Homologation

Cordless Assembly Tools

Model: CLBP08Q

Serial no.: IJJ1016

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Homologation: CLBP08Q SN: IJJ1016

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Document no: 002/2023
Date: 16.11.2023

Test sheet no. 2

Machine Capability Study 30 %

Multi-stage tightening system	☑	Speed 600 rpm	60,9 %
Single-stage tightening system	☐	Speed 100 %	985 rpm

Manufacturer: Apex Tool Group Serial no: **IJJ1016**

Test torque: Tq min. + 0.3 (Tq max. - Tq min.) 3,87 Nm

Hard joint (H)	22,77	Nm / Revolution	Angle degree	30°
Soft joint (L)	1,95	Nm / Revolution	Angle degree	360°

		H	**L**
a)	Tolerance down / up	3,48 - 4,26 Nm	3,48 - 4,26 Nm
	Tolerance down / up	10 %	10 %
	Average torque	3,80 Nm	3,90 Nm
	Standard deviation	0,02 Nm	0,01 Nm
	Torque scatter (99,73%)	0,10 Nm	0,06 Nm
	C_m	7,72	13,47
	C_{mk}	6,24	12,53

b)	Min. C_m hard/soft (lowest value)	7,72
	Min. C_{mk} hard/soft (lowest value)	6,24

Capability is reached if minimum C_{mk} value ≥1.67

Note:

