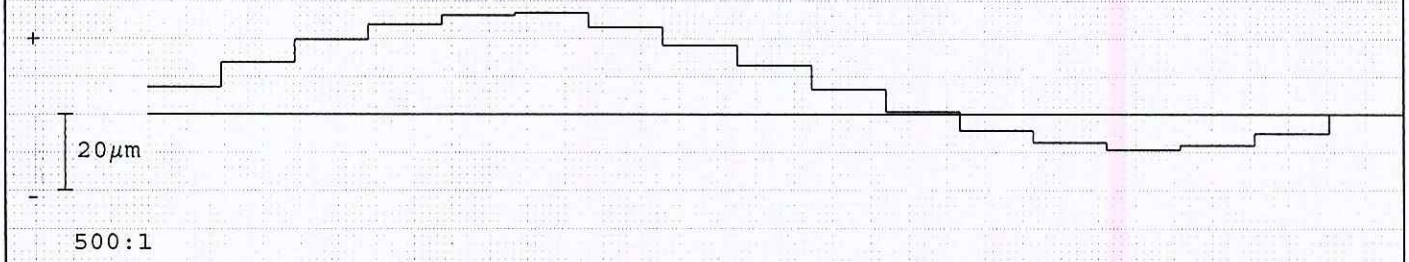
Ruota cilindrica Divisione

Nr. prog.: STI0416a04 0 PNC35 B4784	Controllore: turno c	Data: 24.04.2018 12:27	
Denominazione: Output Shaft 2	Numero denti z 17	Angolo pressione 20°	
Numero disegno.: D51.6.1242.35-IF	Modulo m 2.6mm	Angolo elica -23.35°	
Commessa/serie nr.: 20	Untersuchungszweck: Laufende Messung		
Masch.Nr.: M001 Spindel: Formneat	Werkzeug:	Charge:	

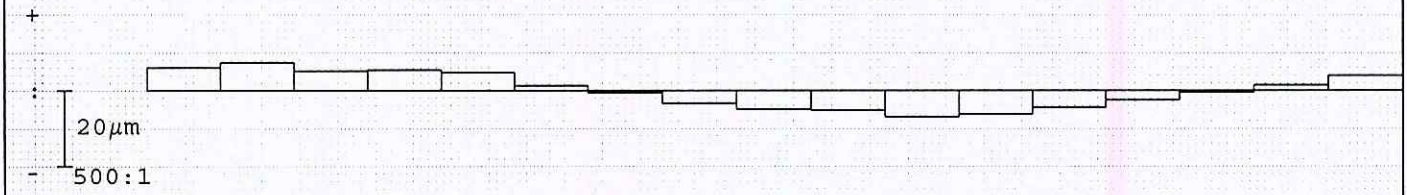
Errori singoli di divisione fp fianco sinistro



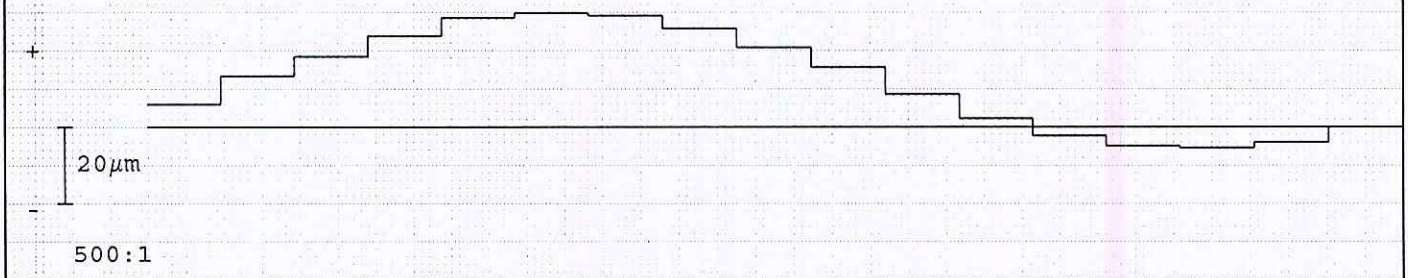
Errore somma di divisione Fp fianco sinistro



Errori singoli di divisione fp fianco destro

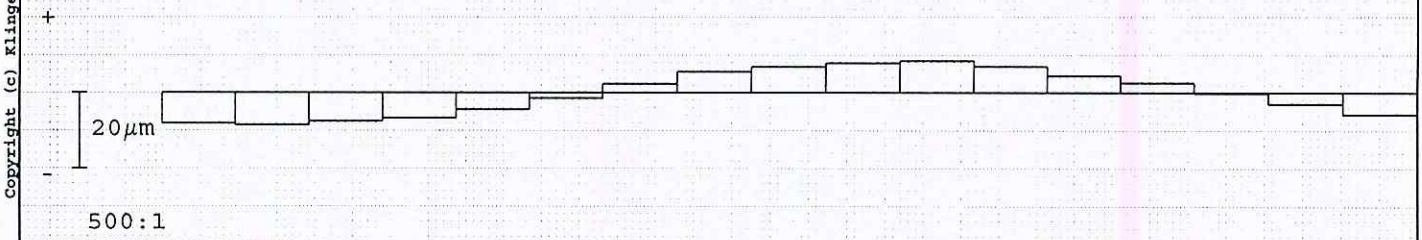


Errore somma di divisione Fp fianco destro



Corsa per misura divis.:50.392 z=21mm		fianco sinistro / TIRO				fianco destro			
		Val.misur	Qual.	Val. amm	Qual.	Val.misur	Qual.	Val. amm	Qual.
Gr. err. singoli divisione	fp max	7.2		14.0		7.3		14.0	
Gr. salto di passo	fu max	4.4		18.0		3.4		18.0	
Scarto di divisione	Rp	13.4				14.3			
Err. globale di divisione	Fp	36.1		40.0		35.1		40.0	
Err. cordale di divisione	Fpz/8	13.6				13.3			

Centricità Fr (Ø-sfera =5.5mm) ◎ : 16.7µm



Err. di concentricitá	Fr	17.0	32.0	
Variaz. spessore dente	Rs			

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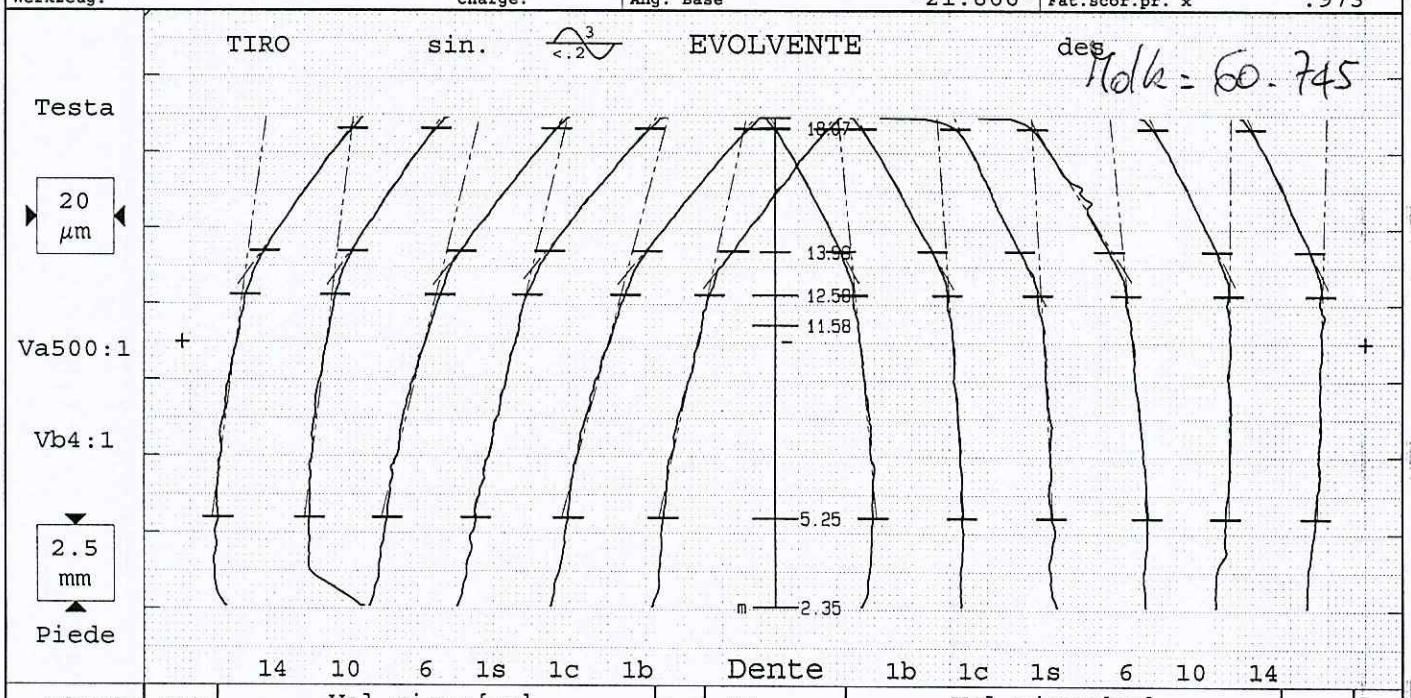
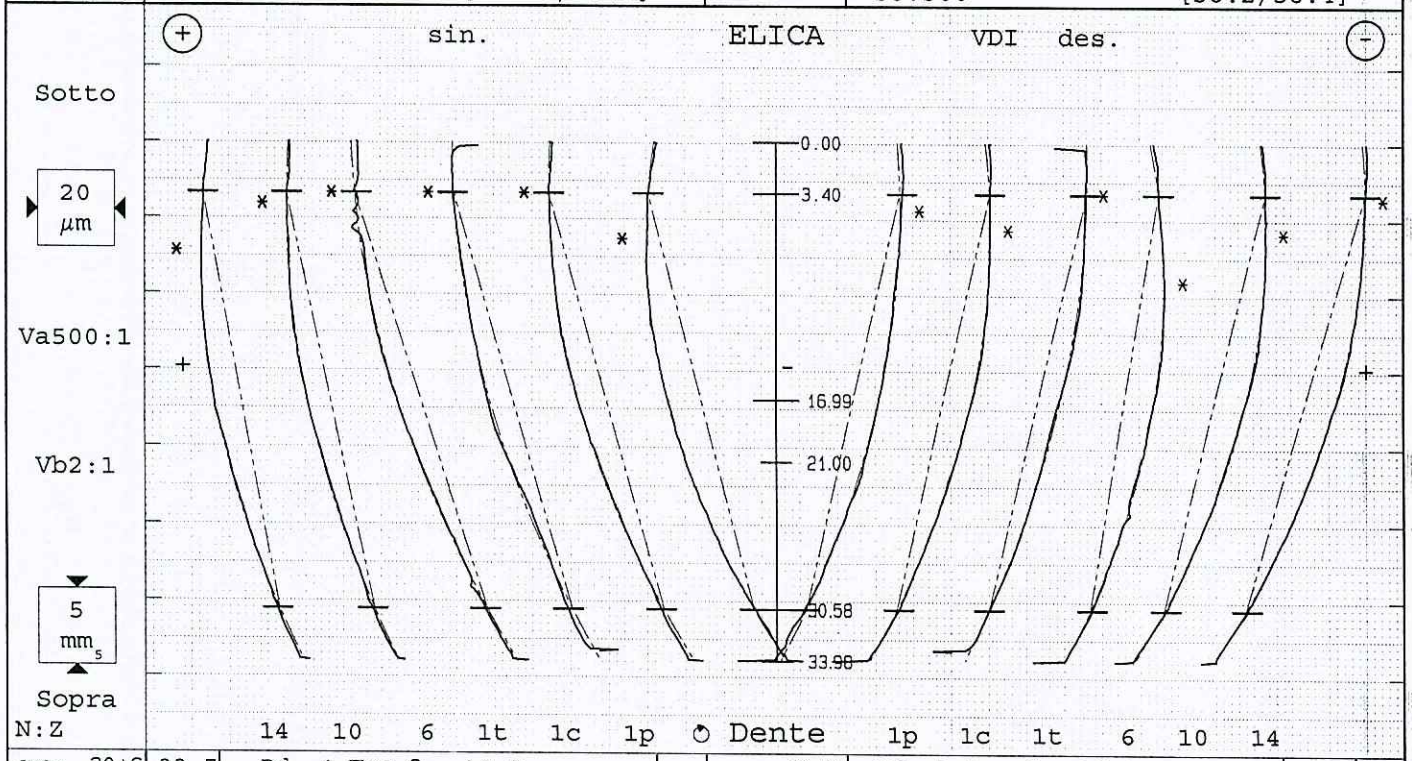
Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416a04 0	PNC35 B4784	Controllore:	turno c	Data:	24.04.2018 12:32
Denominazione:	Output Shaft 2	Numero denti z	17	Largh.fasc.dent. b	33.98mm
Numero disegno.:	D51.6.1242.35-IF	Modulo m	2.6mm	Tratto evolv. La	7.33mm
Commessa/serie nr.:	21 - 2	Angolo pressione	20°	Tratto elica Lß	27.18mm
Masch.Nr.:	M001 Spindel: Formnext	Angolo elica	-23.35°	Inizio elab. M1	5.25mm
Untersuchungszweck:	Laufende Messung	Ø Base db	44.7543mm	Palpatore Ø	(#2)1mm
Werkzeug:	Charge:	Ang. Base	-21.866°	Fat.scor.pr. x	.973



