313011

GETRAG

# Part Submission Warrant

Part Name **Gear 5 TH - Zr 5** Customer Part Number **250.1.3782.35**

Shown on Drawing No. **250.1.3782.35** Organization Part #

Engineering Change Level **b 35670** Dated **23 July 2014**

Additional Engineering Changes Dated

Safety and/or Government Regulation ☐ Yes ☑ No Purchase Order No. Weight (kg) **0.474**

Checking Aid No. Checking Aid Engineering Change Level Dated

**ORGANIZATION MANUFACTURING INFORMATION**

**GETRAG MODUGNO**

Organization Name & Supplier/Vendor Code

**VIA DEI CICLAMINI N°4**

Street Address

**MODUGNO** City **BARI** Region **70026** Postal Code **ITALY** Country

**CUSTOMER SUBMITTAL INFORMATION**

**RENAULT**

Customer Name/Division

Buyer/Buyer Code

**TYP 250**

Application

**MATERIALS REPORTING**

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

Submitted by IMDS or other customer format:

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

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

EXPLANATION / COMMENTS: **New documentation for first PPAP lost**

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

Organization Authorized Signature Date **12 Jan 2015**

Print Name **Pennacchia Vincenzo** Phone No. **tel 390805858580** Fax No.

Title **GPS Leader** E-mail vincenzo.pennacchia@getrag.com

FOR CUSTOMER USE ONLY (IF APPLICABLE)

Part Warrant Disposition: ☑ Approved ☐ Rejected ☐ Other

Customer Signature Date 12.01.15

Print Name Customer Tracking Number (optional)

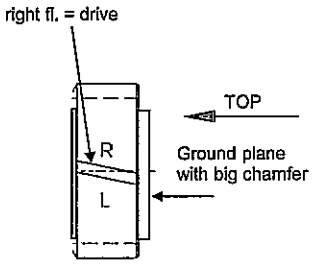
March 2006 CFG-1001

Released by Fabrizio.Cricenti on 2014-12-18
Document Status: approved

| STIRNRAD / GEAR | außenverzahnt / external |
|---|---|

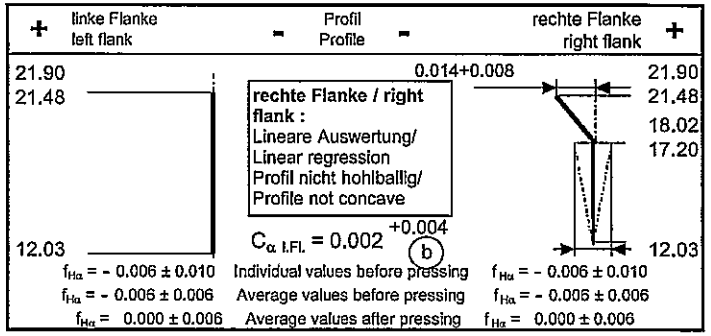
**Toleranzen der Verzahnung (DIN 3961 vom Aug. 1978)** (8)
**gültig für Werte am Einzelzahn**
**Tolerances of gearing (DIN 3961 of Aug. 1978)**
**valid for values at individual tooth**

| | | | linke Fl. / left flank | rechte Fl. / right flank | | |
|---|---|---|---|---|---|---|
| Zähnezahl / Number of teeth | z | 46 | | | | |
| Modul / Normal module | $m_n$ | 1.650000 | Profil-Formabweichung / Profile form error | $f_{f\alpha}$ | # 0.004 | Eingriffsteilungs-Abweich. / Normal pitch error $f_{pe}$ | 0.014 |
| Eingriffswinkel / Normal pressure angle | $\alpha_n$ | 17° 30' 0" | Profil-Gesamtabweichung / Total profile error | $F_\alpha$ | | Teilungs-Einzelabweichung / Adjacent pitch error $f_p$ | 0.014 |
| Schrägungswinkel / Helix angle | $\beta$ | 29° 0' 0" | Profil-Winkelabweichung / Profile angle error | $f_{H\alpha}$ | 0.000 ± 0.010 | 0.000 ± 0.010 | Teilungssprung / Diff. bet. adjacent pitches $f_u$ | 0.018 |
| Steigungsrichtung / Hand of helix | | RECHTS | Flankenl.-Winkelabweich. / Tooth alignment error | $f_{H\beta}$ | 0.000 ± 0.013 | 0.000 ± 0.013 | Teilungs-Summenabweich. / Cumulative circ. pitch error $F_{pk}$ | |
| Profilverschiebungsfaktor / Addendum modification coeff. | x | 0.450 | Flankenl.-Gesamtabweich. / Total alignment error | $F_\beta$ | | | Rundlaufabweichung / Radial run-out $F_r$ | 0.032 |
| Teilkreisdurchmesser / Pitch diameter | d | 86.781 | Flankenl.-Formabweich. / Longitudinal alignment err. | $f_{f\beta}$ | # 0.004 | | Zahndickenschwankung / Range of tooth thickn. error $R_s$ | |
| Kopfkreisdurchmesser / Outside diameter | $d_a$ | 93.10 $_{-0.25}$ | Teilungs-Gesamtabweich. / Cumulative pitch error | $F_p$ | 0.050 | | | |
| Kopfnutzkreisd. theo. max. / Tip diam. usable theo. | $d_{Na}$ | 92.65 | Einf.-Wälzabweichung / Tangential composite error | $F_i'$ | | | Zweifl.-Wälzabweichung / Radial composite error $F_i''$ | 0.040 |
| Kopfnutzkreisd. theo. min. / Tip diam. usable theo. | $d_{Na}$ | 92.25 | Einflanken-Wälzsprung / Tang. tooth to tooth comp. err. | $f_i'$ | | | Zweifl.-Wälzsprung / Radial tooth to tooth comp. err. $f_i''$ | 0.016 |
| Fußkreisdurchmesser / Root diameter | $d_f$ | 82.45 $_{-0.32}$ | Radbreite im Meßkreis / Facewidth in meas. diam. | $d_M$ b | 12.95 | | Meßkreis Krümmungsradius / Radius of curvature meas. diam. $\rho_{dM}$ | 16.20 |
| Fußnutzkreisdurchmesser / Root diameter usable | $d_{Nf}$ | 85.11 | | | | | | |
| Grundkreisradius / Base circle radius | $r_b$ | 40.819 | | | | | | |
| Grundkreisdurchmesser / Base diameter | $d_b$ | 81.638 | | | | | | |
| Normalzahndicke max. / Normal tooth thickness | $s_n$ | 2.996 (a) | | | | | | |
| Normalzahndicke min. / Normal tooth thickness | $s_n$ | 2.971 (a) | | | | | | |
| Meßzähnezahl / Number of teeth spanned | k | 8 | | | | | | |
| Zahnweite max. / Base tangent length | $W_k$ | 38.513 (a) | | | | | | |
| Zahnweite min. / Base tangent length | $W_k$ | 38.489 (a) | vor dem Aufpressen / before pressing | | | | | |
| Meßkugeldurchmesser / Ball diameter | $D_M$ | 2.5000 | gehont / honed | | | | | |
| Diam. Zweikugelmaß max. / Measurement o. balls | $M_{dK}$ | 90.584 (a) | $s_n$ = 2.982 ... 2.957 | (a) | | | | |
| Diam. Zweikugelmaß min. / Measurement o. balls | $M_{dK}$ | 90.512 (a) | $W_k$ = 38.500 ... 38.476 | (a) | | | | |
| Verdrehflankenspiel theo. / Circumferential backlash | | (a) | $M_{dK}$ = 90.544 ... 90.472 | (a) | | | | |

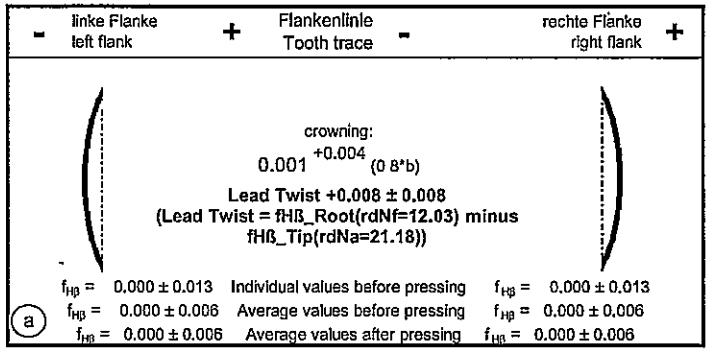



Vorbearbeitungsdaten siehe Verzahnungsblatt Vorbearbeitung gleicher Nr.
For pre-machining dimensions, see gear data sheet same number

Wkz-Profil siehe Werkzeugdatenblatt Nr. 250.1.3782.35
For Tooth profile, see tool data sheet number




* Schreibbeginn
* Start of checking
Ø = 83.60 $_{-0.30}$ ≡ 9.00




Hondurchmesser = 83.60 -0.30 ° 9.00
honing diameter

\# Der Verlauf der Profil- und Flankenlinie muss über den Messbereich stetig sein (ein- oder mehrfache Richtungsänderungen sind nicht zulässig)
\# The form of the profile and helix has to be continuous (one or more changes of directions are not allowed)
Für fp max. zwei Wellen zulässig
For fp max. two waves allowed

* 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 Flankenlinienprüfung nach VDI/VDE 2612
Tabellenwerte fur $F_\beta$ und $f_{H\beta}$ sind auf die gesamte Radbreite im Meßkreis $d_M$ bezogen
Flankenlinienprüfbereich Lβ = 0.8*b hochgerechnet auf 1.0*b
Begriffe für Stirnräder nach DIN 868, 3960, 3998

Profile and helix checking according to VDI/VDE 2612
Listed tolerance data for $F_\beta$ and $f_{H\beta}$ refers to the total face width in the meas. dia. $d_M$
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

| Buch. | Anz. | Änd.Nr. | | Datum | Name |
|---|---|---|---|---|---|
| b | 1 | 36110 | See CR | 20141008 | Cricenti |
| a | 11 | 35549 | Values before pressing added | 20111207 | Paaßen |

Abbildungen sind unmaßstäblich.
Diagrams not to scale.

Ersatz für
Erstverwendung bei Getriebetype: 250.0.0003.17

| | Datum | Name |
|---|---|---|
| gez. | 2011-08-05 | Cricenti, Fabrizio |
| gepr. | | |

Verzahnungsblatt Endkontrolle
Final Check Gear Data

Benennung:
Naming:
**Festrad 5.Gg.**

Verteiler:

Schutzvermerk nach ISO 16016 beachten
Protection per ISO 16016

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

Remark:

Zeichnungsnummer:
Drawing number:

**250.1.3782.35**

GETRAG Production Part Approval

# DIMENSIONAL TEST RESULTS

| | | | |
|---|---|---|---|
| Organization: | GETRAG | Part Number: | 250.1.3782.35 |
| Supplier/Vendor Code: | GETRAG Modugno | Part Name: | Zr 5 |
| INSPECTION FACILITY: | | Design Record Change Level: | b 35670 |
| NA | | Engineering Change Documents: | |

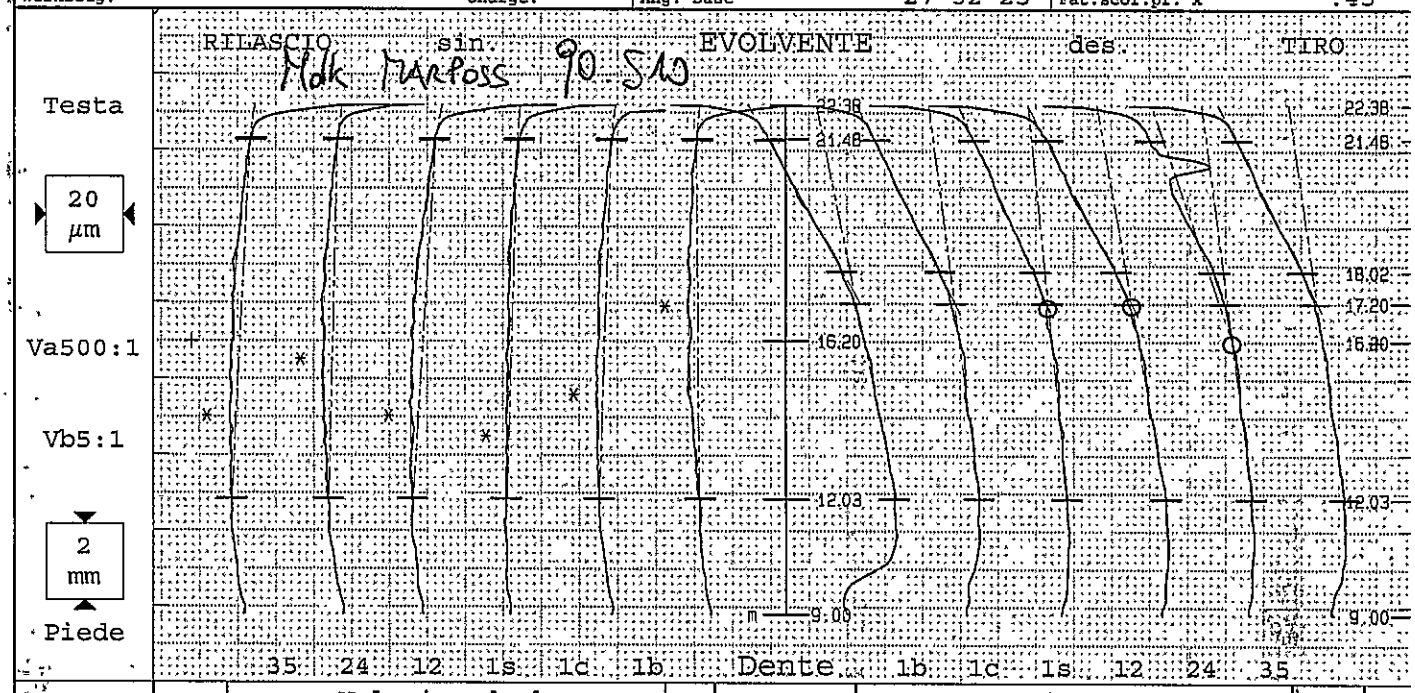
| Item | Dimension/Specification | Specification / Limits | | Test Date | Qty. Tested | Organization Measurement Results (Data) 1 | 2 | 3 | 4 | 5 | test distruttivo | Ok | Not Ok |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Profile teeth | -- | -- | | 5 | ok | ok | ok | ok | ok | | ok | |
| 2 | Root diameter | 82.450 | 82.130 | | 5 | 82.354 | 82.354 | 82.357 | 82.356 | 82.357 | | ok | |
| 3 | Outside diameter | 93.100 | 92.850 | | 5 | 92.983 | 92.984 | 92.979 | 92.985 | 92.983 | | ok | |
| 4 | MDK | 90.544 | 90.472 | | 5 | 90.510 | 90.499 | 90.503 | 90.502 | 90.508 | | ok | |