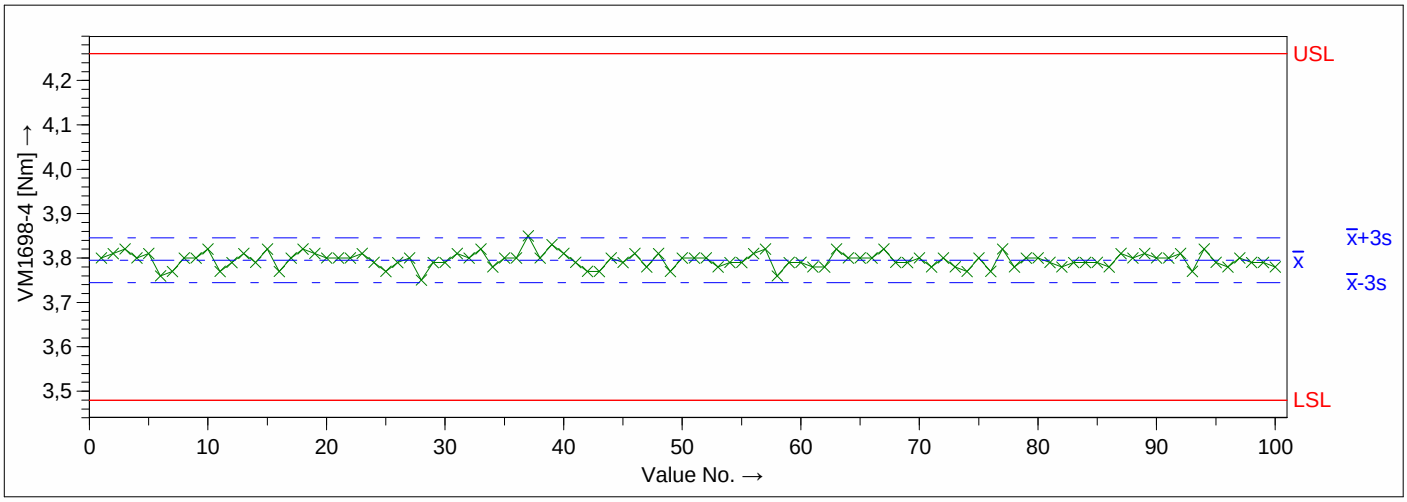
Machine Capability Study
Control System

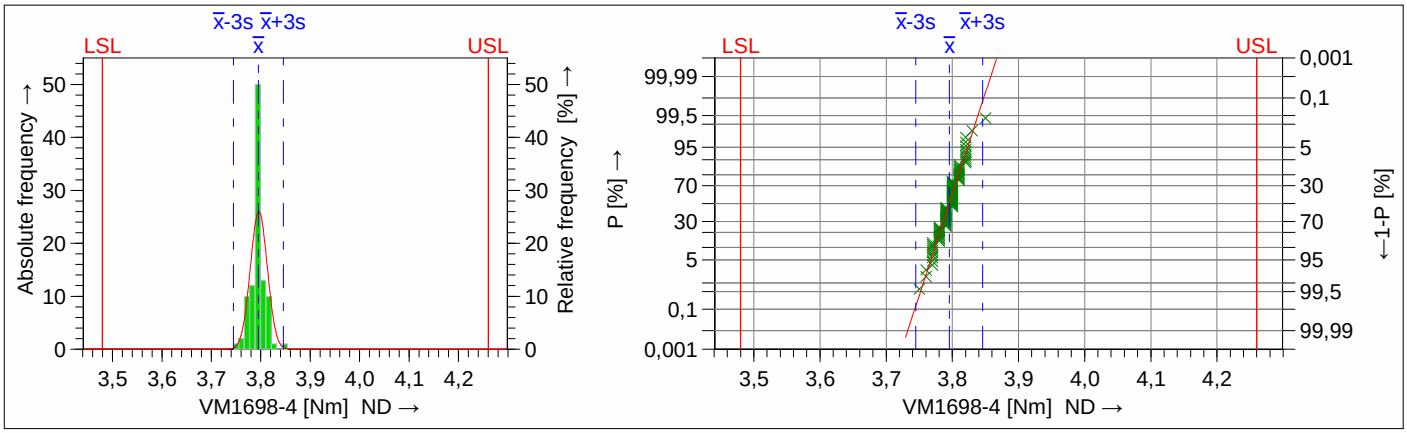
Plant	ATG Westhausen	Operator Name	Stölzle
Date	10.11.2023		

Ord. No.	CLBP08Q	Part type	CLBP08Q	Contr.item	yes
Serial No.	IJJ1016d	Char.Descr.	VM1698-4	Nom.val. 3,87 0,39	USL 4,26
		Serial No.	1024210	Unit Nm -0,39	LSL 3,48
Char.Type	variable			Tolerance value 10 %	Decimal Pl. 2
Cust.Name	ATG	Reference System	VM1698-4	Test Electronic	---
Contr.No.	Homologation	Reference Transducer	10/1026388	nges.	100

Evaluation from 10.11.2023 14:54:18 to 10.11.2023 15:07:58

Rem. TQ 30% hard +/-10% * Speed: 600 rpm





Drawing Values		Collected Values		Statistics	
T_m	3.87			$\bar{x}$	3.7953
LSL	3.48	x_{min}	3.75	$\bar{x}$-3s	3.7448
USL	4.26	x_{max}	3.85	$\bar{x}$+3s	3.8458
T	0.78	R	0.10	6s	0.1011
		$n_{<T>}$	100	$p_{<T>}$	100.00000 %
		$n_{>USL}$	0	$p_{>USL}$	0.00000%
		$n_{<LSL}$	0	$p_{<LSL}$	0.00000%
		n_{eff}	100		
		n_{tot}	100		

Model distribution			Normal Distribution
Calculation method			M1.1.4 $\hat{\sigma} = S_{tot}$
Potential Capability index	=	C_m	7.72
Critical capability index	=	C_{mk}	6.24

The requirements were met (C_m,C_{mk})

APEX VDI/VDE 2647 V0.1

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016d	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	3,87
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	3,48
				USL	4,26
Remark	TQ 30% hard +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
1024210	VM1698-4	Nm	3,80	3,81	3,82	3,80	3,81	3,76	3,77	3,80	3,80	3,82
1024210	VM1698-4	Grad	31,25	30,25	29,75	30,25	31,50	31,25	30,25	31,00	30,75	32,00

Char.No.	Char.Descr.	Unit	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}	x_{18}	x_{19}	x_{20}
1024210	VM1698-4	Nm	3,77	3,79	3,81	3,79	3,82	3,77	3,80	3,82	3,81	3,80
1024210	VM1698-4	Grad	31,25	32,00	29,75	32,00	29,75	31,50	29,00	28,50	32,50	31,25

Char.No.	Char.Descr.	Unit	x_{21}	x_{22}	x_{23}	x_{24}	x_{25}	x_{26}	x_{27}	x_{28}	x_{29}	x_{30}
1024210	VM1698-4	Nm	3,80	3,80	3,81	3,79	3,77	3,79	3,80	3,75	3,79	3,79
1024210	VM1698-4	Grad	29,50	32,00	31,50	29,00	29,50	32,50	29,50	31,00	30,50	30,25

Char.No.	Char.Descr.	Unit	x_{31}	x_{32}	x_{33}	x_{34}	x_{35}	x_{36}	x_{37}	x_{38}	x_{39}	x_{40}
1024210	VM1698-4	Nm	3,81	3,80	3,82	3,78	3,80	3,80	3,85	3,80	3,83	3,81
1024210	VM1698-4	Grad	31,25	28,75	31,00	31,75	29,00	28,50	29,50	29,50	29,25	31,25

Char.No.	Char.Descr.	Unit	x_{41}	x_{42}	x_{43}	x_{44}	x_{45}	x_{46}	x_{47}	x_{48}	x_{49}	x_{50}
1024210	VM1698-4	Nm	3,79	3,77	3,77	3,80	3,79	3,81	3,78	3,81	3,77	3,80
1024210	VM1698-4	Grad	31,25	29,00	29,75	30,50	29,50	30,50	31,25	31,75	30,00	31,75