Tolerance	Medio	Val.misur[µm]						Qual	Tolerance	Val.misur[µm]						Medio	Qual
fHαm -16±6	-19.7	Var a 14.6							±6	Var a 12.3						-3.5	
fHα -16±12	-19.7	-13.8	-12.5	-25.2	-24.1	-27.1	-22.3		±12	-9.8	-7.0	-5.5	-9.9	0.5	2.4	-3.5	
Fα	4.8	3.2	3.3	6.0	5.0	6.5	3.9			5.7	4.1	3.9	5.7	1.5	2.6	3.5	
ffα 4	2.5	2.6	2.3	2.4	1.0	2.6	1.9		4	1.8	1.2	2.0	1.1	1.4	1.5	1.3	
Cα -25/-17	-21.6	-22.7	-21.8	-20.7	-21.7	-21.2	-21.6		-20/-12	-16.6	-19.8	-19.3	-20.0	-20.0	-19.6	-19.9	
ffαf 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		3	0.0	0.0	0.3	0.0	0.0	0.0	0.0	
P/T-ø [mm]	43.114	[42.85/43.2]								58.300	[58.2/58.4]						



fHßm 30±6	33.7	Bd 4.Var ß 18.8							-30±6	Bd -1.Var ß 17.0						-31.8	
fHß 30±13	33.7	24.8	28.9	**43.6**	38.6	37.4	34.4		-30±13	-31.2	-31.0	-32.7	-22.8	-33.6	-39.8	-31.8	
Fß	6.0	4.8	1.9	11.6	6.4	5.7	6.4			3.2	2.8	2.9	7.4	4.9	8.0	5.8	
ffß 4	1.4	0.9	1.2	2.5	2.1	1.1	0.8		4	1.3	0.9	1.2	1.4	1.0	0.7	1.0	
Cß 5/9	6.7	7.0	6.1	6.3	6.2	7.4	8.9		5/9	6.8	7.6	6.0	7.9	8.3	8.2	8.0	

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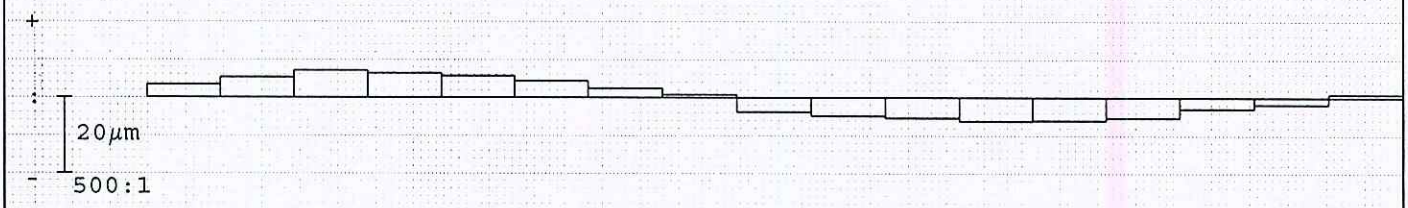
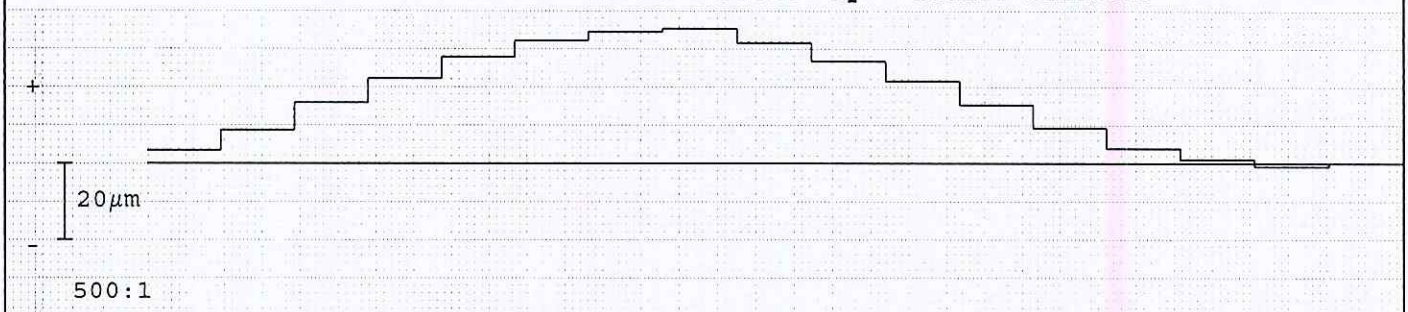
Ruota cilindrica Divisione

Nr. prog.: STI0416a04 0 PNC35 B4784		Controllore: turno c	Data: 24.04.2018 12:32
Denominazione:	Output Shaft 2	Numero denti z 17	Angolo pressione 20°
Numero disegno.:	D51.6.1242.35-IF	Modulo m 2.6mm	Angolo elica -23.35°
Commessa/serie nr.:	21	Untersuchungszweck:	Laufende Messung
Masch.Nr.:	M001 Spindel: Formnest	Werkzeug:	Charge:

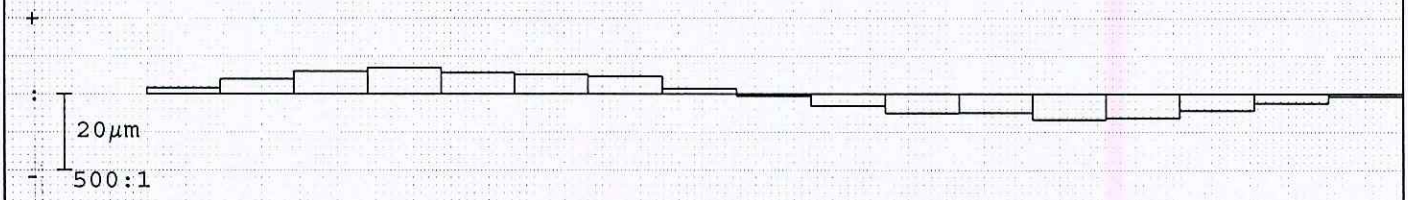
Errori singoli di divisione fp fianco sinistro



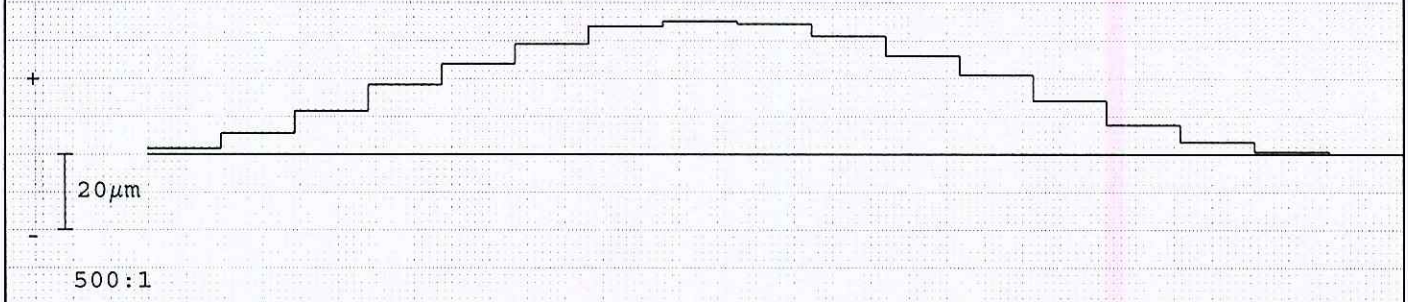
Errore somma di divisione Fp fianco sinistro