| SIGNATURE | TITLE | DATE |
|---|---|---|
| G. Russo | QPE | 12/01/2015 |

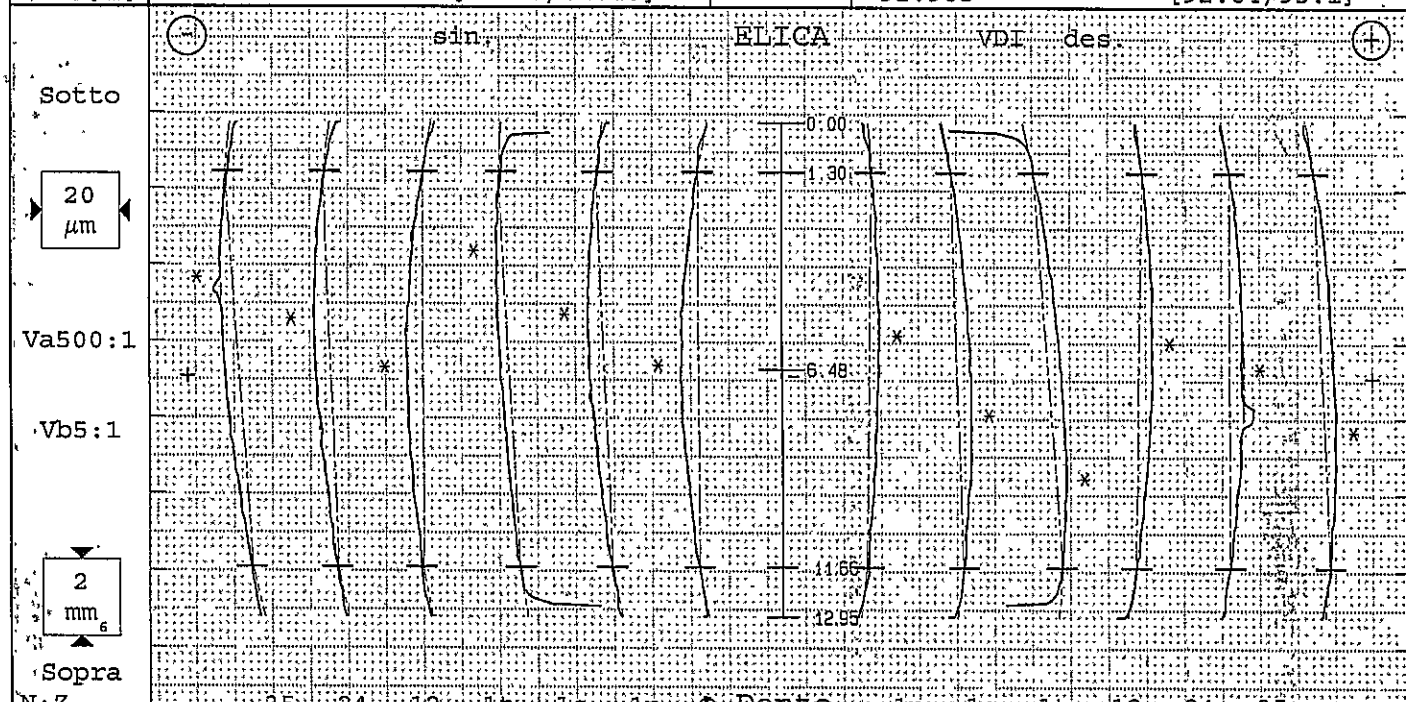
Docum.archiviato elettronicamente.Archiviazione cartacea non necessaria

# Ruota cilindrica Evolvente/Elica

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: | STI0412_06 0 P26 601265 | Controllore: | turno B | Data: | 12.01.2015 09:21 |
| Denominazione: | ZR5 | Numero denti z | 46 | Largh.fasc.dent. b | 12.95mm |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Tratto evolv. La | 9.45/5.17mm |
| Commessa/serie nr.: | 1 | Angolo pressione | 17°30'00" | Tratto elica Lß | 10.36mm |
| Masch.Nr.: | M001 Spindel: Formmaschine | Angolo elica | 29°00'00" | Inizio elab. M1 | 12.03mm |
| Untersuchungszweck: | Laufende Messung | ø Base db | 81.6378mm | Palpatore ø | (#2D) 1mm |
| Werkzeug: | Charge: | Ang. Base | 27°32'25" | Fat.scor.pr. x | .45 |




| Tolerance | Medio | Val.misur[µm] | | | | | | Qual | Tolerance | Val.misur[µm] | | | | | | Medio | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fHαm -6±6 | -4 | Var 4 | | | | | | | -6±6 | Var 2 | | | | | | -8 | |
| fHα -6±10 | -4 | -5 | -2 | -6 | -3 | -3 | 1 | | -6±10 | -10 | -7 | -5 | -9 | -7 | -7 | -8 | |
| Fα | 3 | 2 | 3 | 2 | 3 | 3 | 7 | | | 5 | 2 | 2 | 4 | 2 | 2 | 3 | |
| ffα 4 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | | 4 | 1 | 2 | 2 | 2 | 1 | 1 | 2 | |
| cα 2/6 | 3 | 2 | 3 | 3 | 1 | 2 | 2 | | | | | | | | | | |
| Ca | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | -22/-14 | -15 | -16 | -15 | -15 | -11 | -15 | -14 | |
| P/T-ø[mm] | 82.354 [82.13/82.45] | | | | | | | | | 92.983 [92.84/93.1] | | | | | | | |




| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fHßm ±6 | -5 | Var 9 | | | | | | | ±6 | Var 7 | | | | | | -2 | |
| fHß ±13 | -5 | -9 | -5 | 0 | -7 | -5 | 0 | | ±13 | 2 | -4 | -9 | 2 | 0 | -5 | -2 | |
| Fß | 6 | 9 | 5 | 4 | 6 | 5 | 4 | | | 2 | 4 | 8 | 4 | 5 | 5 | 5 | |
| ffß 4 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | | 4 | 1 | 1 | 1 | 1 | 3 | 1 | 2 | |
| cß 1/5 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | | 1/5 | 2 | 3 | 3 | 3 | 4 | 3 | 3 | |
| Fu 8+8 | 7 | | | | | | | | | | | | | | | | |

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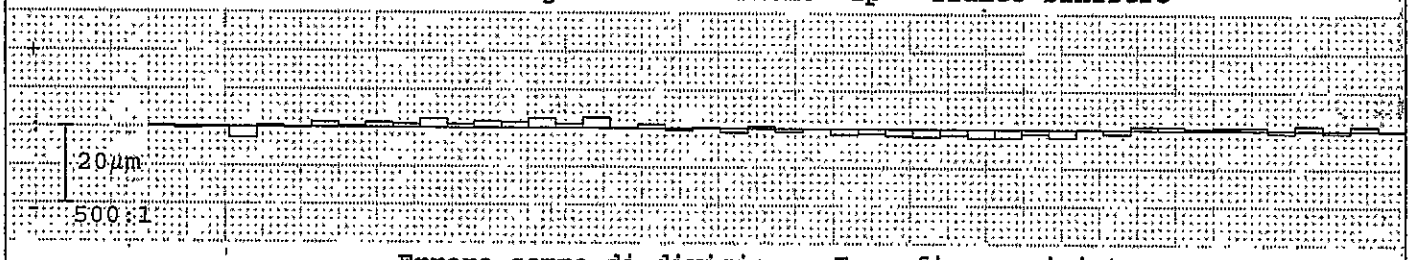
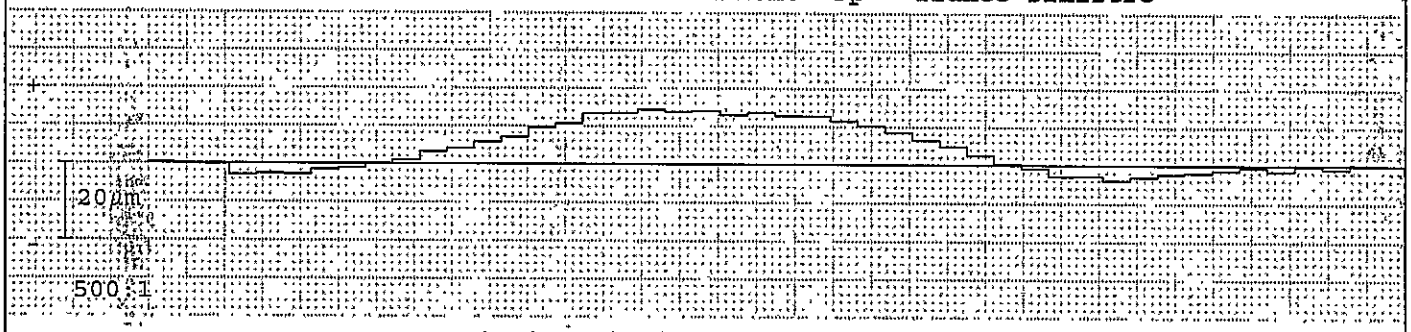
# Ruota cilindrica Divisione

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: | STI0412_06 0 P26 601265 | Controllore: | turno B | Data: | 12.01.2015 09:21 |
| Denominazione: | ZR5 | Numero denti z | 46 | Angolo pressione | 17°30'00" |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Angolo elica | 29°00'00" |
| Commessa/serie nr.: | 1 | Untersuchungszweck: | Laufende Messung | | |
| Masch.Nr.: | M001 Spindel: Formmeßzeug: | | | Charge: | |

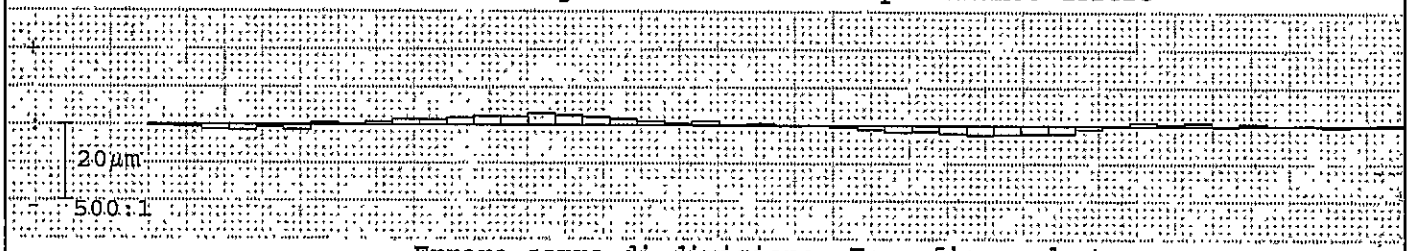
## Errori singoli di divisione fp fianco sinistro