Char.No.	Char.Descr.	Unit	x_{51}	x_{52}	x_{53}	x_{54}	x_{55}	x_{56}	x_{57}	x_{58}	x_{59}	x_{60}
1024210	VM1698-4	Nm	3,80	3,80	3,78	3,79	3,79	3,81	3,82	3,76	3,79	3,79
1024210	VM1698-4	Grad	29,25	30,75	30,50	29,25	31,00	30,25	28,50	31,00	30,25	30,75

Char.No.	Char.Descr.	Unit	x_{61}	x_{62}	x_{63}	x_{64}	x_{65}	x_{66}	x_{67}	x_{68}	x_{69}	x_{70}
1024210	VM1698-4	Nm	3,78	3,78	3,82	3,80	3,80	3,80	3,82	3,79	3,79	3,80
1024210	VM1698-4	Grad	29,50	31,25	29,75	30,50	31,75	31,50	29,75	30,25	31,50	29,75

Char.No.	Char.Descr.	Unit	x_{71}	x_{72}	x_{73}	x_{74}	x_{75}	x_{76}	x_{77}	x_{78}	x_{79}	x_{80}
1024210	VM1698-4	Nm	3,78	3,80	3,78	3,77	3,80	3,77	3,82	3,78	3,80	3,80
1024210	VM1698-4	Grad	30,25	28,75	30,25	29,50	30,00	30,75	30,00	29,75	32,25	30,50

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016d	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	3,87
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	3,48
				USL	4,26
Remark	TQ 30% hard +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_{81}	x_{82}	x_{83}	x_{84}	x_{85}	x_{86}	x_{87}	x_{88}	x_{89}	x_{90}
1024210	VM1698-4	Nm	3,79	3,78	3,79	3,79	3,79	3,78	3,81	3,80	3,81	3,80
1024210	VM1698-4	Grad	30,50	29,50	29,50	32,00	29,75	30,50	30,25	30,75	30,25	29,50

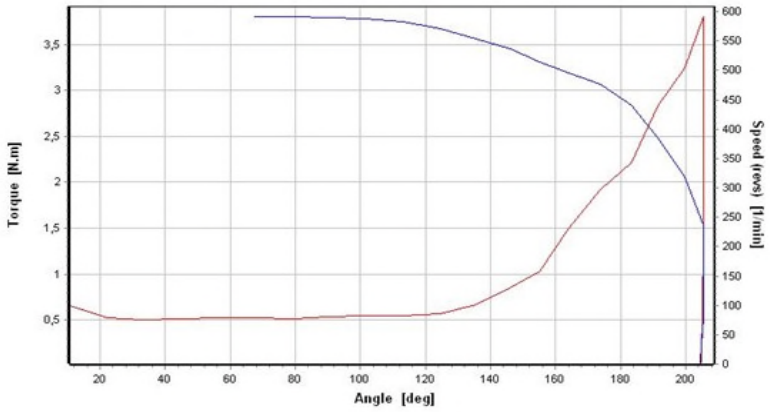
Char.No.	Char.Descr.	Unit	x_{91}	x_{92}	x_{93}	x_{94}	x_{95}	x_{96}	x_{97}	x_{98}	x_{99}	x_{100}
1024210	VM1698-4	Nm	3,80	3,81	3,77	3,82	3,79	3,78	3,80	3,79	3,79	3,78
1024210	VM1698-4	Grad	31,00	28,75	29,75	30,75	31,50	30,25	31,50	31,00	31,00	29,25