Errori singoli di divisione fp fianco destro



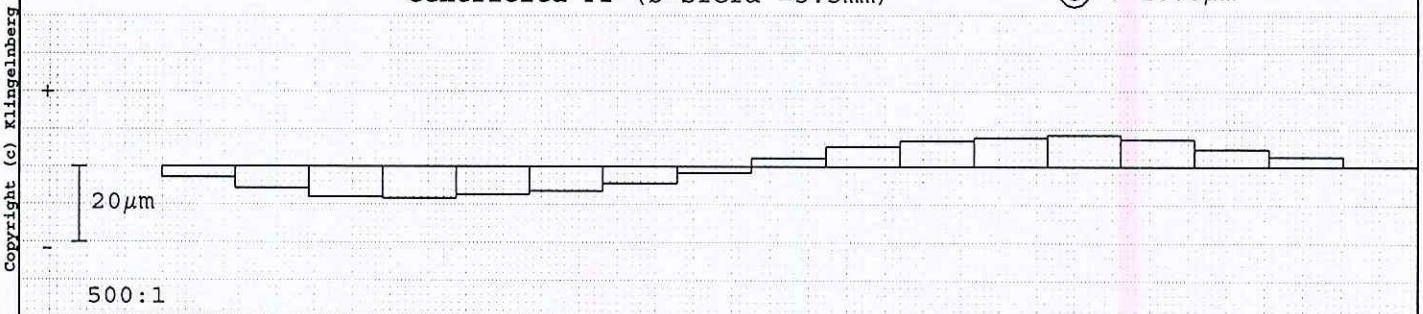
Errore somma di divisione Fp fianco destro



Corsa per misura divis.:50.392 z=21mm

		fianco sinistro / TIRO				fianco destro			
		Val.misur	Qual.	Val. amm	Qual.	Val.misur	Qual.	Val. amm	Qual.
Gr. err. singoli divisione	fp max	7.1		14.0		6.9		14.0	
Gr. salto di passo	fu max	4.5		18.0		3.2		18.0	
Scarto di divisione	Rp	13.3				13.7			
Err. globale di divisione	Fp	36.1		40.0		34.9		40.0	
Err. cordale di divisione	Fpz/8	13.5				13.2			

Centricità Fr (Ø-sfera =5.5mm) ◎ : 16.6µm



Err. di concentricitá	Fr	16.8	32.0	
Variaz. spessore dente	Rs			

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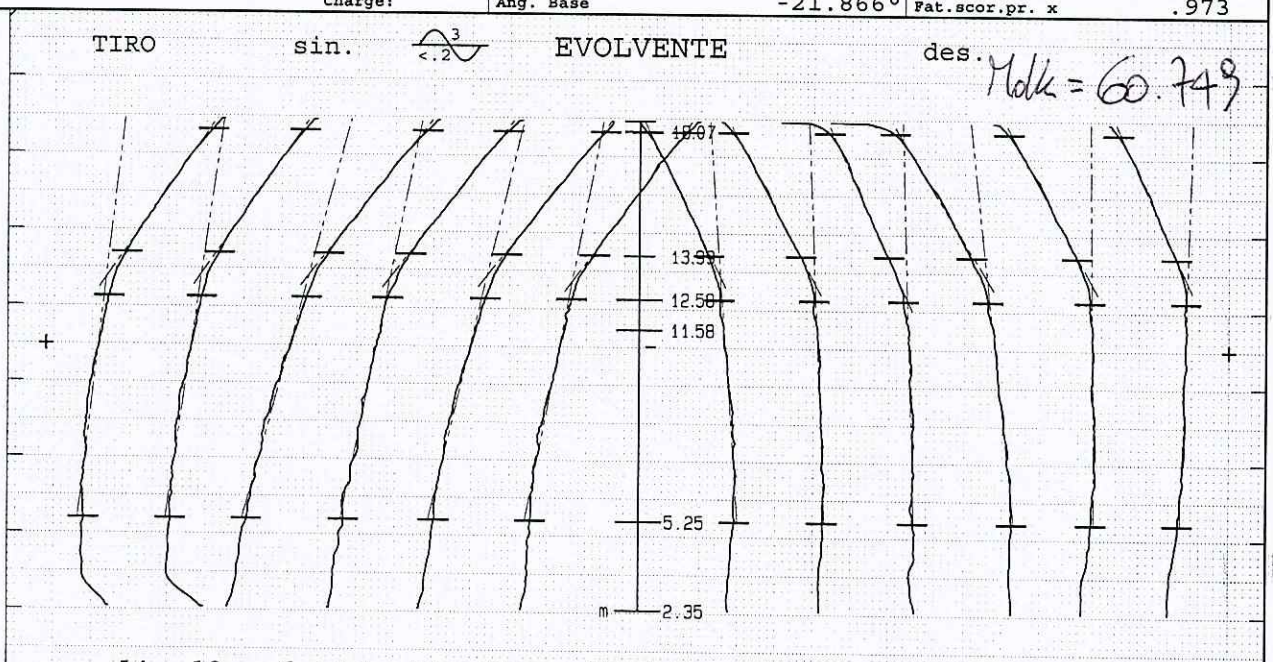
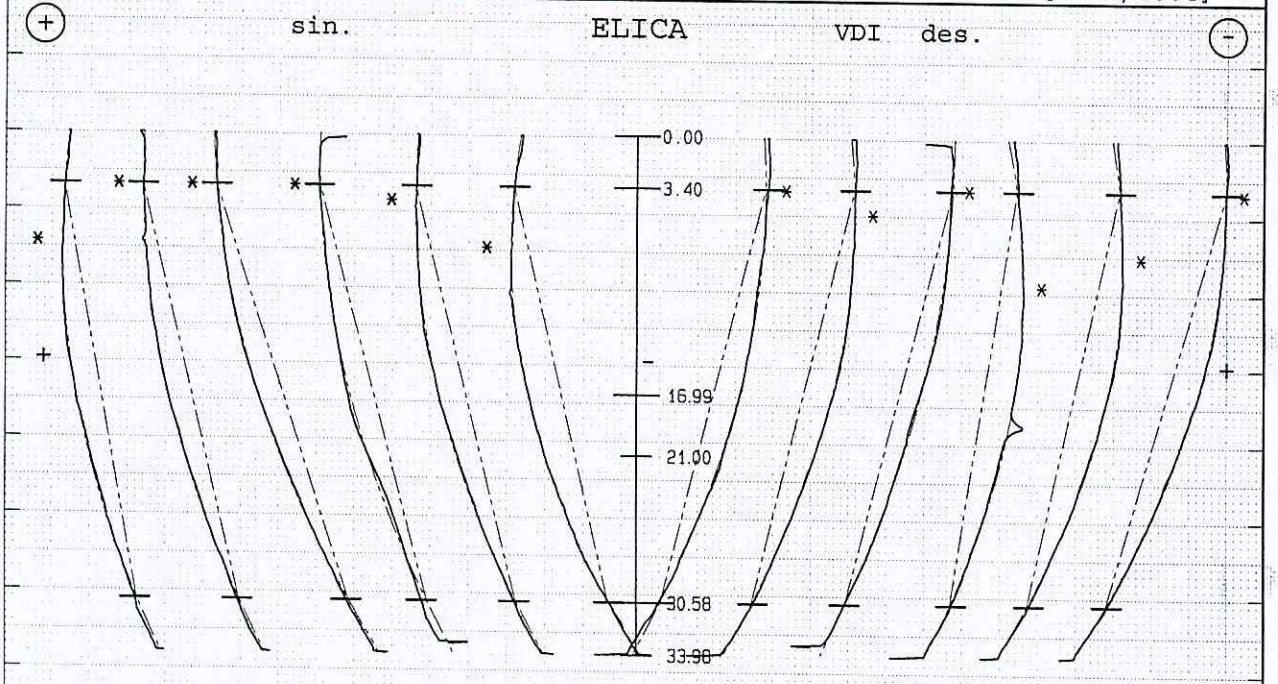
Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416a04 0	PNC35 B4784	Controllore:	turno c	Data:	24.04.2018 12:37
Denominazione:	Output Shaft 2	Numero denti z	17	Largh.fasc.dent. b	33.98mm
Numero disegno.:	D51.6.1242.35-IF	Modulo m	2.6mm	Tratto evolv. La	7.33mm
Commessa/serie nr.:	22 - 3	Angolo pressione	20°	Tratto elica Lß	27.18mm
Masch.Nr.:	M001 Spindel: Formnestl	Angolo elica	-23.35°	Inizio elab. M1	5.25mm
Untersuchungszweck:	Laufende Messung	Ø Base db	44.7543mm	Palpatore Ø	(#2)1mm
Werkzeug:	Charge:	Ang. Base	-21.866°	Fat.scor.pr. x	.973



Tolerance	Medio	Val.misur [µm]						Qual	Tolerance	Val.misur [µm]						Medio	Qual
fHαm -16±6	-19.6	Var a 16.0							±6	Var a 14.4						-3.5	
fHα -16±12	-19.6	-11.8	-14.7	-27.8	-20.6	-24.0	-19.6		±12	-7.4	-4.4	-3.2	-11.4	-1.2	3.0	-3.5	
Fα	4.5	3.9	2.7	6.7	3.4	4.7	3.2			4.5	3.1	2.9	6.4	1.6	2.4	3.4	
ffα 4	2.4	2.7	2.3	2.3	1.5	2.4	2.5		4	1.7	1.3	1.7	1.2	1.3	1.2	1.3	
Cα -25/-17	-21.4	-22.8	-21.3	-20.0	-22.4	-21.3	-21.9		-20/-12	-16.1	-19.7	-18.6	-19.3	-21.0	-19.1	-19.8	
ffαf 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
P/T-ø [mm]	43.110	[42.85/43.2]								58.295	[58.2/58.4]						



fHßm 30±6	33.3	Bd 4.Var ß 19.9							-30±6	Bd -1.Var ß 17.9						-31.6	
fHß 30±13	33.3	24.1	32.0	44.0	35.3	33.0	30.9		-30±13	-34.6	-34.0	-35.6	-22.0	-30.3	-39.9	-31.6	
Fß	5.8	6.1	2.4	11.1	3.9	3.5	4.4			5.1	4.5	4.5	10.1	4.0	8.1	6.7	
ffß 4	1.1	1.0	1.2	1.1	2.6	1.0	1.2		4	1.3	0.7	1.2	4.2	0.8	0.8	1.6	
Cß 5/9	6.7	6.7	6.3	6.7	6.3	7.1	8.8		5/9	7.0	7.8	5.7	8.2	8.9	8.1	8.3	