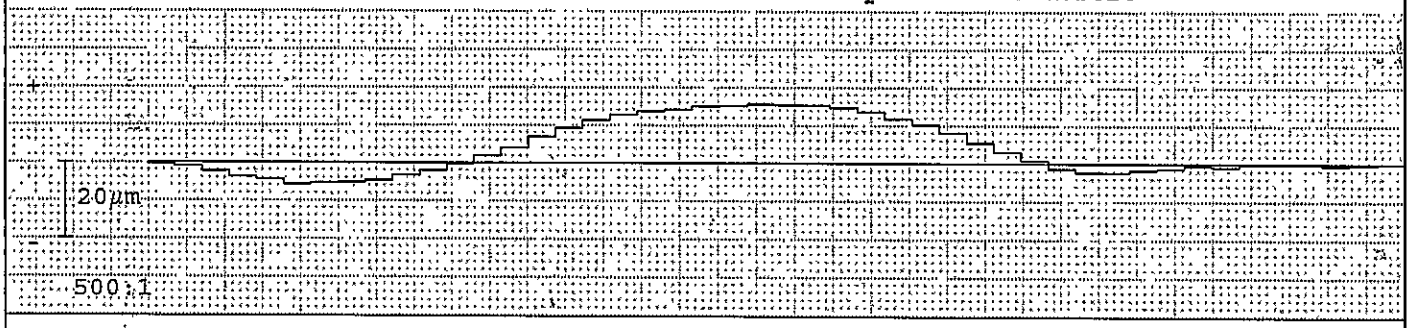

## Errore somma di divisione Fp fianco sinistro




## Errori singoli di divisione fp fianco destro



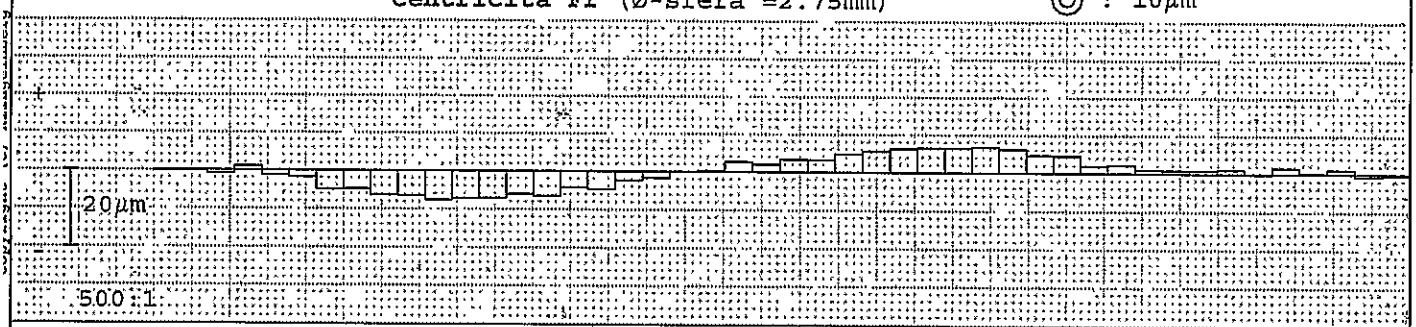

## Errore somma di divisione Fp fianco destro




Corsa per misura divis.:87.832 z=6.5mm

| | | fianco sinistro / RILASCIO | | fianco destro / TIRO | |
|---|---|---|---|---|---|
| | | Val.misur Qual. | Val. amm Qual. | Val.misur Qual. | Val. amm Qual. |
| Gr. err. singoli divisione | fp max | 3 | 14 | 3 | 14 |
| Gr. salto di passo | fu max | 3 | 18 | 2 | 18 |
| Scarto di divisione | Rp | 6 | | 6 | |
| Err. globale di divisione | Fp | 18 | 50 | 21 | 50 |
| Err. cordale di divisione | Fpz/8 | 11 | | 13 | |

## Centricità Fr (Ø-sfera =2.75mm) ◎ : 10µm




| | | | | |
|---|---|---|---|---|
| Err. di concentricitá | Fr | 14 | 32 | |
| Variaz. spessore dente | Rs | | | |

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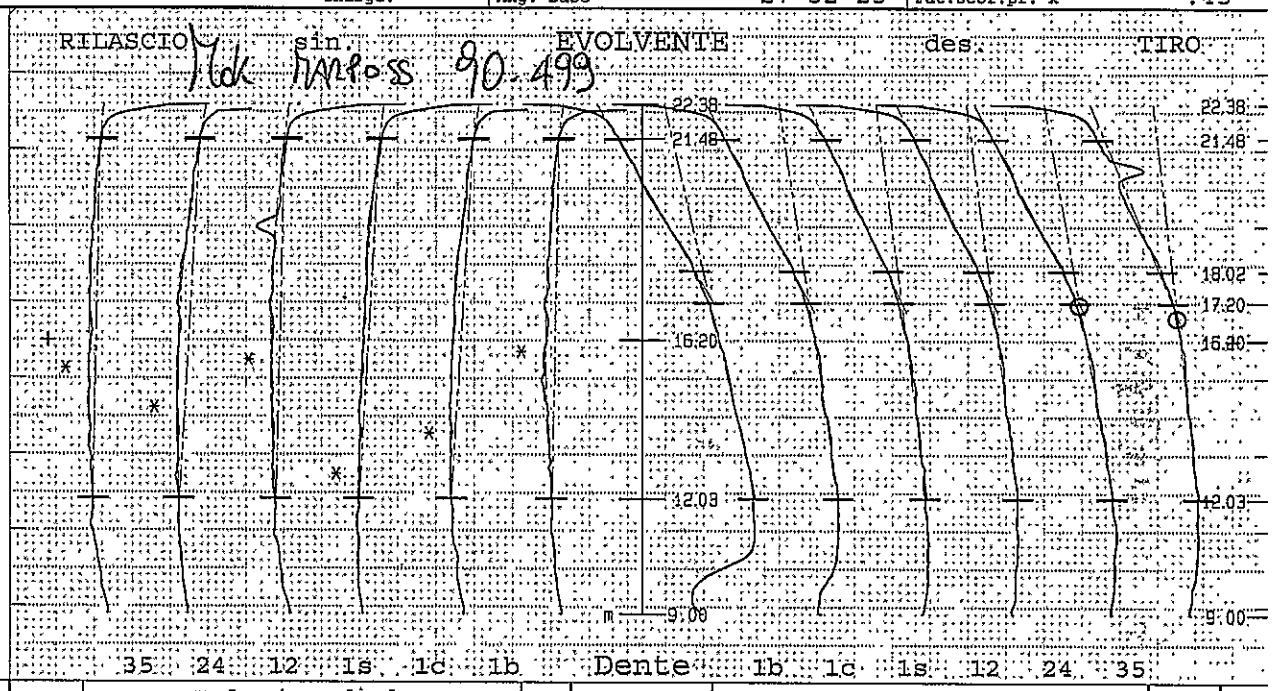
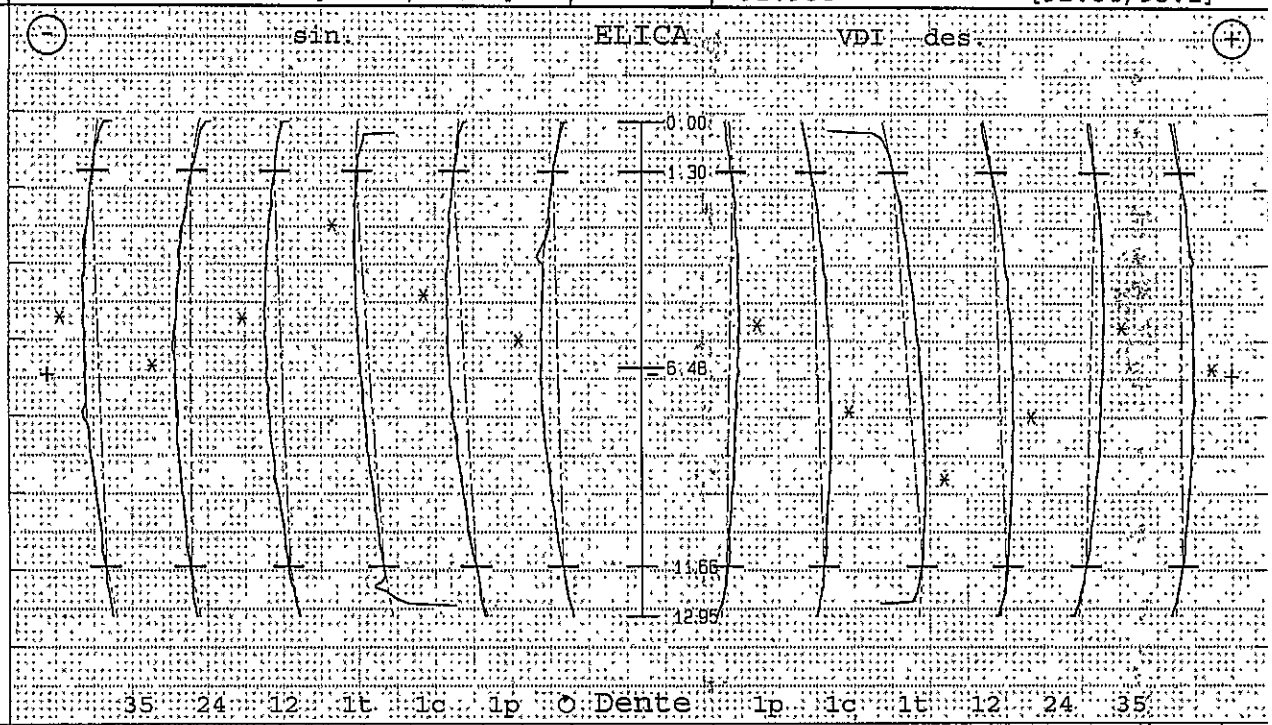
# Ruota cilindrica Evolvente/Elica

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: STI0412_06 0 | P26 601265 | Controllore: turno B | | Data: | 12.01.2015 10:06 |
| Denominazione: | ZR5 | Numero denti z | 46 | Largh.fasc.dent. b | 12.95mm |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Tratto evolv. La | 9.45/5.17mm |
| Commessa/serie nr.: | | Angolo pressione | 17°30'00" | Tratto elica Lß | 10.36mm |
| Masch.Nr.: | M001 Spindel: Formr | Angolo elica | 29°00'00" | Inizio elab. M1 | 12.03mm |
| Untersuchungszweck: | Laufende Messung | ø Base db | 81.6378mm | Palpatore ø | (#2D) 1mm |
| Werkzeug: | Charge: | Ang. Base | 27°32'25" | Fat.scor.pr. x | .45 |




| Tolerance | Medio | Val.misur [µm] | | | | | | Qual | Tolerance | Val.misur [µm] | | | | | | Medio | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fHαm -6±6 | -4 | Var 4 | | | | | | | -6±6 | Var 3 | | | | | | -8 | |
| fHα -6±10 | -4 | -2 | -6 | -2 | -5 | -6 | -2 | | -6±10 | -12 | -8 | -7 | -7 | -9 | -6 | -8 | |
| Fα | 4 | 4 | 2 | 8 | 2 | 1 | 4 | | | 6 | 3 | 2 | 2 | 4 | 2 | 3 | |
| ffα 4 | 2 | 1 | 1 | 6 | 1 | 1 | 2 | | 4 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | |
| cα 2/6 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | | | | | | | | | | |
| Ca | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | -22/-14 | -14 | -16 | -15 | -15 | -15 | -14 | -15 | |
| P/T-ø [mm] | 82.354 | [82.13/82.45] | | | | | | | | 92.984 | [92.84/93.1] | | | | | | |




| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fHßm ±6 | -4 | Var 7 | | | | | | | ±6 | Var 7 | | | | | | -1 | |
| fHß ±13 | -4 | -5 | 0 | -5 | -9 | -7 | -3 | | ±13 | 2 | -4 | -9 | -4 | 3 | 0 | -1 | |
| Fß | 5 | 5 | 4 | 5 | 7 | 7 | 6 | | | 2 | 5 | 8 | 5 | 4 | 3 | 4 | |
| ffß 4 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | | 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| cß 1/5 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | | 1/5 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | |

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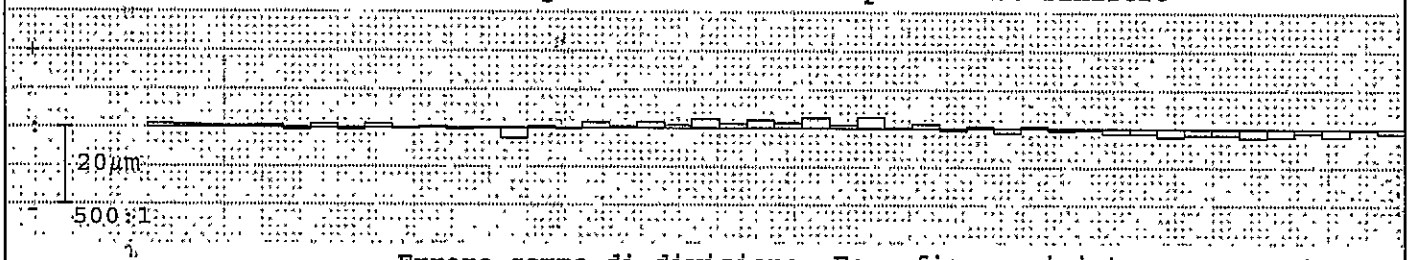
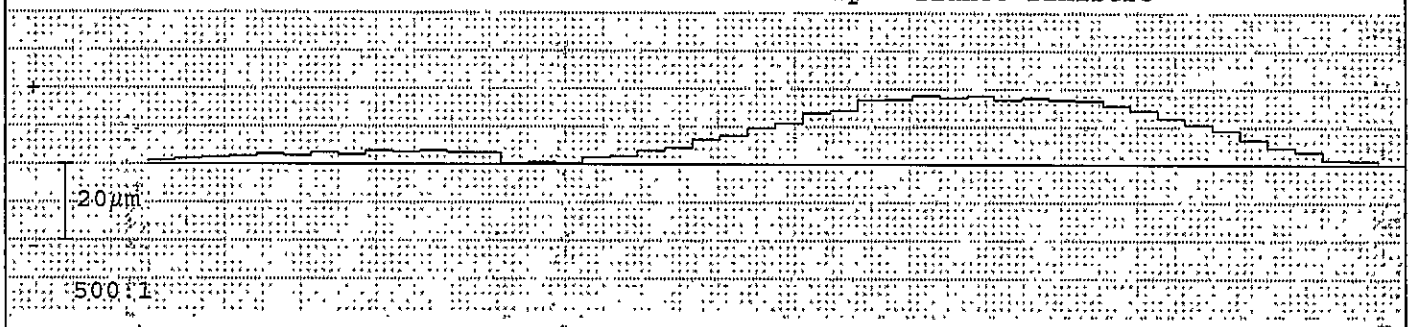
# Ruota cilindrica Divisione

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: | STI0412_06_0 P26 601265 | Controllore: | turno B | Data: | 12.01.2015 10:06 |
| Denominazione: | ZR5 | Numero denti z | 46 | Angolo pressione | 17°30'00" |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Angolo elica | 29°00'00" |
| Commessa/serie nr.: | 1 | Untersuchungszweck: | Laufende Messung | | |
| Masch.Nr.: | M001 | Spindel: Formmesszeug | | Charge: | |