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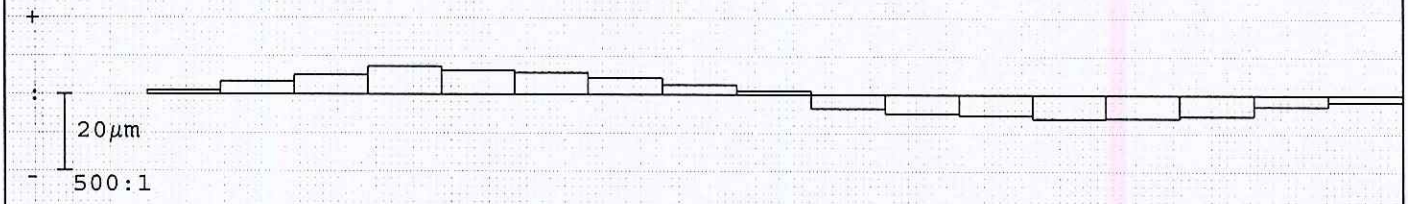
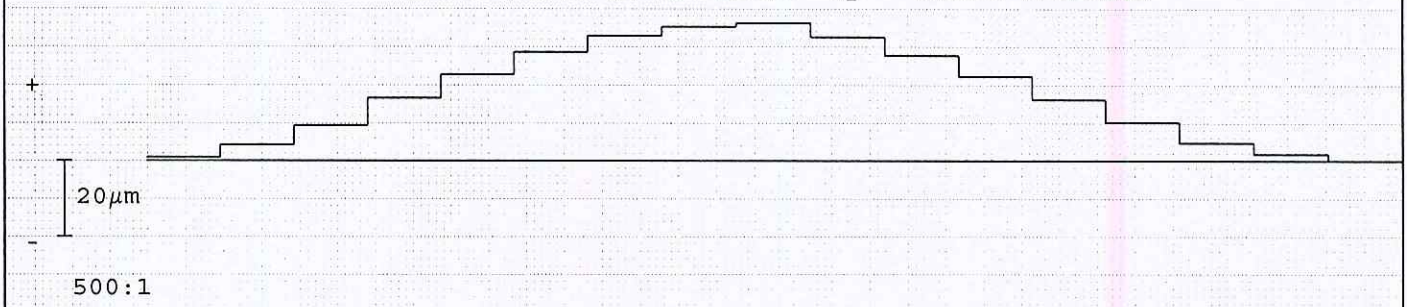
Ruota cilindrica Divisione

Nr. prog.: STI0416a04 0	PNC35 B4784	Controllore:	turno c	Data:	24.04.2018 12:37
Denominazione:	Output Shaft 2	Numero denti z	17	Angolo pressione	20°
Numero disegno.:	D51.6.1242.35-IF	Modulo m	2.6mm	Angolo elica	-23.35°
Commessa/serie nr.:	22	Untersuchungszweck:	Laufende Messung		
Masch.Nr.:	M001	Spindel: Formnest	Werkzeug:	Charge:	

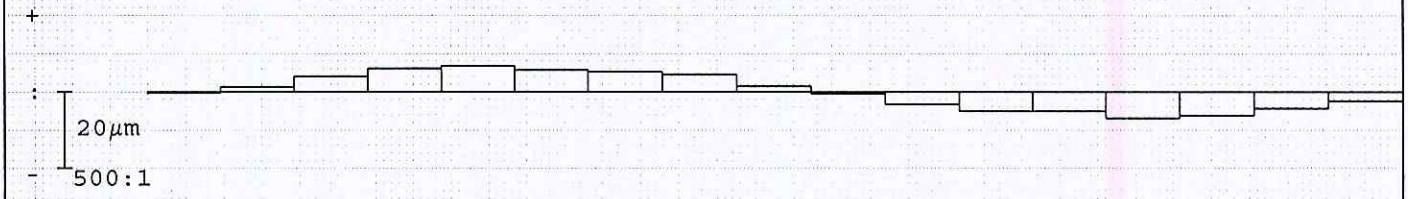
Errori singoli di divisione fp fianco sinistro



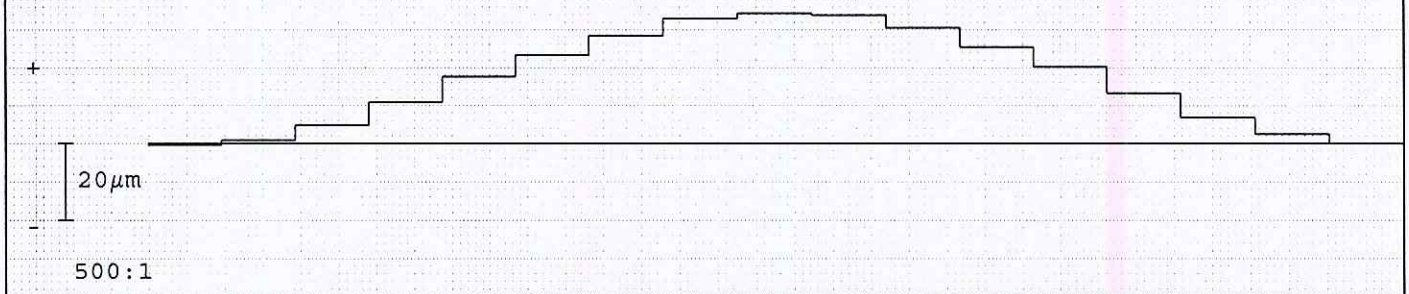
Errore somma di divisione Fp fianco sinistro



Errori singoli di divisione fp fianco destro

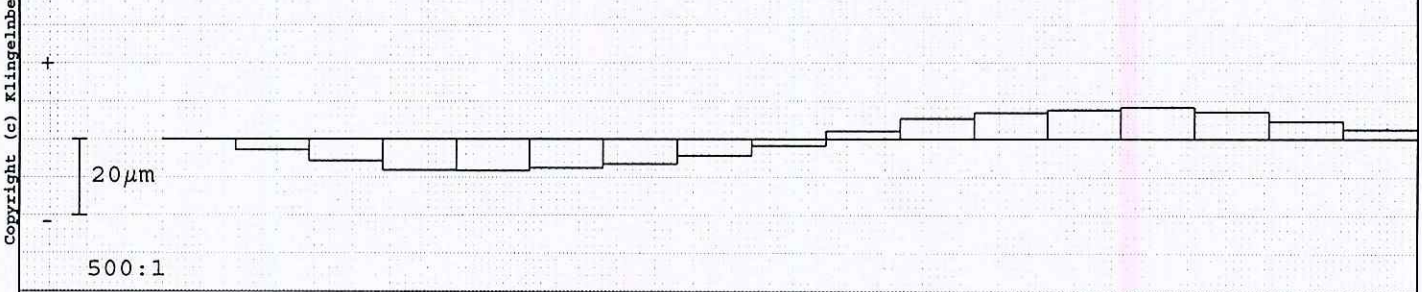


Errore somma di divisione Fp fianco destro



Corsa per misura divis.:50.392 z=21mm		fianco sinistro / TIRO				fianco destro			
		Val.misur	Qual.	Val. amm	Qual.	Val.misur	Qual.	Val. amm	Qual.
Gr. err. singoli divisione	fp max	7.2		14.0		7.0		14.0	
Gr. salto di passo	fu max	4.6		18.0		3.2		18.0	
Scarto di divisione	Rp	13.4				13.7			
Err. globale di divisione	Fp	36.2		40.0		34.7		40.0	
Err. cordale di divisione	Fpz/8	13.5				13.3			

Centricità Fr (Ø-sfera =5.5mm) ◎ : 16.5µm



Err. di concentricitá	Fr	16.5	32.0	
Variaz. spessore dente	Rs			

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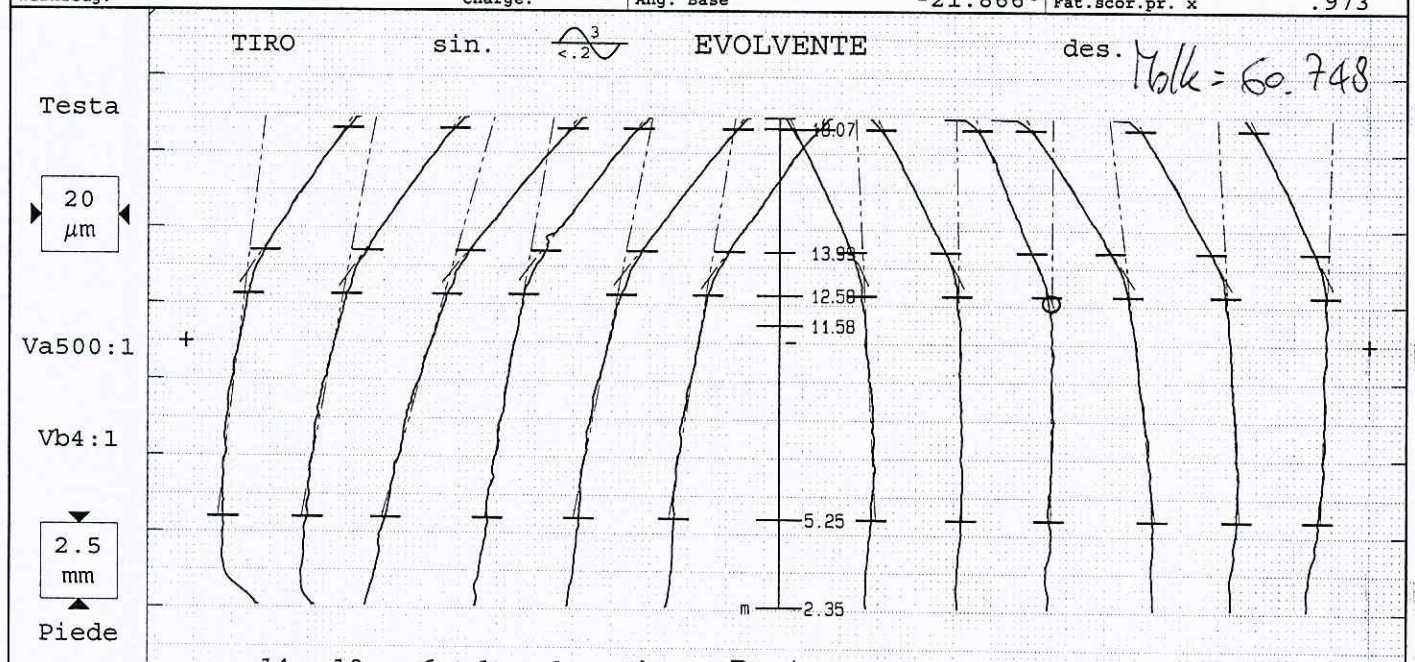
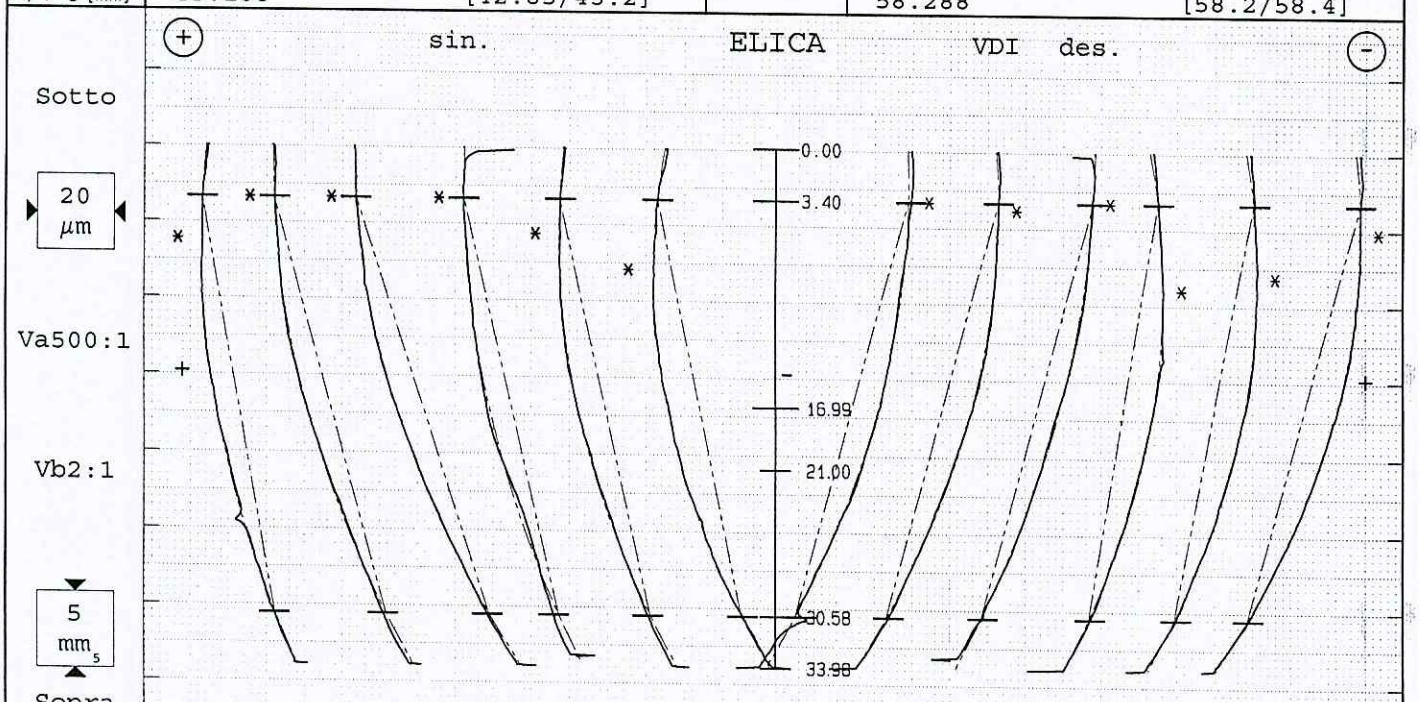
Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416a04 0	PNC35 B4784	Controllore:	turno c	Data:	24.04.2018 12:43
Denominazione:	Output Shaft 2	Numero denti z	17	Largh.fasc.dent. b	33.98mm
Numero disegno.:	D51.6.1242.35-IF	Modulo m	2.6mm	Tratto evolv. La	7.33mm
Commessa/serie nr.:	23 -4	Angolo pressione	20°	Tratto elica Lß	27.18mm
Masch.Nr.:	M001 Spindel: Formnext	Angolo elica	-23.35°	Inizio elab. M1	5.25mm
Untersuchungszweck:	Laufende Messung	Ø Base db	44.7543mm	Palpatore Ø	(#2)1mm
Werkzeug:	Charge:	Ang. Base	-21.866°	Fat.scor.pr. x	.973



Tolerance	Medio	Val.misur[µm]						Qual	Tolerance	Val.misur[µm]						Medio	Qual
fHαm -16±6	-20.0	Var a 16.8							±6	Var a 14.6						-4.1	
fHα -16±12	-20.0	-12.1	-19.0	**-28.9**	-17.6	-20.1	-16.8		±12	-5.2	-1.8	0.4	-11.7	-5.7	2.9	-4.1	
Fα	4.3	3.7	3.0	7.0	1.3	3.4	2.1			3.7	1.6	2.0	6.4	3.5	2.5	3.5	
ffα 4	2.4	2.4	2.6	2.2	1.1	2.4	2.2		4	1.9	1.0	2.1	1.4	1.3	1.4	1.3	
Cα -25/-17	-21.4	-21.6	-20.9	-20.7	-22.4	-22.3	-21.9		-20/-12	-16.3	-19.5	-19.2	**-20.6**	**-20.1**	**-20.3**	**-20.1**	
ffαf 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
P/T-ø [mm]	43.108	[42.85/43.2]								58.288	[58.2/58.4]						



fHßm 30±6	33.8	Bd 3.Var ß 20.2							-30±6	Bd 0.Var ß 14.7						-30.9	
fHß 30±13	33.8	24.0	37.2	**44.2**	31.3	29.7	27.6		-30±13	-37.3	-37.1	-37.1	-22.8	-26.1	-37.5	-30.9	
Fß	6.4	6.4	5.4	11.1	2.5	2.8	4.6			6.9	6.1	5.8	6.3	4.7	7.3	6.1	
ffß 4	1.5	2.5	1.5	0.9	2.5	1.2	0.9		4	2.3	1.0	1.1	1.4	0.8	0.6	1.0	
Cß 5/9	6.7	6.1	6.4	7.2	5.9	7.2	8.4		5/9	7.1	7.8	5.9	7.9	8.1	8.8	8.2	

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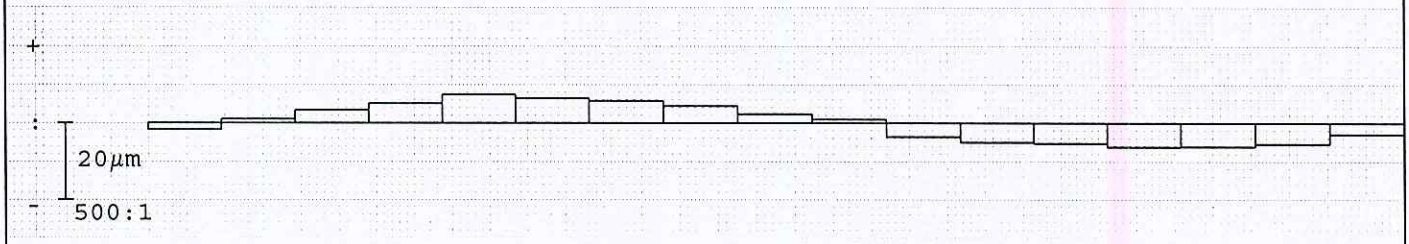
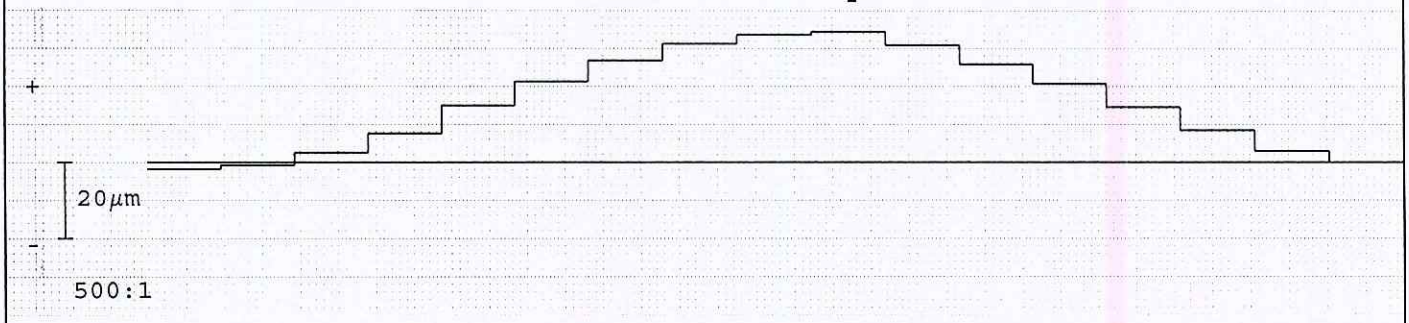
Ruota cilindrica Divisione

Nr. prog.: STI0416a04 0 PNC35 B4784		Controllore: turno c	Data: 24.04.2018 12:43
Denominazione:	Output Shaft 2	Numero denti z 17	Angolo pressione 20°
Numero disegno.:	D51.6.1242.35-IF	Modulo m 2.6mm	Angolo elica -23.35°
Commessa/serie nr.:	23	Untersuchungszweck:	Laufende Messung
Masch.Nr.:	M001 Spindel: Formmaschine	Werkzeug:	Charge:

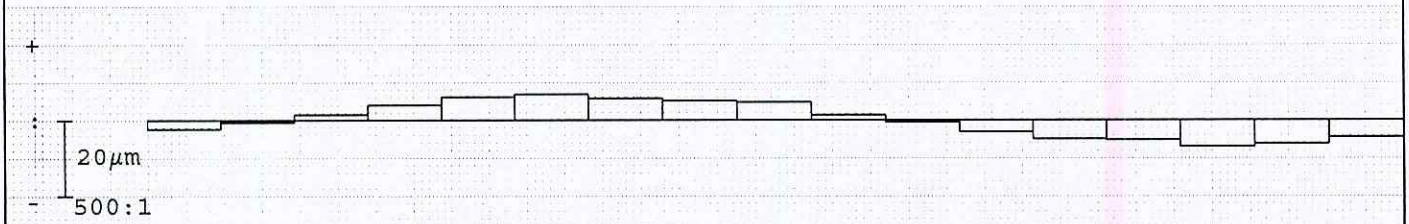
Errori singoli di divisione fp fianco sinistro



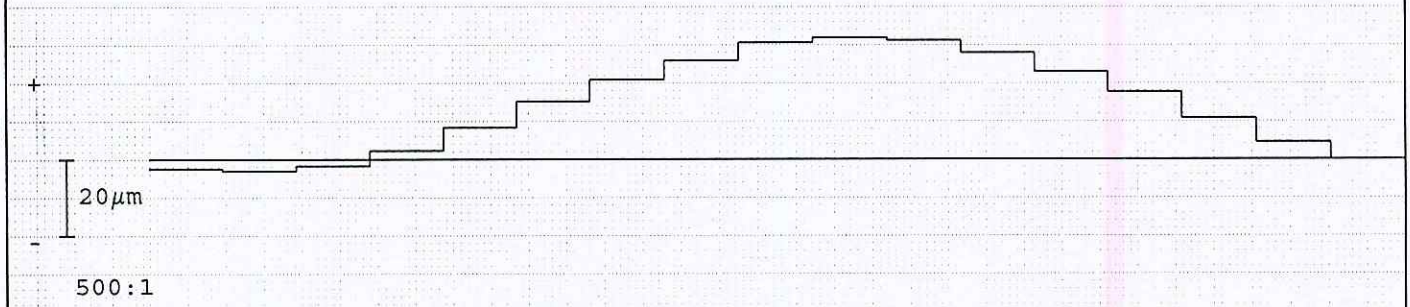
Errore somma di divisione Fp fianco sinistro