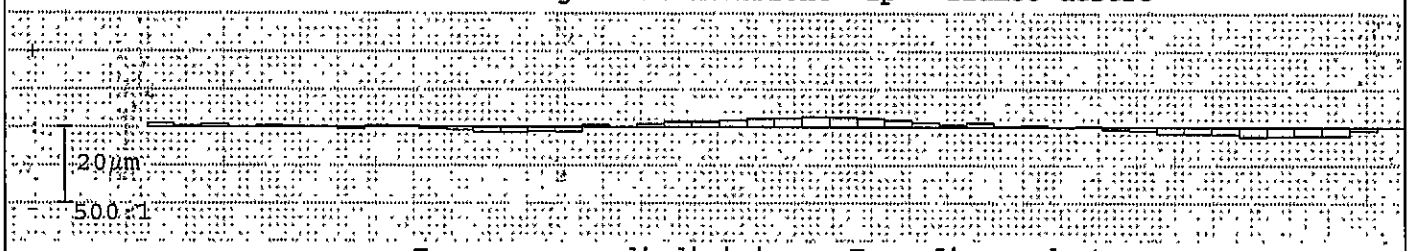
## Errori singoli di divisione fp fianco sinistro



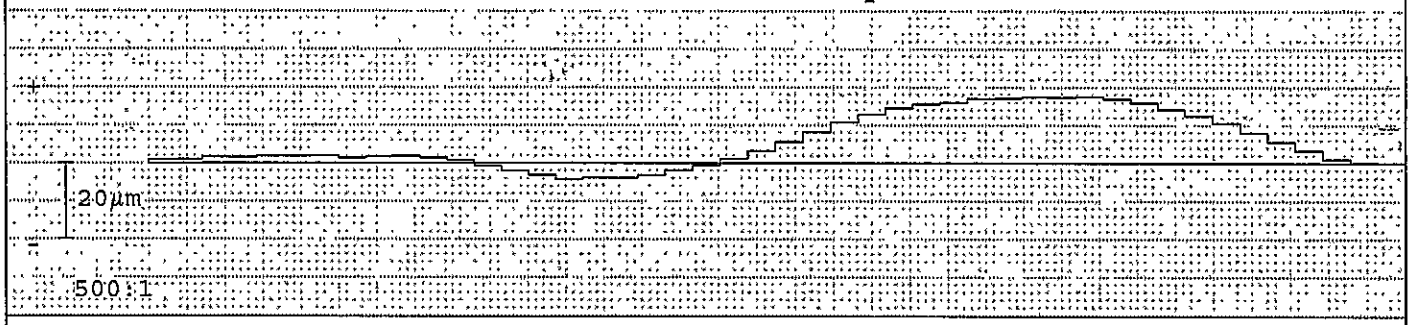

## Errore somma di divisione Fp fianco sinistro




## Errori singoli di divisione fp fianco destro



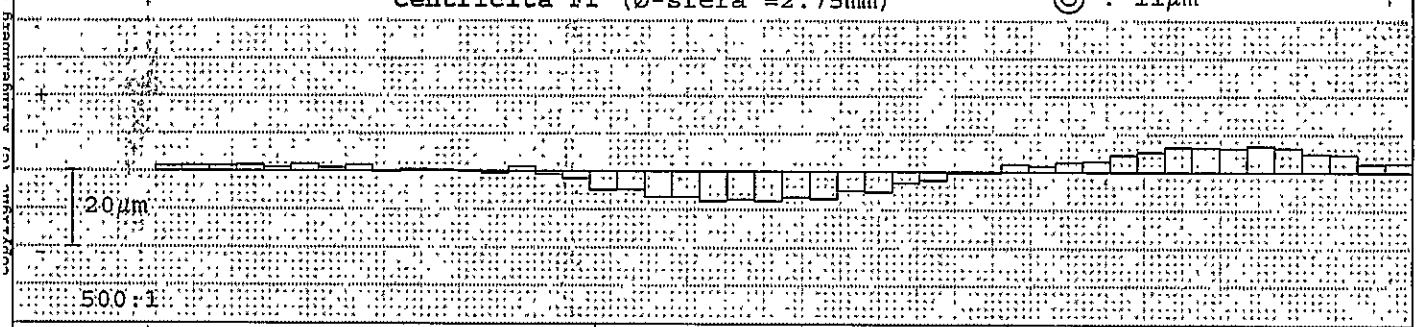

## Errore somma di divisione Fp fianco destro




Corsa per misura divis.:87.832 z=6.5mm

| | | fianco sinistro / RILASCIO | | fianco destro / TIRO | |
|---|---|---|---|---|---|
| | | Val.misur Qual. | Val. amm Qual. | Val.misur Qual. | Val. amm Qual. |
| Gr. err. singoli divisione | fp max | 3 | 14 | 3 | 14 |
| Gr. salto di passo | fu max | 3 | 18 | 2 | 18 |
| Scarto di divisione | Rp | 6 | | 6 | |
| Err. globale di divisione | Fp | 18 | 50 | 22 | 50 |
| Err. cordale di divisione | Fpz/8 | 11 | | 13 | |

## Centricità Fr (Ø-sfera =2.75mm) ◎ : 11µm




| | | | | |
|---|---|---|---|---|
| Err. di concentricitá | Fr | 15 | 32 | |
| Variaz. spessore dente | Rs | | | |

Docum.archiviato elettronicamente.Archiviazione cartacea non necessaria

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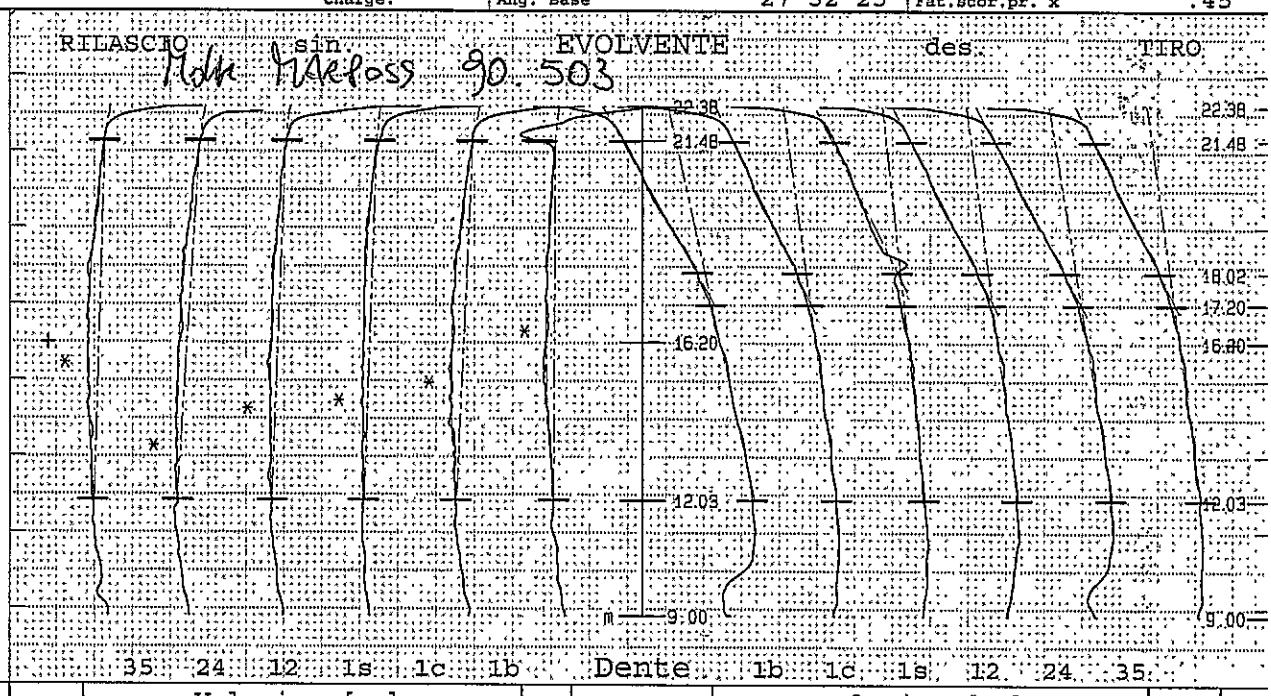
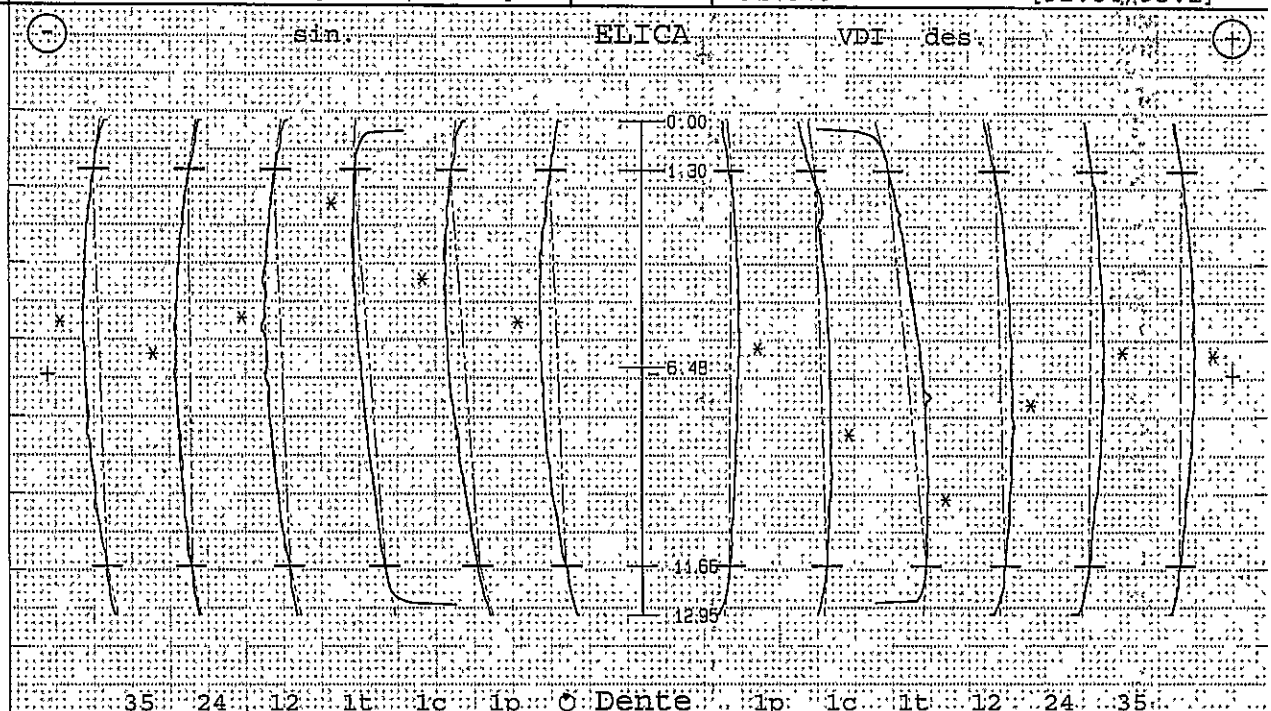
Docum.archiviato elettronicamente.Archiviazione cartacea non necessaria

# Ruota cilindrica Evolvente/Elica

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: STI0412_06 0 | P26 601265 | Controllore: turno B | | Data: | 12.01.2015 09:59 |
| Denominazione: | ZR5 | Numero denti z | 46 | Largh.fasc.dent. b | 12.95mm |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Tratto evolv. La | 9.45/5.17mm |
| Commessa/serie nr.: | 2 | Angolo pressione | 17°30'00" | Tratto elica Lß | 10.36mm |
| Masch.Nr.: | M001 Spindel: Formmaster | Angolo elica | 29°00'00" | Inizio elab. M1 | 12.03mm |
| Untersuchungszweck: | Laufende Messung | ø Base db | 81.6378mm | Palpatore ø | (#2D) 1mm |
| Werkzeug: | Charge: | Ang. Base | 27°32'25" | Fat.scor.pr. x | .45 |




| Tolerance | Medio | Val.misur[µm] | | | | | | Qual | Tolerance | Val.misur[µm] | | | | | | Medio | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fHαm -6±6 | -4 | Var 3 | | | | | | | -6±6 | Var 1 | | | | | | -7 | |
| fHα -6±10 | -4 | -3 | -6 | -4 | -3 | -4 | -1 | | -6±10 | -11 | -7 | -6 | -7 | -8 | -7 | -7 | |
| Fα | 3 | 4 | 1 | 2 | 3 | 3 | 15 | | | 5 | 2 | 3 | 2 | 3 | 2 | 2 | |
| ffα 4 | 1 | 2 | 1 | 1 | 1 | 1 | 10 | | 4 | 1 | 1 | 3 | 2 | 2 | 1 | 2 | |
| cα 2/6 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | | | | | | | | | | |
| Cα | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | -22/-14 | -14 | -15 | -14 | -16 | -16 | -15 | -16 | |
| P/T-ø [mm] | 82.357 [82.13/82.45] | | | | | | | | | 92.979 [92.84/93.1] | | | | | | | |




| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| fHßm ±6 | -5 | Var 8 | | | | | | | ±6 | Var 5 | | | | | | -1 | |
| fHß ±13 | -5 | -5 | -1 | -5 | -10 | -9 | -5 | | ±13 | 1 | -4 | -12 | -3 | 1 | 1 | -1 | |
| Fß | 6 | 6 | 4 | 6 | 8 | 8 | 6 | | | 2 | 5 | 10 | 4 | 3 | 3 | 4 | |
| ffß 4 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | | 4 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | |
| ßß 1/5 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | | 1/5 | 2 | 2 | 4 | 3 | 3 | 4 | 3 | |
| fHß 8±8 | 5 | | | | | | | | 8±8 | | | | | | | 13 | |

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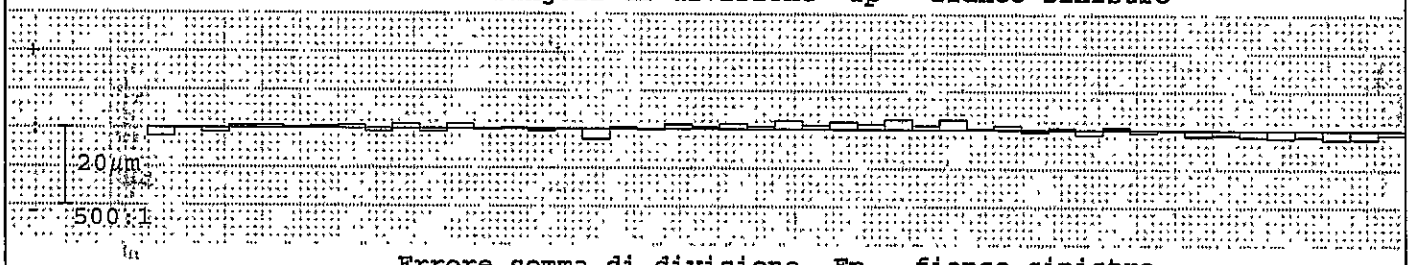
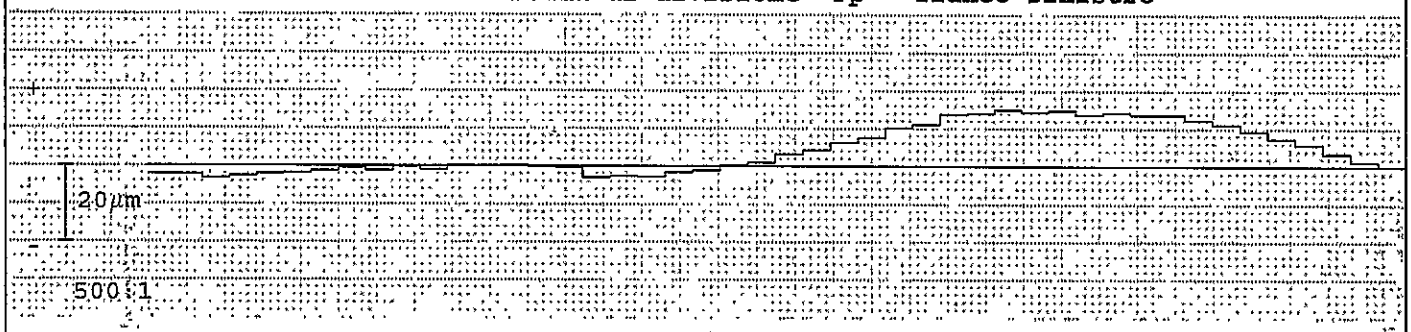
# Ruota cilindrica Divisione

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: | STI0412_06_0 P26 601265 | Controllore: | turno B | Data: | 12.01.2015 09:59 |
| Denominazione: | ZR5 | Numero denti z | 46 | Angolo pressione | 17°30'00" |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Angolo elica | 29°00'00" |
| Commessa/serie nr.: | 2 | Untersuchungszweck: | Laufende Messung | | |
| Masch.Nr.: | M001 Spindel: Formwerkzeug | | | Charge: | |

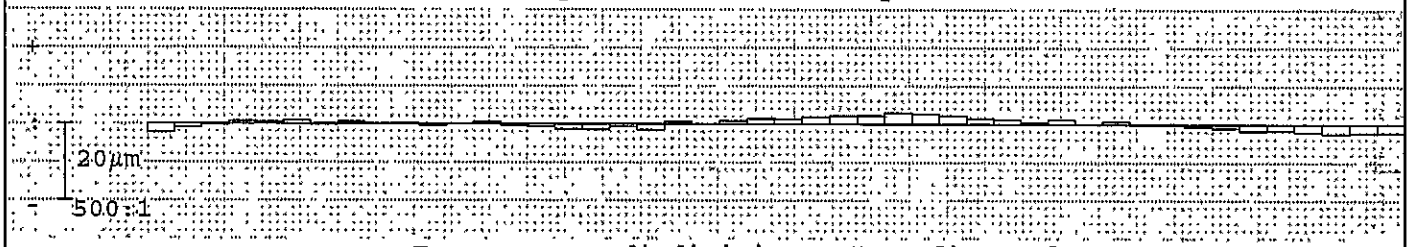
Errori singoli di divisione fp fianco sinistro



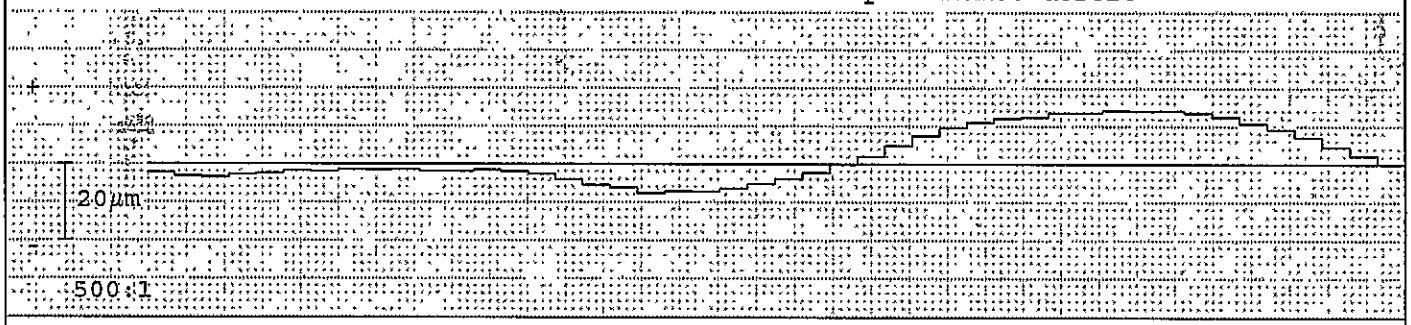

Errore somma di divisione Fp fianco sinistro




Errori singoli di divisione fp fianco destro



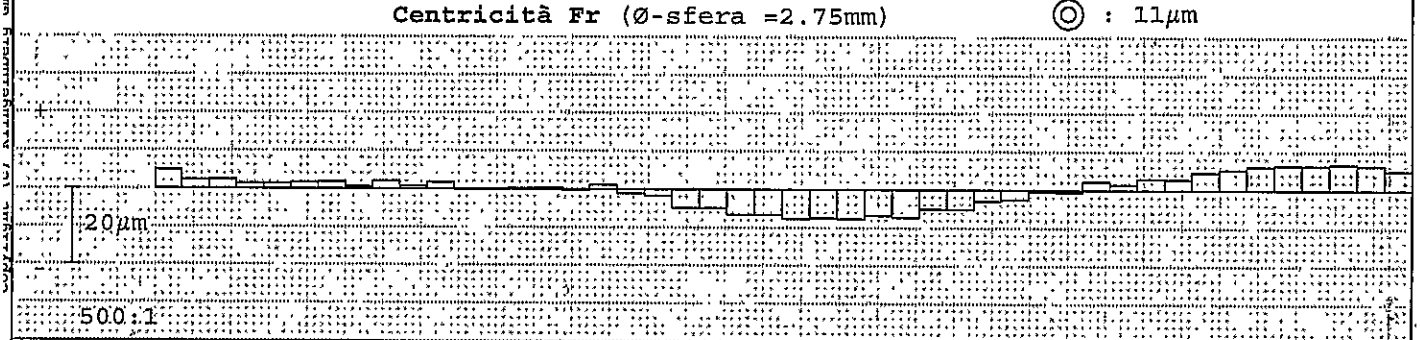

Errore somma di divisione Fp fianco destro




Corsa per misura divis.:87.832 z=6.5mm

| | | fianco sinistro / RILASCIO | | | | fianco destro / TIRO | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Val.misur | Qual. | Val. amm | Qual. | Val.misur | Qual. | Val. amm | Qual. |
| Gr. err. singoli divisione | fp max | 3 | | 14 | | 3 | | 14 | |
| Gr. salto di passo | fu max | 3 | | 18 | | 2 | | 18 | |
| Scarto di divisione | Rp | 6 | | | | 5 | | | |
| Err. globale di divisione | Fp | 18 | | 50 | | 22 | | 50 | |
| Err. cordale di divisione | Fpz/8 | 11 | | | | 14 | | | |

Centricità Fr (Ø-sfera =2.75mm) ◎ : 11µm




| | | | | |
|---|---|---|---|---|
| Err. di concentricitá | Fr | 14 | 32 | |
| Variaz. spessore dente | Rs | | | |

Docum.archiviato elettronicamente.Archiviazione cartacea non necessaria

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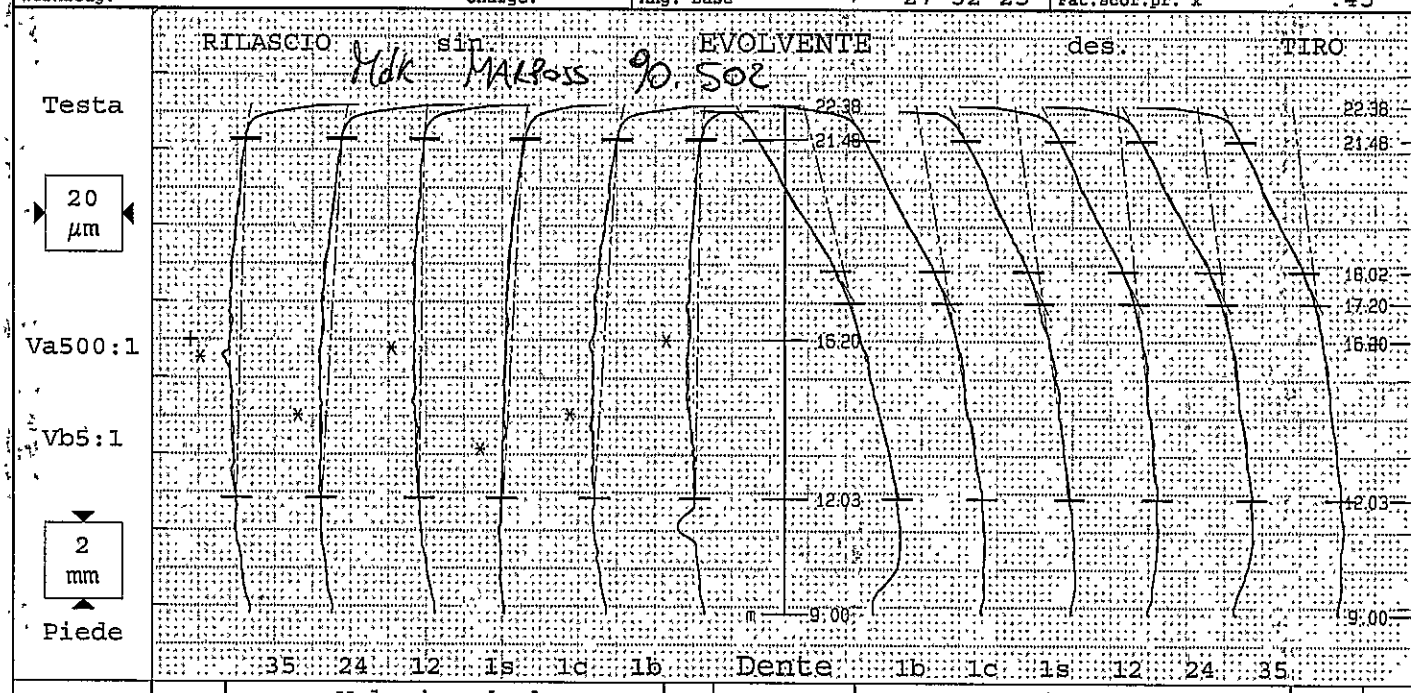
Docum.archiviato elettronicamente.Archiviazione cartacea non necessaria