Errori singoli di divisione fp fianco destro



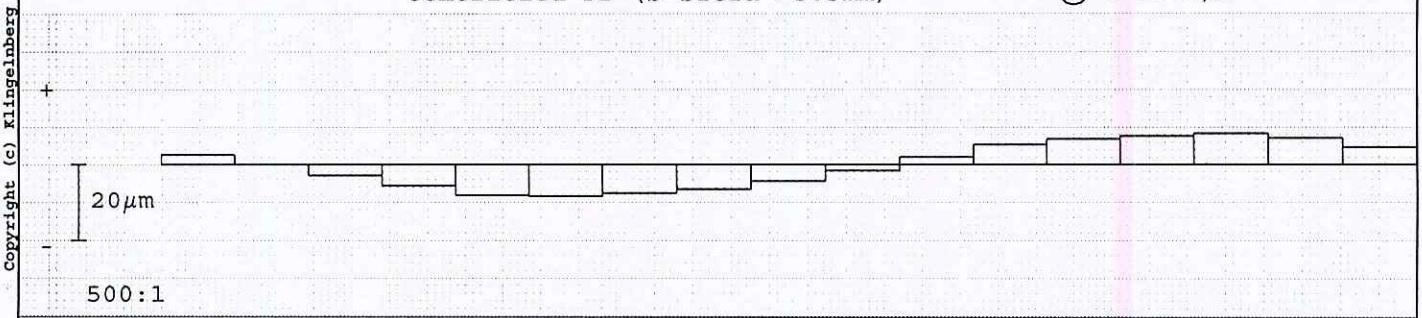
Errore somma di divisione Fp fianco destro



Corsa per misura divis.:50.392 z=21mm

		fianco sinistro / TIRO				fianco destro			
		Val.misur	Qual.	Val. amm	Qual.	Val.misur	Qual.	Val. amm	Qual.
Gr. err. singoli divisione	fp max	7.3		14.0		6.9		14.0	
Gr. salto di passo	fu max	4.5		18.0		3.4		18.0	
Scarto di divisione	Rp	13.4				13.7			
Err. globale di divisione	Fp	36.2		40.0		34.9		40.0	
Err. cordale di divisione	Fpz/8	13.7				13.2			

Centricità Fr (Ø-sfera =5.5mm) ◎ : 16.5µm



Err. di concentricitá	Fr	16.7	32.0	
Variaz. spessore dente	Rs			

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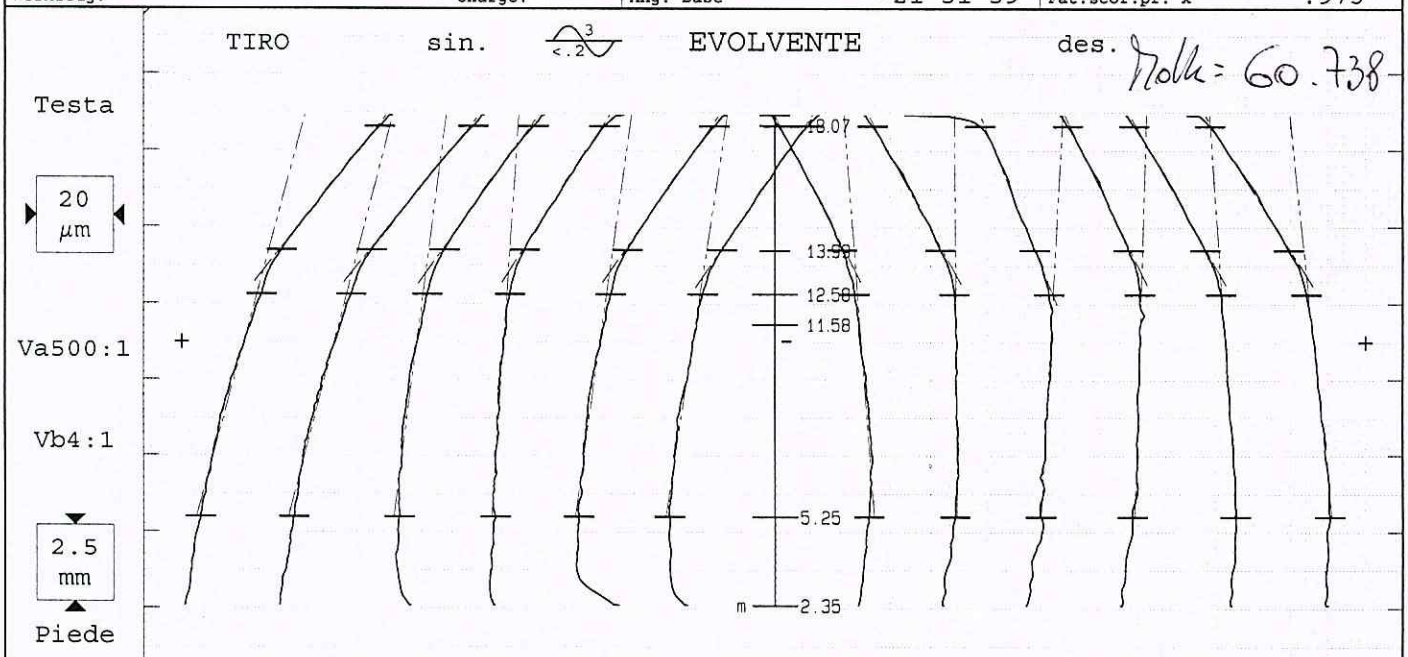
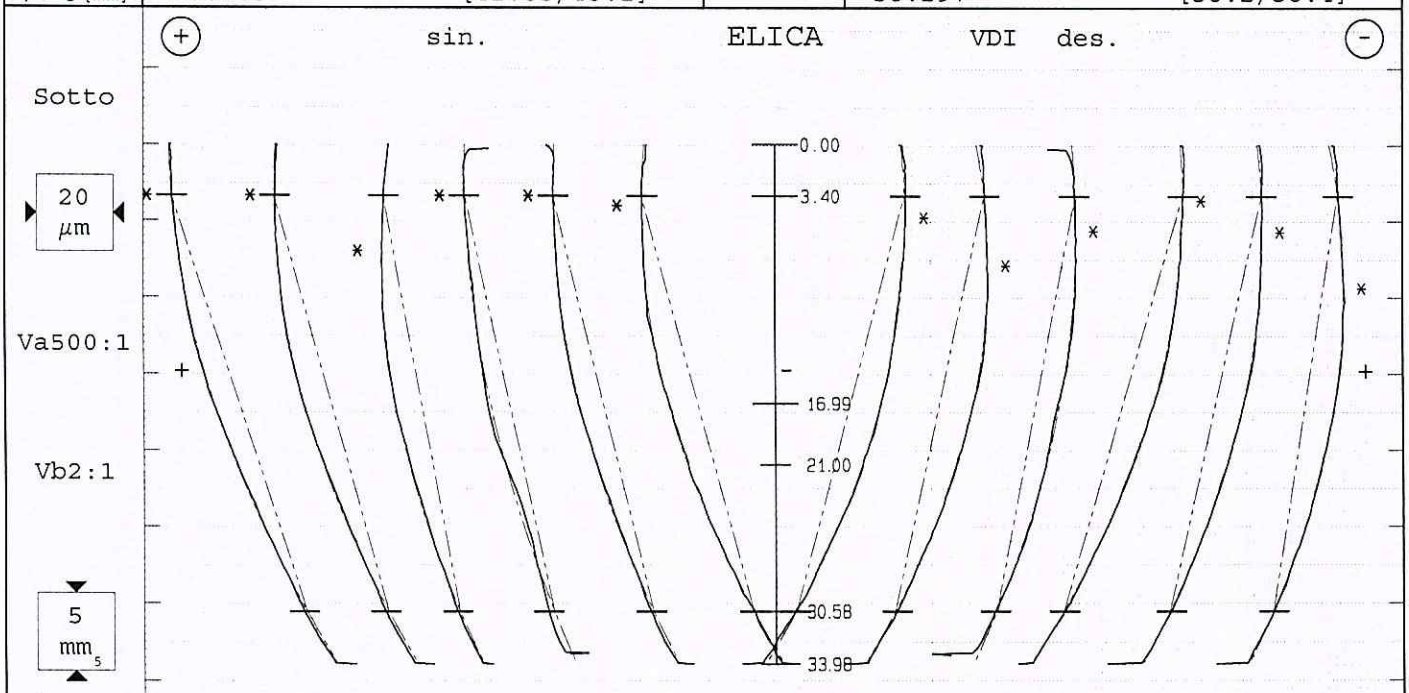
Ruota cilindrica Evolvente/Elica

Nr. prog.: STI0416b04 0	P26 601265	Controllore:	Turno B	Data:	17.04.2018 17:13
Denominazione:	Output Shaft 2	Numero denti z	17	Largh.fasc.dent. b	33.98mm
Numero disegno.:	D51.6.1242.35-IF	Modulo m	2.6mm	Tratto evolv. La	7.33mm
Commessa/serie nr.:	24 -5	Angolo pressione	20°00'00"	Tratto elica Lß	27.18mm
Masch.Nr.:	M001 Spindel: Formnest 1	Angolo elica	-23°21'00"	Inizio elab. M1	5.25mm
Untersuchungszweck:	Laufende Messung	ø Base db	44.7543mm	Palpatore ø	(#2)1mm
Werkzeug:	Charge:	Ang. Base	-21°51'59"	Fat.scor.pr. x	.973