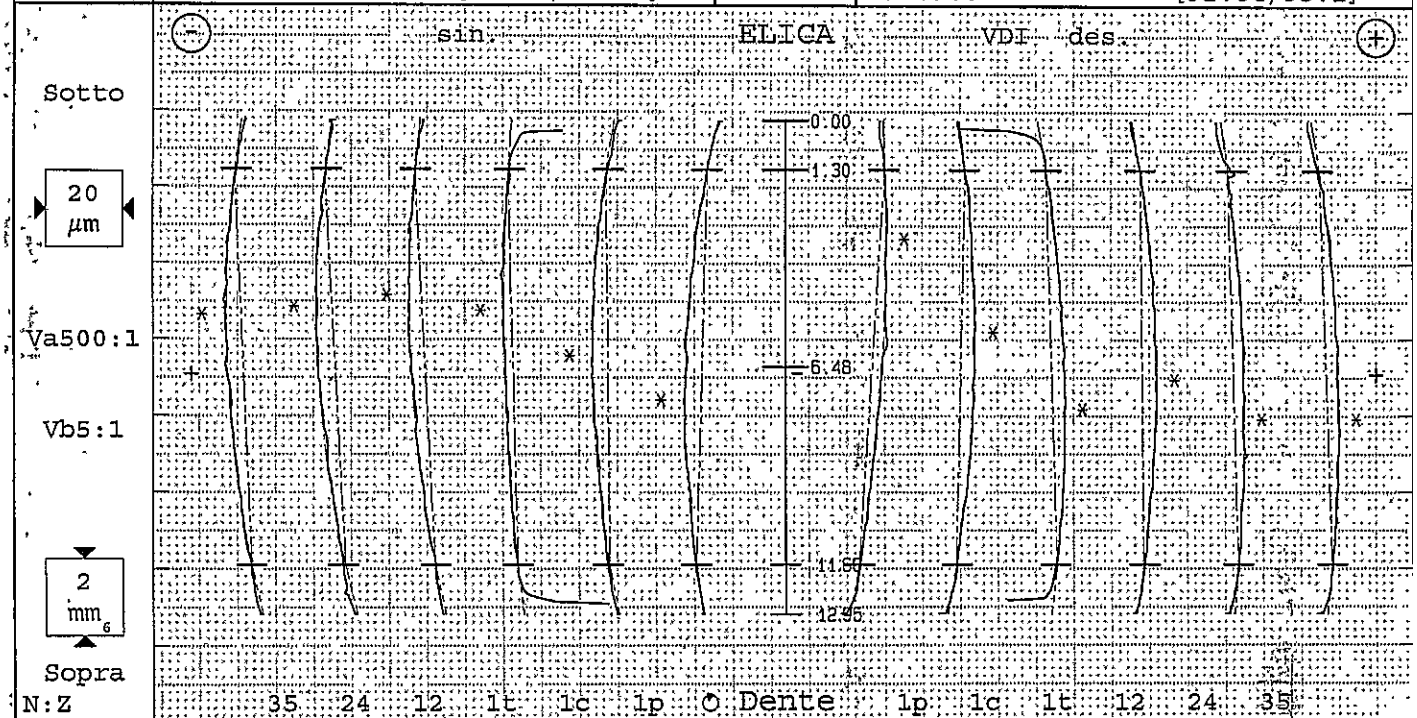
# Ruota cilindrica Evolvente/Elica

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: | STI0412_06 0 P26 601265 | Controllore: | turno B | Data: | 12.01.2015 09:43 |
| Denominazione: | ZR5 | Numero denti z | 46 | Largh.fasc.dent. b | 12.95mm |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Tratto evolv. La | 9.45/5.17mm |
| Commessa/serie nr.: | 4 | Angolo pressione | 17°30'00" | Tratto elica Lß | 10.36mm |
| Masch.Nr.: | M001 Spindel: Formrad | Angolo elica | 29°00'00" | Inizio elab. Ml | 12.03mm |
| Untersuchungszweck: | Laufende Messung | ø Base db | 81.6378mm | Palpatore ø | (#2D) 1mm |
| Werkzeug: | Charge: | Ang. Base | 27°32'25" | Fat.scor.pr. 'x | .45 |




| Tolerance | Medio | Val.misur[µm] | | | | | | Qual |
|---|---|---|---|---|---|---|---|---|
| fHαm -6±6 | -4 | Var 5 | | | | | | |
| fHα -6±10 | -4 | -2 | -5 | -1 | -5 | -6 | -1 | |
| Fα | 3 | 4 | 2 | 5 | 2 | 2 | 5 | |
| ffα 4 | 2 | 3 | 1 | 1 | 1 | 2 | 1 | |
| cα 2/6 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | |
| Ca | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| P/T-ø[mm] | 82.356 | [82.13/82.45] | | | | | | |

| Tolerance | Val.misur[µm] | | | | | | Medio | Qual |
|---|---|---|---|---|---|---|---|---|
| -6±6 | Var 4 | | | | | | -7 | |
| -6±10 | -13 | -9 | -7 | -5 | -7 | -7 | -7 | |
| | 7 | 4 | 3 | 2 | 2 | 1 | 2 | |
| 4 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | |
| | | | | | | | | |
| -22/-14 | -14 | -15 | -14 | -16 | -16 | -15 | -16 | |
| 92.985 | [92.84/93.1] | | | | | | | |




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| fHßm ±6 | -5 | Var 6 | | | | | | |
| fHß ±13 | -5 | -6 | -7 | -7 | -3 | -1 | 4 | |
| Fß | 6 | 6 | 6 | 7 | 4 | 3 | 5 | |
| ffß 4 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | |
| cß 1/5 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ±6 | Var 7 | | | | | | -2 | |
| ±13 | 9 | 3 | -4 | -1 | -4 | -4 | -2 | |
| | 7 | 4 | 4 | 3 | 4 | 5 | 4 | |
| 4 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | |
| 1/5 | 3 | 4 | 3 | 4 | 3 | 3 | 4 | |
| | | | | | | | 13 | |

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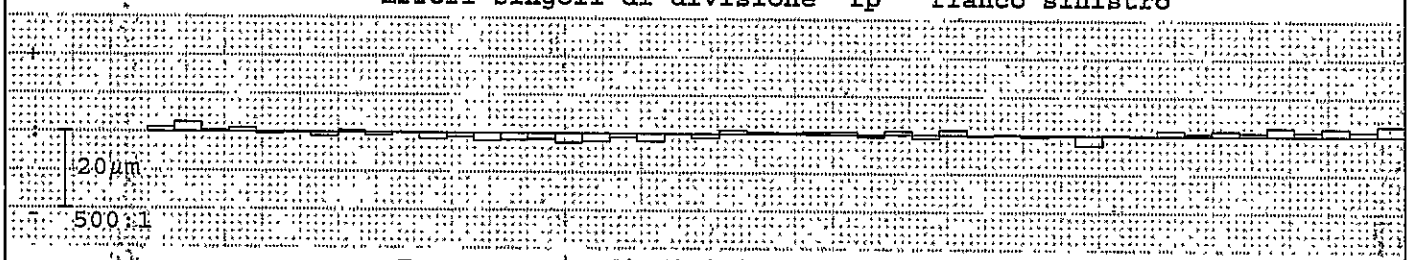
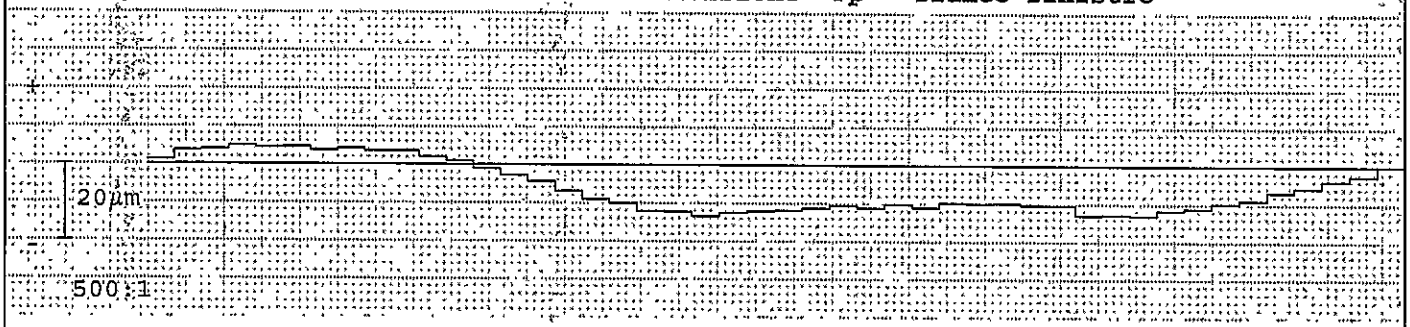
# Ruota cilindrica Divisione

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: STI0412_06 0 | P26 601265 | Controllore: turno B | | Data: 12.01.2015 09:43 | |
| Denominazione: | ZR5 | Numero denti z | 46 | Angolo pressione | 17°30'00" |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Angolo elica | 29°00'00" |
| Commessa/serie nr.: | 4 | Untersuchungszweck: | Laufende Messung | | |
| Masch.Nr.: | M001 | Spindel: Formwerkzeug: | | Charge: | |

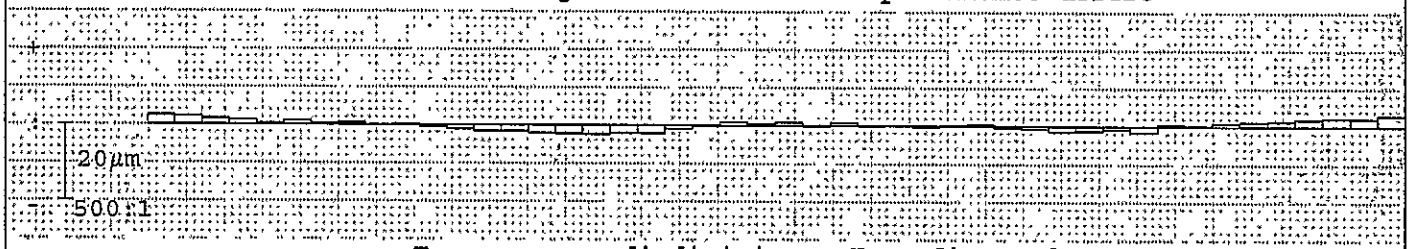
Errori singoli di divisione fp fianco sinistro



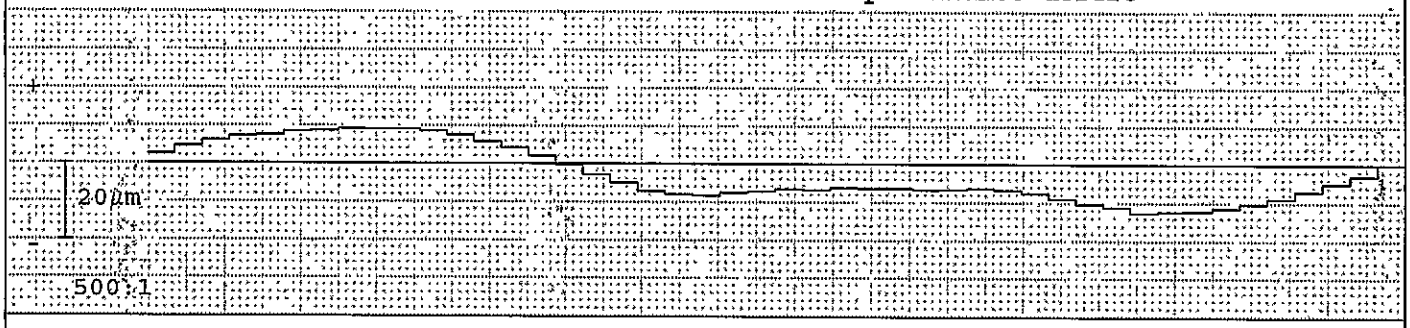

Errore somma di divisione Fp fianco sinistro




Errori singoli di divisione fp fianco destro



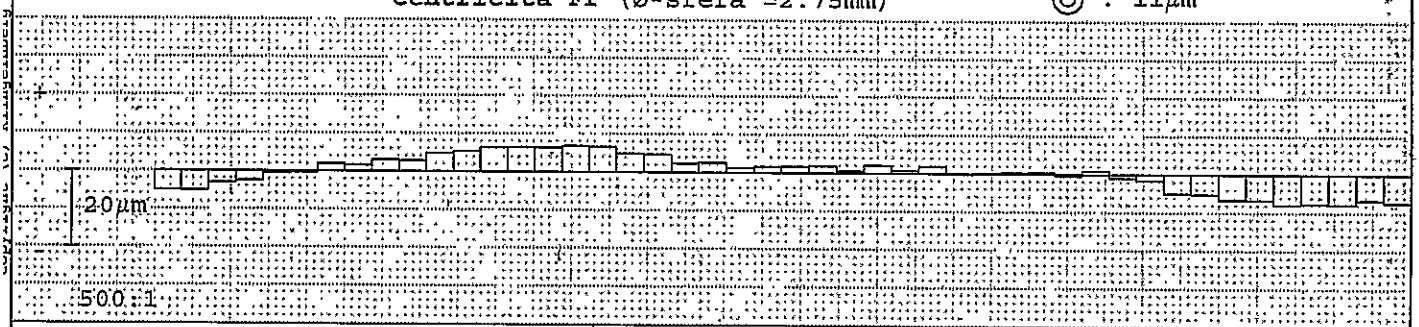

Errore somma di divisione Fp fianco destro




Corsa per misura divis.:87.832 z=6.5mm

| | | fianco sinistro / RILASCIO | | | fianco destro / TIRO | | |
|---|---|---|---|---|---|---|---|
| | | Val.misur | Qual. | Val. amm Qual. | Val.misur | Qual. | Val. amm Qual. |
| Gr. err. singoli divisione | fp max | 3 | | 14 | 3 | | 14 |
| Gr. salto di passo | fu max | 3 | | 18 | 2 | | 18 |
| Scarto di divisione | Rp | 6 | | | 5 | | |
| Err. globale di divisione | Fp | 18 | | 50 | 22 | | 50 |
| Err. cordale di divisione | Fpz/8 | 11 | | | 14 | | |

Centricità Fr (Ø-sfera =2.75mm) ◎ : 11µm




| | | | | |
|---|---|---|---|---|
| Err. di concentricitá | Fr | 15 | 32 | |
| Variaz. spessore dente | Rs | | | |