Tolerance	Medio	Val.misur[µm]						Qual	Tolerance	Val.misur[µm]						Medio	Qual
fHαm -16±6	-20.6	Var a 14.2							±6	Var a 13.7						-3.9	
fHα -16±12	-20.6	-27.7	-26.8	-13.5	-7.0	-14.4	-15.6		±12	-7.7	-0.7	5.6	2.9	-7.0	-10.8	-3.9	
Fα	4.7	7.0	6.3	3.2	5.7	2.3	2.0			4.8	1.1	3.4	3.1	3.9	6.3	3.6	
ffα 4	2.1	2.2	2.2	2.2	1.5	1.9	1.9		4	2.1	1.0	1.6	1.6	0.7	1.0	1.1	
Cα -25/-17	-21.5	-20.2	-21.4	-22.8	-22.2	-21.4	-21.0		-20/-12	-17.1	***-21.3***	-20.6	***-20.1***	-19.6	***-20.9***	***-20.5***	
ffαf 3	0.0	0.0	0.0	0.0	0.0	0.0	0.0		3	0.0	0.0	0.7	0.0	0.0	0.0	0.0	
P/T-ø [mm]	43.113	[42.85/43.2]								58.297	[58.2/58.4]						



fHßm 30±6	34.9	FV -7.Var ß 19.2							-30±6	FV 9.Var ß 17.9						-30.3
fHß 30±13	34.9	***44.3***	37.6	25.1	29.2	32.5	36.4		-30±13	-35.9	-29.8	-26.3	-39.5	-30.4	-21.6	-30.3
Fß	6.1	10.9	5.6	4.6	3.4	3.1	6.6			6.1	4.2	3.8	7.9	2.6	7.2	5.5
ffß 4	1.2	1.2	1.2	1.0	2.6	1.2	1.0		4	0.8	0.9	1.2	0.8	0.9	0.7	0.8
cß 5/9	6.8	6.7	7.3	6.9	5.0	6.3	7.7		5/9	8.1	9.0	6.4	8.1	7.4	7.8	8.1

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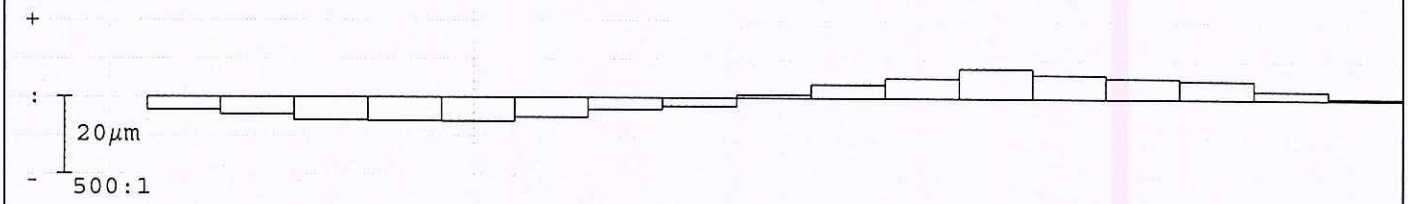
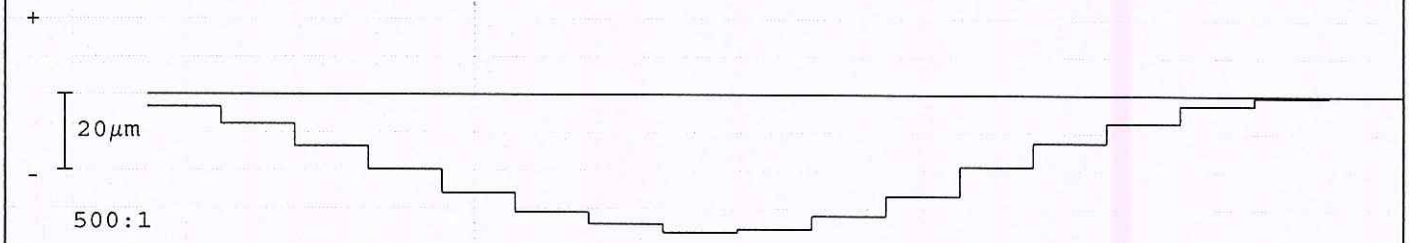
Ruota cilindrica Divisione

Nr. prog.: STI0416b04 0 P26 601265	Controllore: Turno B	Data: 17.04.2018 17:13
Denominazione: Output Shaft 2	Numero denti z 17	Angolo pressione 20°00'00"
Numero disegno.: D51.6.1242.35-IF	Modulo m 2.6mm	Angolo elica -23°21'00"
Commessa/serie nr.: 24	Untersuchungszweck: Laufende Messung	
Masch.Nr.: M001 Spindel: Formnestl	Werkzeug:	Charge:

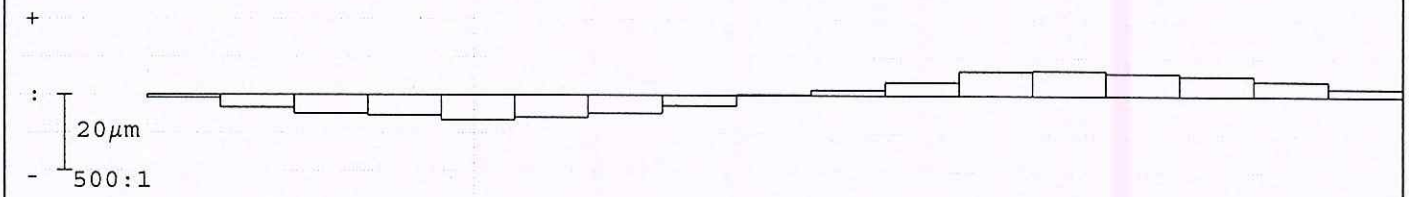
Errori singoli di divisione fp fianco sinistro



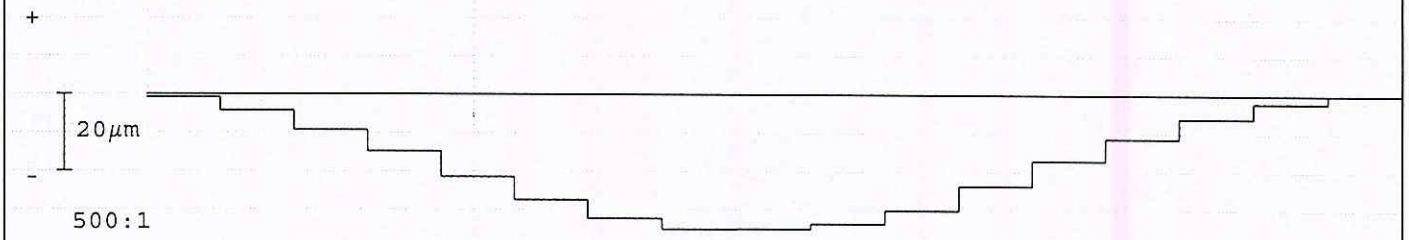
Errore somma di divisione Fp fianco sinistro



Errori singoli di divisione fp fianco destro



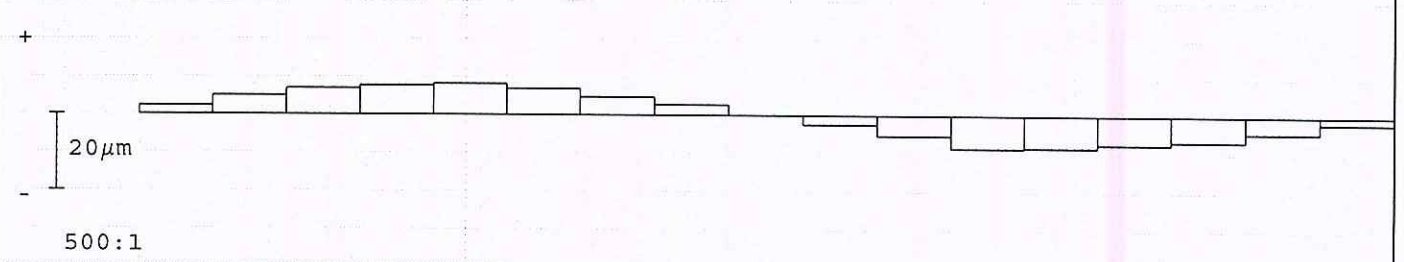
Errore somma di divisione Fp fianco destro



Corsa per misura divis.:50.392 z=21mm

		fianco sinistro / TIRO				fianco destro			
		Val.misur	Qual.	Val. amm	Qual.	Val.misur	Qual.	Val. amm	Qual.
Gr. err. singoli divisione	fp max	7.8		14.0		6.7		14.0	
Gr. salto di passo	fu max	3.7		18.0		3.0		18.0	
Scarto di divisione	Rp	14.0				13.3			
Err. globale di divisione	Fp	36.3		40.0		35.2		40.0	
Err. cordale di divisione	Fpz/8	14.0				13.0			

Centricità Fr (Ø-sfera =5.5mm) ◎ : 16.6µm



Err. di concentricitá	Fr	16.9	32.0	
Variaz. spessore dente	Rs			

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MAGNA GETRAG

REPORT 18/073

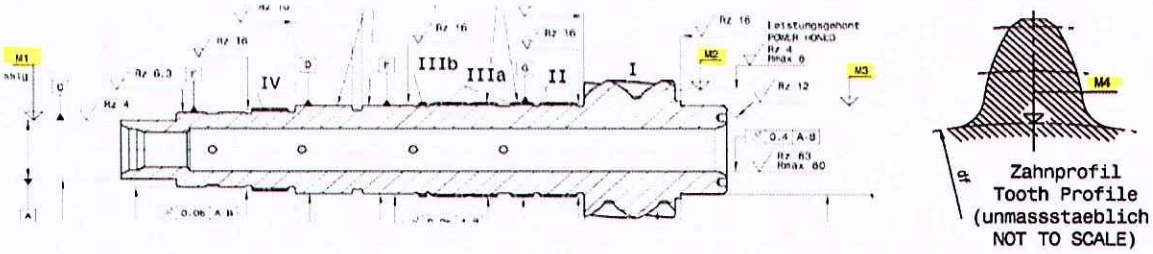
Date: 10/05/2018
Author: M. de Dato

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

Part Name: *Nome particolare:*	OS2	**P/N:**	251.6.1242.35
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:*	WLQ - M. Vicenti
Notes: *Note:*	Gearset 32C		

Drawing *(disegno)*



Picture 1: posizioni di misura a disegno.