Docum.archiviato elettronicamente.Archiviazione cartacea non necessaria

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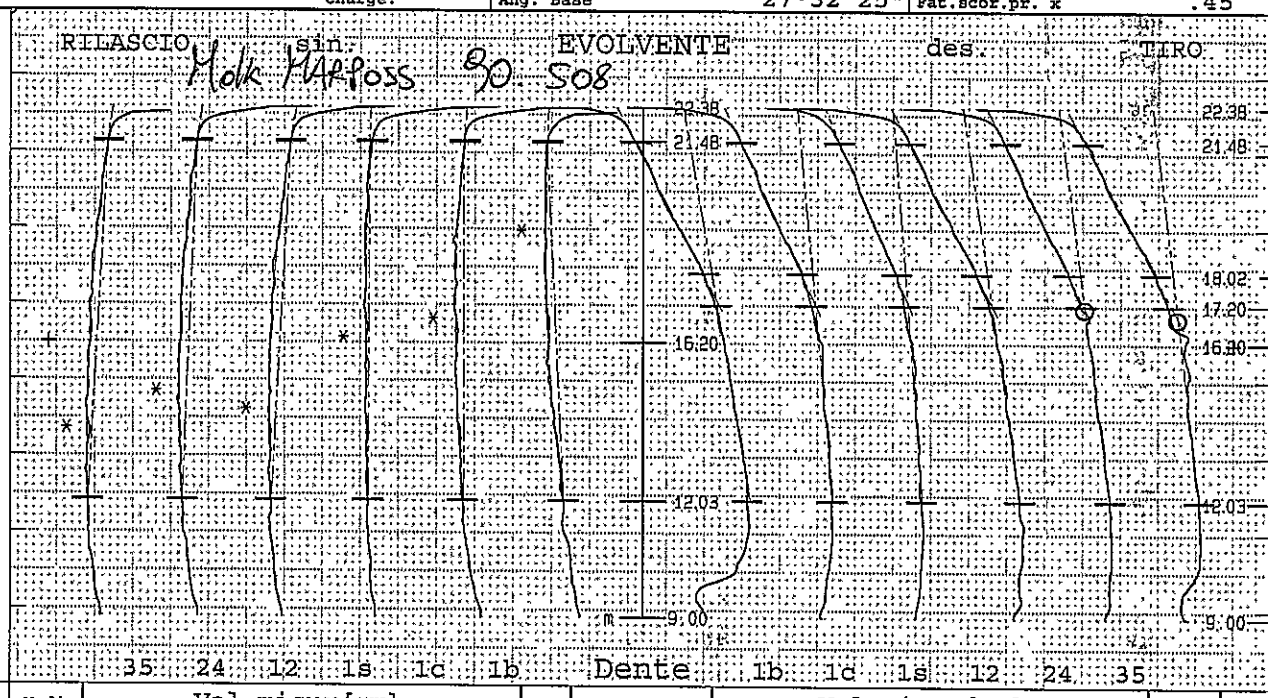
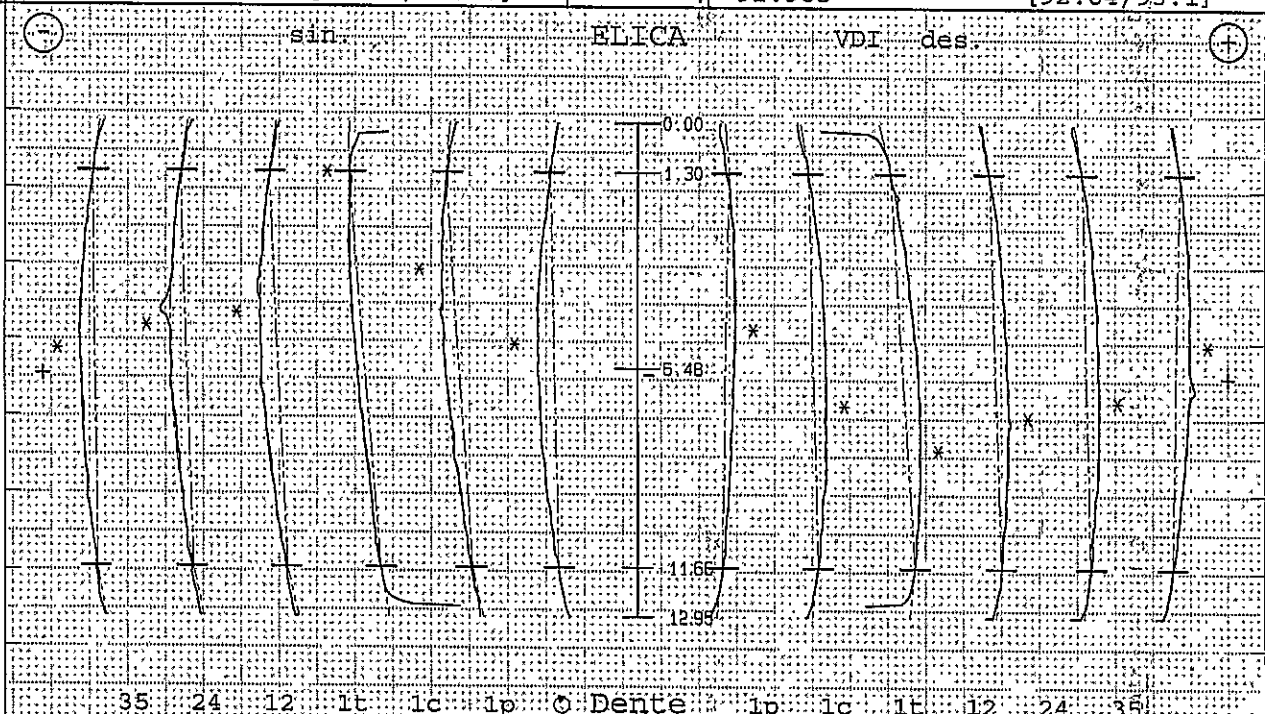
# Ruota cilindrica Evolvente/Elica

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: | STI0412_06 0 P26 601265 | Controllore: | turno B | Data: | 12.01.2015 09:49 |
| Denominazione: | ZR5 | Numero denti z | 46 | Largh.fasc.dent. b | 12.95mm |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Tratto evolv. La | 9.45/5.17mm |
| Commessa/serie nr.: | 5 | Angolo pressione | 17°30'00" | Tratto elica Lß | 10.36mm |
| Masch.Nr.: | M001 Spindel: Formmaster | Angolo elica | 29°00'00" | Inizio elab. M1 | 12.03mm |
| Untersuchungszweck: | Laufende Messung | ø Base db | 81.6378mm | Palpatore ø | (#2D) 1mm |
| Werkzeug: | Charge: | Ang. Base | 27°32'25" | Fat.scor.pr. x | .45 |




| Tolerance | Medio | Val.misur[µm] | | | | | | Qual |
|---|---|---|---|---|---|---|---|---|
| fHαm -6±6 | -4 | Var 5 | | | | | | |
| fHα -6±10 | -4 | -5 | -4 | -5 | 0 | 0 | 4 | |
| Fα | 3 | 2 | 3 | 2 | 5 | 6 | 10 | |
| ffα 4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | |
| cα 2/6 | 2 | 2 | 2 | 3 | 1 | 2 | 2 | |
| Ca | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| P/T-ø [mm] | 82.357 | [82.13/82.45] | | | | | | |

| Tolerance | Val.misur[µm] | | | | | | Medio | Qual |
|---|---|---|---|---|---|---|---|---|
| -6±6 | Var 3 | | | | | | -7 | |
| -6±10 | -9 | -5 | -4 | -8 | -7 | -6 | -7 | |
| | 3 | 2 | 3 | 2 | 2 | 5 | 3 | |
| 4 | 1 | 2 | 2 | 1 | 2 | 5 | 3 | |
| | | | | | | | | |
| -22/-14 | -14 | -16 | -15 | -16 | -16 | -19 | -17 | |
| | 92.983 | | | | | | [92.84/93.1] | |




| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| fHßm ±6 | -5 | Var 7 | | | | | | |
| fHß ±13 | -5 | -2 | -4 | -6 | -11 | -9 | -3 | |
| Fß | 6 | 4 | 7 | 7 | 8 | 7 | 5 | |
| ffß 4 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | |
| cß 1/5 | 4 | 4 | 4 | 4 | 2 | 4 | 4 | |
| bm 8±8 | 8 | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ±6 | Var 6 | | | | | | | |
| ±13 | 2 | -3 | -8 | -4 | -3 | 2 | -2 | |
| | 3 | 4 | 7 | 5 | 4 | 5 | 5 | |
| 4 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | |
| 1/5 | 2 | 3 | 4 | 3 | 3 | 4 | 3 | |

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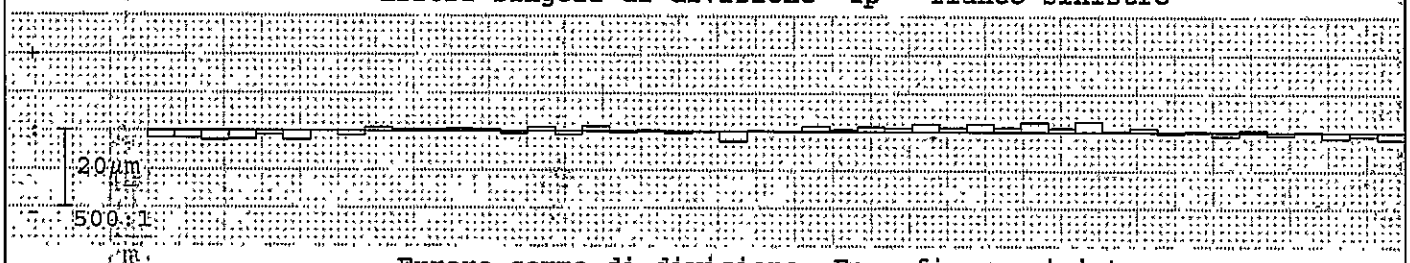
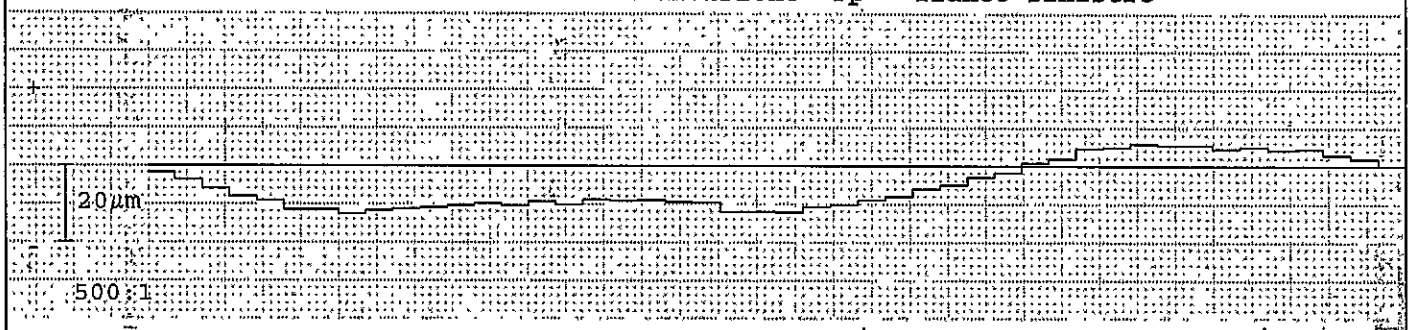
# Ruota cilindrica Divisione

| | | | | | |
|---|---|---|---|---|---|
| Nr. prog.: STI0412_06 0 | P26 601265 | Controllore: turno B | | Data: 12.01.2015 09:49 | |
| Denominazione: | ZR5 | Numero denti z | 46 | Angolo pressione | 17°30'00" |
| Numero disegno.: | 250.1.3782.35-IPA | Modulo m | 1.65mm | Angolo elica | 29°00'00" |
| Commessa/serie nr.: | 5 | Untersuchungszweck: | Laufende Messung | | |
| Masch.Nr.: | M001 | Spindel: Formmesskeil | | Charge: | |

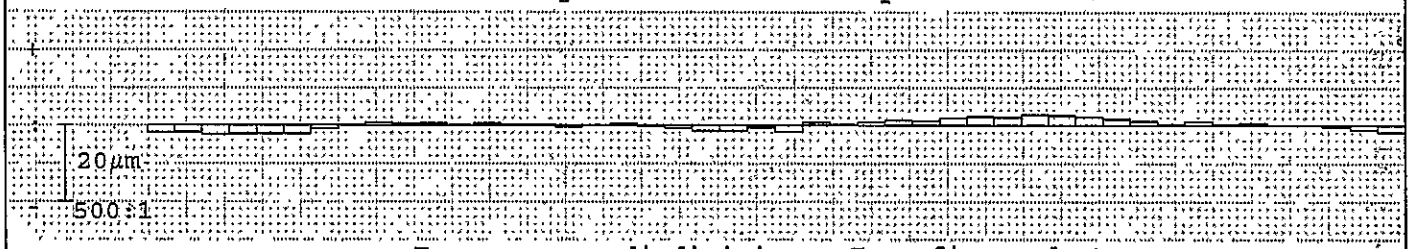
## Errori singoli di divisione fp fianco sinistro