Surface hardness verification *(verifica durezza superficiale)*

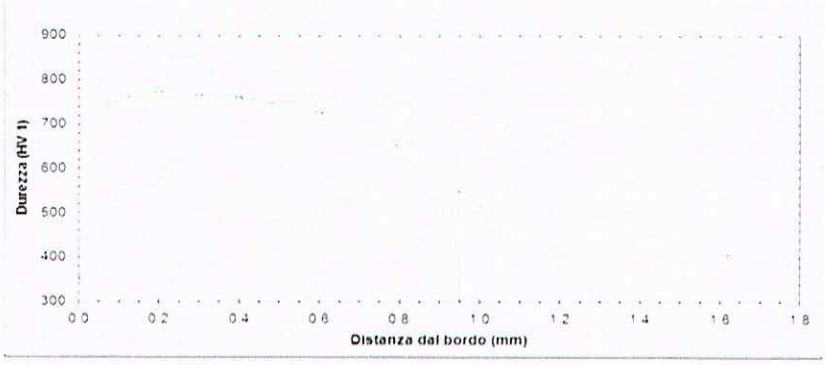
Component	Scale	Position	Measured Value	Range
Shaft	HRC	M1	61.8	-
Shaft	HRA	M1	82.3	80.5 + 2.5

REPORT 18/073

Date: 10/05/2018
Author: M. de Dato

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

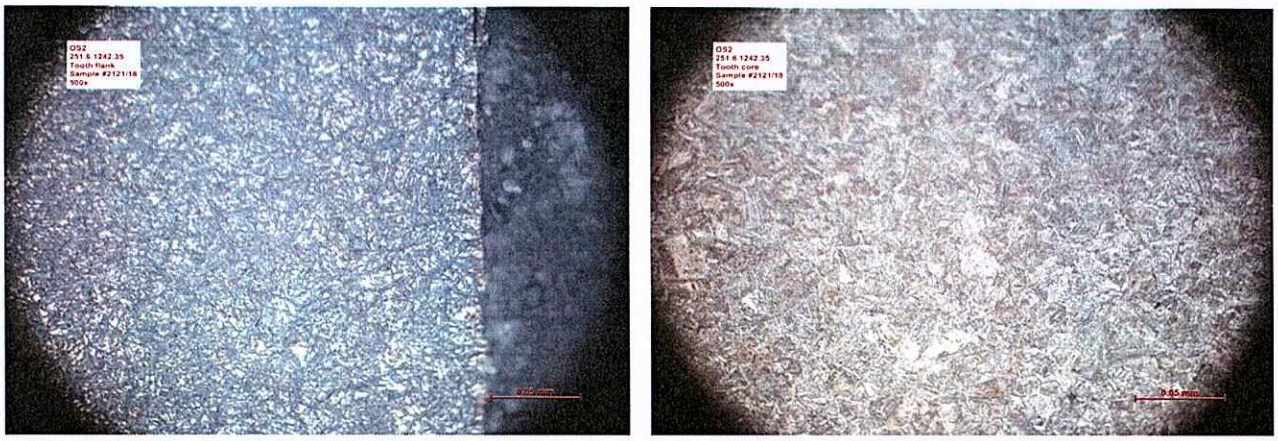
Component	Scale	Sample #	Position	Measured Value	Range
Shaft	CHD 550 HV1	2121/18	M2 (tooth flank)	1.04	0.70+0.50 mm
Shaft	CHD 550 HV1	2121/18	M3	0.95	0.50 mm min.
Shaft	Core hardness HV10	2121/18	M4 (tooth core)	351	≥ 300



Picture 2: profili di durezza.

Microstructure analysis *(analisi della microstruttura)*

Sample #	2121/18
Shaft - Tooth flank surface structure:	Martensite e austenite residua (10%)
Shaft - Tooth base core structure:	Martensite, bainite



Picture 2: 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: HNW11007
Capability da confrontare Nr.: 02/03/2017

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

Codice Pezzo di riferimento: 251.6.1078.35

Partnumber in esame: 251.6.1242.35

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 %

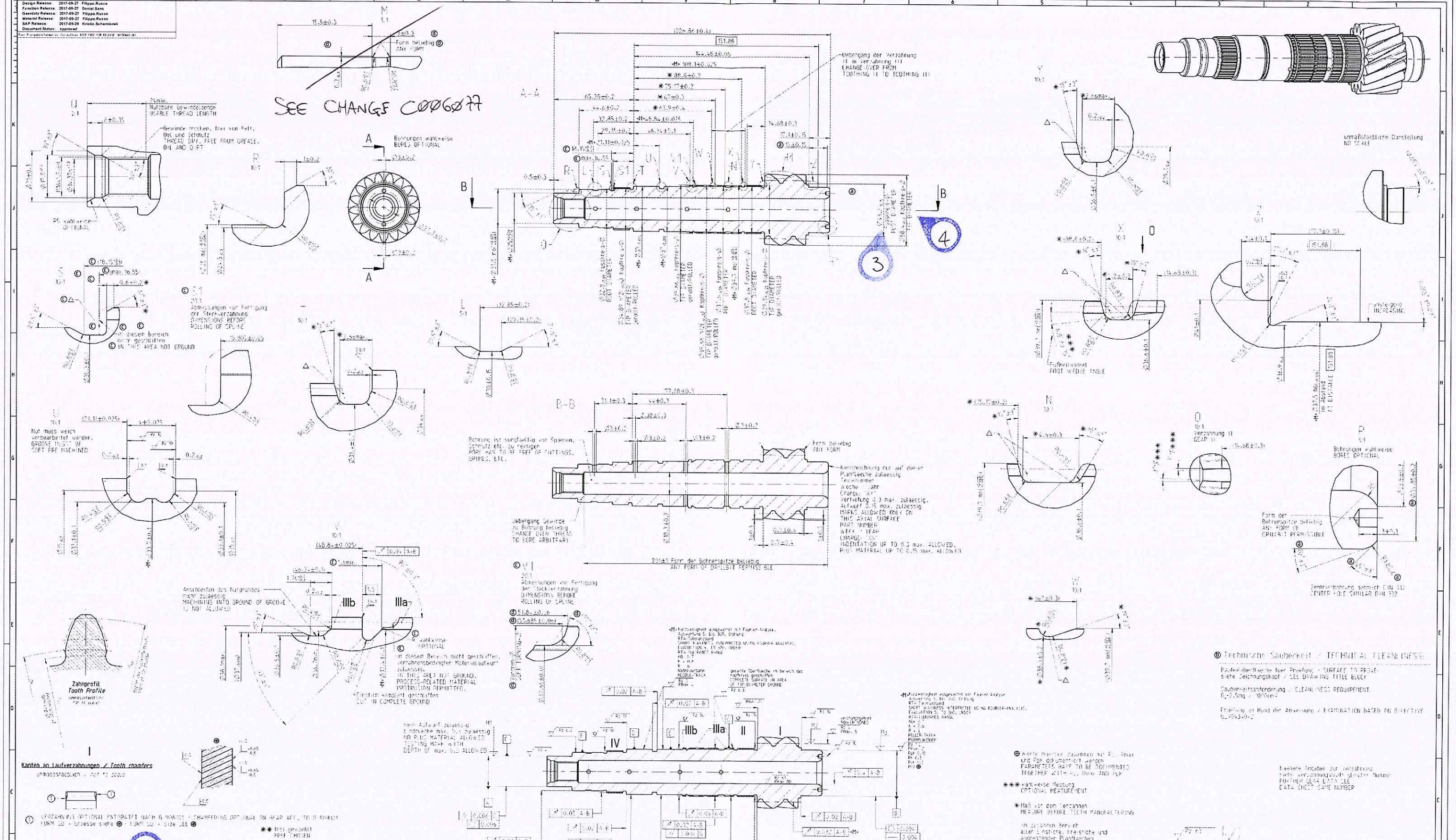
Componente di riferimento					Componente in esame					
DIMENSIONI					DIMENSIONI					
Caratteristiche	Unità	Nominale		Deviazione ammessa in %	Nominale		Deviazione %	i.O./n.i.O.		
numero denti Z	---	15			17			i.O.		
diam.primitivo - Ø	mm	40.879			44.754			i.O.		
Altezza dentatura	mm	14.780			16.990			i.O.		
diam.testa - Ø (da)	mm	54.700			58.400			i.O.		

Studio delle specifiche						Studio delle specifiche					
Caratteristiche	Unità	Nominale	Tolleranza T_1	P_p	P_{Pk} (solo per caratteristiche unilaterali)	Nominale	Tolleranza T_2	Target (1,00/1,33/1,67)	i.O./n.i.O.	Min. P_p	Min. P_{pk}
Mdk - Ø	mm	56.753	0.050	2.36		60.742	0.051	1.67	i.O	2.41	
Fr (Eccentricità)	µm	0	32	3.45		0	32	1.67	i.O	3.45	
	µm								---		
	µm								---		
	µm								---		
	µm								---		
	µm								---		
...									---		

Design Release:	2017-09-27	Filippo.Russo
Function Release:	2017-09-27	Daniel.Sans
Geardata Release:	2017-09-27	Filippo.Russo
Material Release:	2017-09-27	Filippo.Russo
SAP Release:	2017-09-29	Kristin.Schamionek
Document Status:	approved	

Nur Freigabeinformation (keine Aktion) / KEEP FREE FOR RELEASE INFORMATION

SEE CHANGE C00607 7



Aussenverzahnung / EXTERNAL GEAR			I	IIIa	IIIb	II
Zahnwelle/ SPLINE DATA EXTERNAL			DIN 5480	DIN 5480	DIN 5480	DIN 5480
Bezugsdurchmesser / REFERENCE DIAMETER d_B			40.000	40.000	40.000	40.000
Modul / MODULE m_n		2.500	1.000	1.000	1.000	1.000
Zahnzahl / NUMBER OF TEETH z		17	38	38	38	38
Eingriffswinkel / NORMAL PRESSURE ANGLE α_n		20.0°	30.0°	30.0°	30.0°	30.0°
Schrägungswinkel / HELIX ANGLE β		0.35°	0°	0°	0°	0°
Richtung / HAND OF HELIX		LEFT, links	STRAIGHT, gerade	STRAIGHT, gerade	STRAIGHT, gerade	STRAIGHT, gerade
Bezugsnorm / REF STD			DIN 5480	DIN 5480	DIN 5480	DIN 5480
Zahnweitenabweichung / PITCH DEVIATION f_{pt}	Nennmaß / Nominal	2.500	0.020	0.020	0.020	0.020
Gesamtteilungsabweichung / TOTAL PITCH DEVIATION F_p						
Toleranzklasse / TOLERANCE CLASS			9	9	9	9
Zahnweite / TOOTH THICKNESS s_n	Istmaß / Actual		2.332	2.330	2.330	Ⓓ -M- 1.615
Hohlkehle / TOOTH CHAMFER						
Zahnhöhe / TOOTH THICKNESS h_a	Max.	2.625	0.625	1.625	0.625	1.550
Bezugsmaß / REFERENCE		2.500	0.500	1.500	0.500	1.500
Rundlauf / RUNOUT F_r		0.060	0.060	0.060	0.060	0.060
Prüfmaß / MEASUREMENT OVER WIRES M_R	Max.	-M- 42.250	-M- 42.250	-M- 42.250	-M- 41.900	Ⓓ 41.938
Kerbmaßmaß / METRIC		-M- 42.250	-M- 42.250	-M- 42.250	-M- 41.900	Ⓓ 41.862

Design Release: 2017-09-27 Filippo.Russo
Function Release: 2017-09-27 Daniel.Sans
Geardata Release: 2017-09-27 Filippo.Russo
Material Release: 2017-09-27 Filippo.Russo
SAP Release: 2017-09-29 Kristin.Schamionek
Document Status: approved