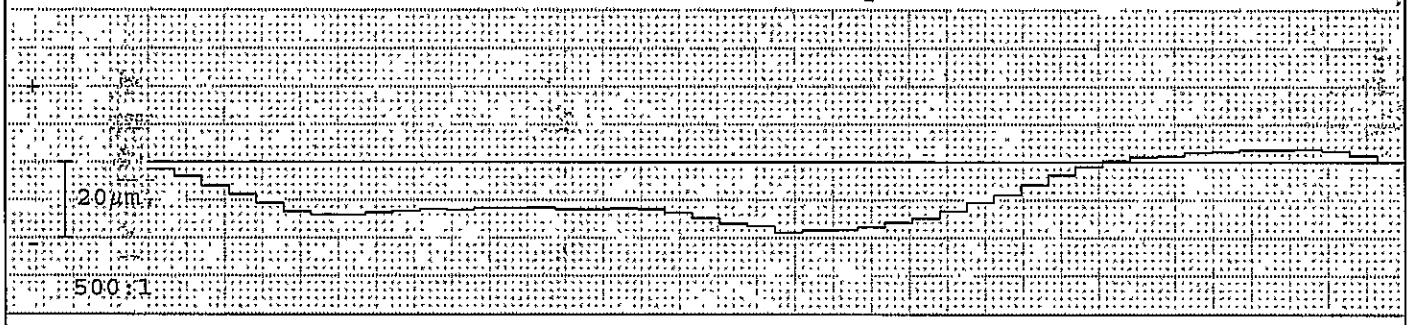

## Errore somma di divisione Fp fianco sinistro




## Errori singoli di divisione fp fianco destro



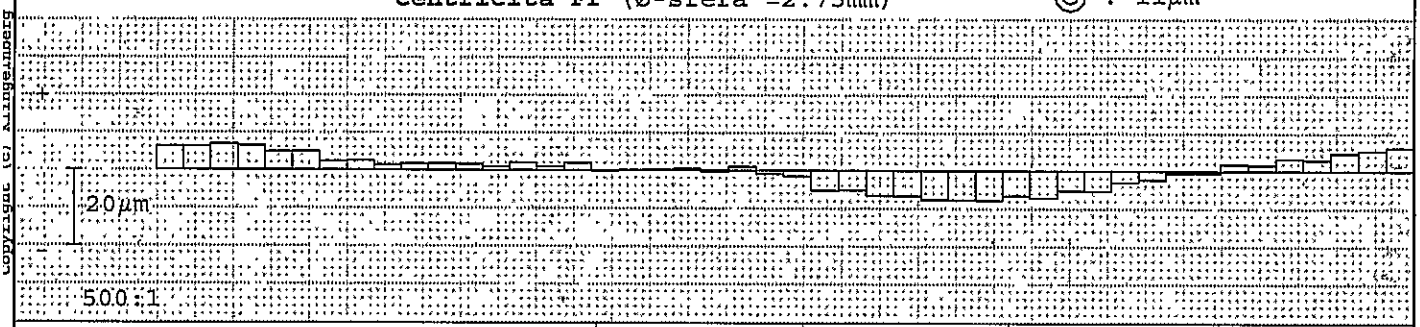

## Errore somma di divisione Fp fianco destro




Corsa per misura divis.:87.832 z=6.5mm

| | | fianco sinistro / RILASCIO | | fianco destro / TIRO | |
|---|---|---|---|---|---|
| | | Val.misur Qual. | Val. amm Qual. | Val.misur Qual. | Val. amm Qual. |
| Gr. err. singoli divisione | fp max | 3 | 14 | 3 | 14 |
| Gr. salto di passo | fu max | 3 | 18 | 2 | 18 |
| Scarto di divisione | Rp | 6 | | 6 | |
| Err. globale di divisione | Fp | 18 | 50 | 22 | 50 |
| Err. cordale di divisione | Fpz/8 | 12 | | 14 | |

## Centricità Fr (Ø-sfera =2.75mm) ◎ : 11µm




| | | | | |
|---|---|---|---|---|
| Err. di concentricitá | Fr | 15 | 32 | |
| Variaz. spessore dente | Rs | | | |

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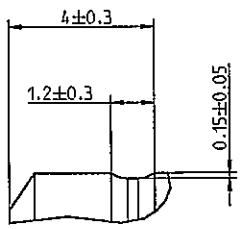
Docum.archiviato elettronicamente.Archiviazione cartacea non necessaria

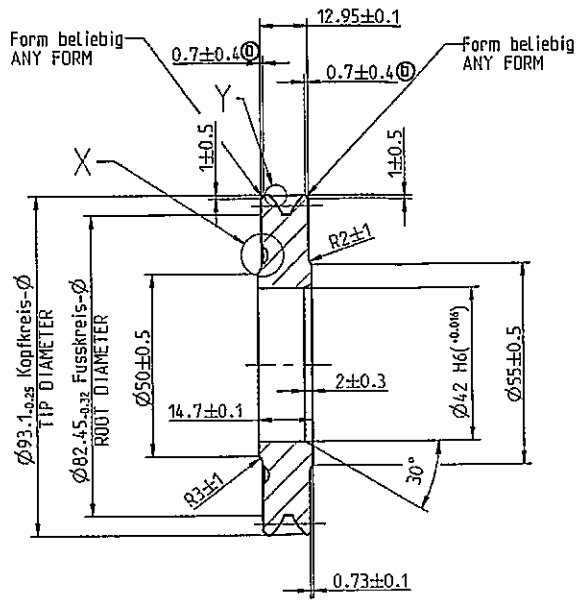
KLINGELNBERG

| | | |
|---|---|---|
| Design Release: | 2014-07-23 | Agepi.Raidt |
| Function Release: | 2014-08-22 | Alejandro.Mejia |
| Geardata Release: | 2011-08-18 | I.A. Fabrizio Cricenti |
| Material Release: | not required | |
| SAP Release: | 2014-09-12 | Ruth.Ernstberger |
| Document Status: | approved | |

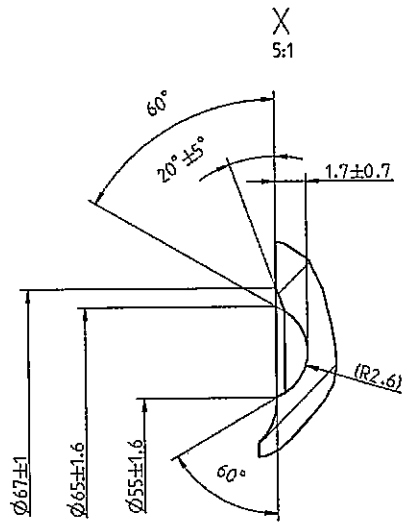
Freigabeinformation freihalten! KEEP FREE FOR RELEASE INFORMATION!

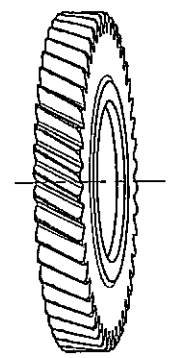
Y
10:1

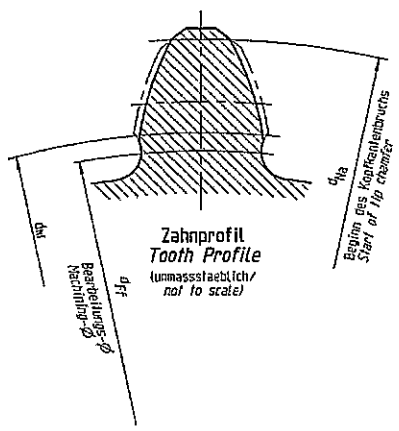


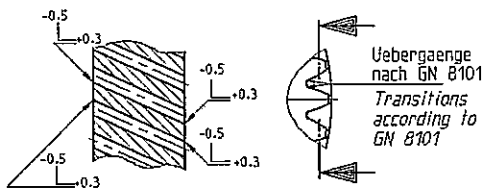

X
5:1



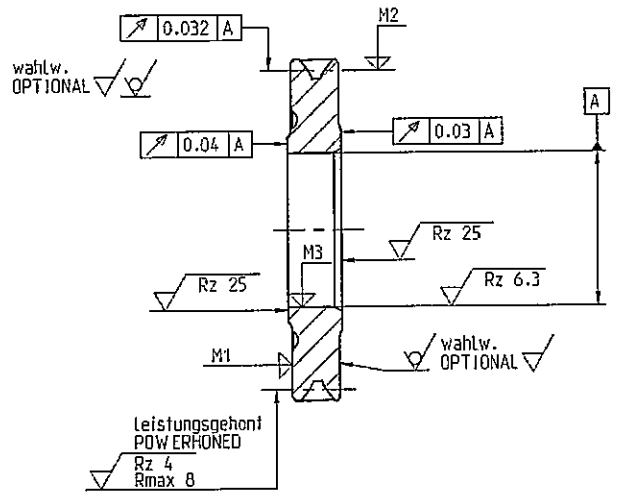



Kanten an Laufverzahnungen / *Tooth chamfers*
unmassstaeblich / *not to scale*




ⓐ
Werte in Tabelle gelten als Fertigungsmaß.
Werte veraendern sich beim Aufpressen auf die Welle.
VALUES IN TABLE ARE MANUFACTURING MEASURES.
VALUES CAN BE DIFFERENT AFTER PRESSING THE GEAR ON THE SHAFT.

| | | |
|---|---|---|
| **Aussenverzahnung / EXTERNAL GEAR** | | |
| **Zahnwelle/ SPLINE DATA EXTERNAL** | | |
| Bezugsdurchmesser / REFERENCE DIAMETER $d_B$ | | |
| Modul / NORMAL MODULE $m_n$ | | 1.650 |
| Zaehnezahl / NUMBER OF TEETH z | | 46 |
| Eingriffswinkel / NORMAL PRESSURE ANGLE $\alpha_n$ | | 17.5° |
| Schraegungswinkel / HELIX ANGLE β | | 29.0° |
| Richtung / HAND OF HELIX | | RIGHT, rechts |
| Bezugsprofil / BASIC RACK | | |
| Profilverschiebung/ADDENDUM MODIFICATION $x=m_n$ | Hennmass / NOMINAL | 0.743 |
| Qualitaet / GEAR TOOTH QUALITY (DIN3960) | | 8 |
| Toleranzklasse / TOLERANCE CLASS | | |
| Zahndicke / TOOTH THICKNESS $s_n$ (Lehrenmass / GAGE DIMENSION) | effective max. | |
| Zahndicke / TOOTH THICKNESS $s_n$ (Einzelmessung / ACTUAL) | max. | 2.982 |
| | min. | 2.957 |
| Messkugel-Ø / BALL DIA $D_M$ | | 2.50 |
| Pruefmass / MEASUREMENT OVER BALLS $M_{dK}$ (Einzelmessung / ACTUAL) | max. | 90.544 |
| | min. | 90.472 |



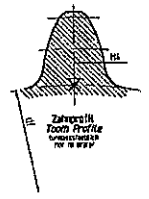

Naehere Angaben zur Verzahnung
siehe Verzahnungsblatt gleicher Nummer
FURTHER GEAR DATA SEE
DATA SHEET SAME NUMBER

Technische Sauberkeit / TECHNICAL CLEANLINESS:

Es gelten die Sauberkeitsanforderungen nach GN 4340-1
CLEANLINESS REQUIREMENTS OF THE GN 4340-1 HAVE TO BE ABIDED

einsatzgehaertet und angelassen
M1 (Oberflaechenhaerte) : 80.5+2.5 HRA
M2 (Zahnflanke) : CHD (Eht) 550= 0.5+0.4
M3 (Bohrung) : CHD (Eht) 550= 0.3 min.
M4 (Kernhaerte) : min. 300 HV10

CASE HARDENED AND TEMPERED
M1 (CASE HARDNESS) : 80.5+2.5 HRA
M2 (TOOTH FLANK) : CHD (Eht) 550= 0.5+0.4
M3 (BORE) : CHD (Eht) 550= 0.3 min.
M4 (INSIDE BASE OF TOOTH) : min. 300 HV10




Rz 40

0.3
0.1

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| GCG/TS 803001 | 0 | <M> | | | | | | |
| | 0 | ▽ | | | | | | |
| GN 3010 | 0 | <N> | | | | | | |
| | 0 | <C> | | | | | | |
| | 0 | <A> | b | 2x | 35670 | Main. 0.7±0.4 war/WAS 0.7±0.5 (2x) | | 20140723 |
| CAD Prof Engineer | | | a | 1x | 35549 | Verzahnungstabelle/TABLE GEAR DATA: Notiz/NOTE neu/NEW | | 20111207 |
| | | | -- | -- | 250/S112 | Spezifikationsreifegrad 3 erfüllt SPECIFICATION MATURITY LEVEL 3 APPROVED | | 20110804 |

Massstab / SCALE: M: 1:1 (--)
Buchst. CHANGE INDEX | Anzahl NUMBER | Aend.-Nr. CHANGE REQUEST NO | Aenderung MODIFICATION --nur mittels CAD zulaessig, ENEA ueberpruefen-- --ONLY ALLOWED BY CAD; CHECK ENEA-- | Datum DATE

Allgemeintoleranzen fuer Laengenmasse, Form und Lage ISO 2768 - mH gebrochene Kanten, Radien und Winkelmasse ISO 2768 - f GENERAL TOLERANCES FOR LINEAR DIMENSIONS, FORM AND POSITION ISO 2768 - mH; CHAMFERS, RADII AND ANGULAR DIMENSIONS ISO 2768 - f

Informationen auf dieser Zeichnung sind ohne Angaben zu Verwendung und Freigabe unverbindlich. INFORMATION ON THIS DRAWING PROVIDED WITHOUT OBLIGATION IF USAGE AND RELEASE ARE NOT SHOWN.

Auswertung der Durchmesserpruefung erfolgt nach der Gauss-Methode (arithmetischer Mittelwert) EVALUATION OF THE DIAMTER MEASUREMENT IS CARRIED OUT ACCORDING TO THE GAUSS METHOD (ARITHMETICAL MEAN VALUE)

Form- und Lagetolerierung FORM AND POSITION TOLERANCES EN ISO 1101 | Toleranzring TOLERANCING ISO 8015 | Oberflaechenangaben SURFACE TEXTURE EN 4287 | Werkstuecktkanten BREAK EDGES ISO 13715

Werkstoff / MATERIAL: GCG_805000_02_20MnCrS5
Haertung SOFT-FINISHED: -
Gesamtoberflaeche SURFACE AREA: 20791 mm²
Masse MASS: 0.474 kg
Benennung / ITEM NAME: Festrad 5.Gang, GEAR 5TH
Artikel-Nr./ ITEM NO.: 2501378235
CAD-Modell: 2501378235
Blatt/SHEET 1 von/OF 9
Reifegrad MATURITY: 3
Format SIZE: A1
Ersatz fuer SUBSTITUTE FOR: -
ERSTELLT / DRAWN: Agepi.Raidt 22.07.2014
GEPRUEFT / CHECKED: Agepi.Raidt 22.07.2014
FREIGEGEBEN / RELEASED: Agepi.Raidt 22.07.2014

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