Torque graphs

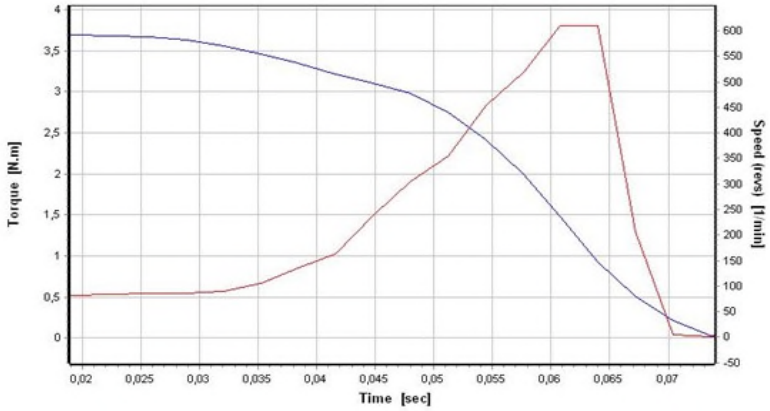
Machine Capability Study 30 %

Model: **CLBP08Q**
Serial no: **IJJ1016**

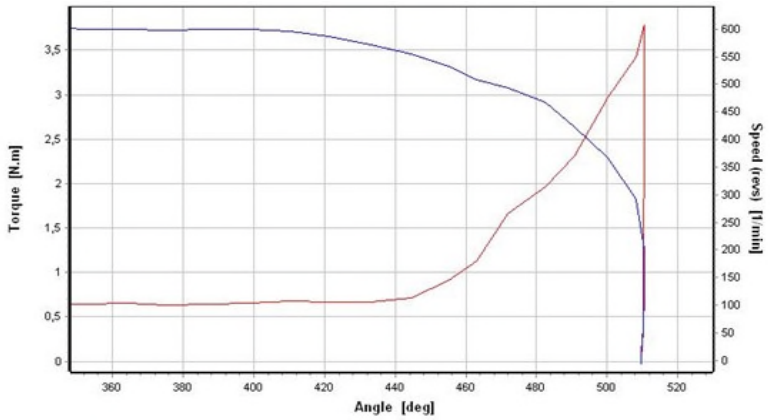
Angle degree: **30°**
Test torque: **3,9 Nm**



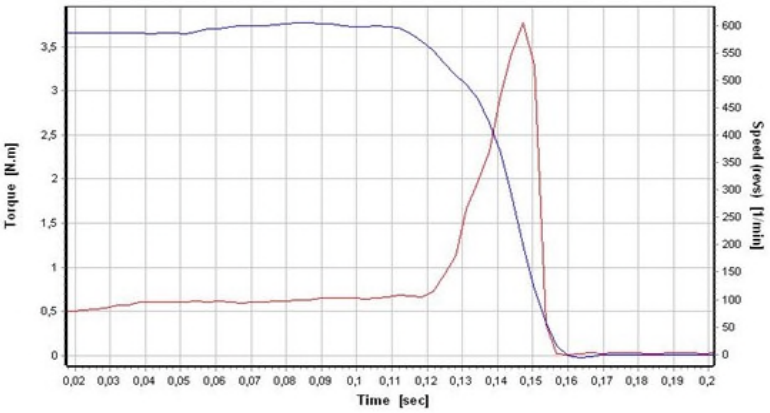
Value no. 1
Graph
Torque / Angle / Speed



Value no. 1
Graph
Torque / Time / Speed



Value no. 100
Graph
Torque / Angle / Speed



Value no. 100
Graph
Torque / Time / Speed

Machine Capability Study
Control System

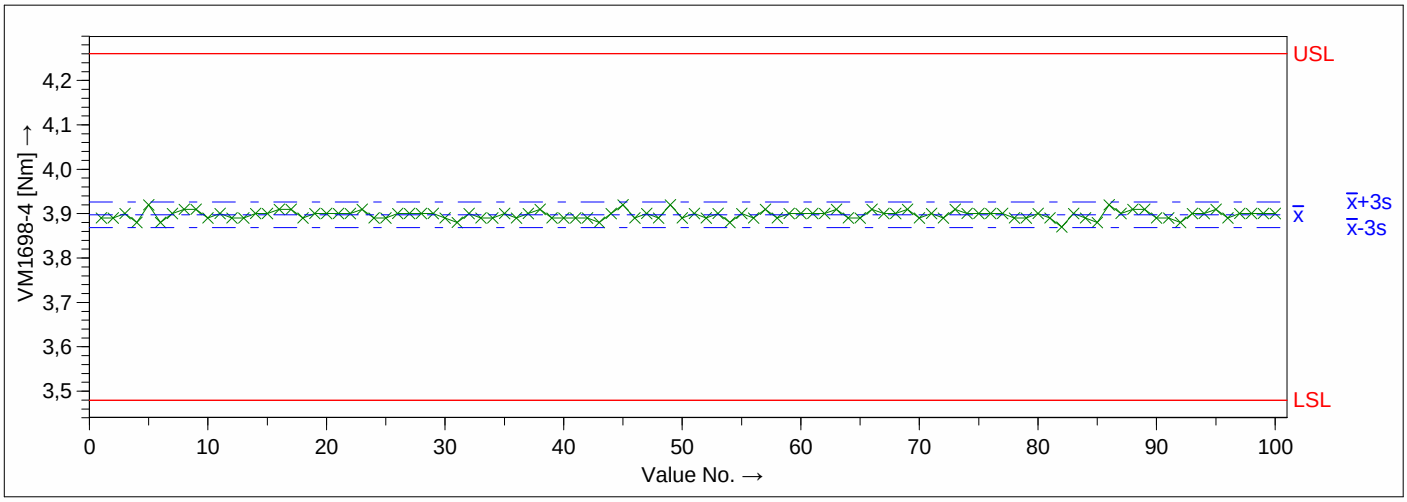
Cleco Production Tools

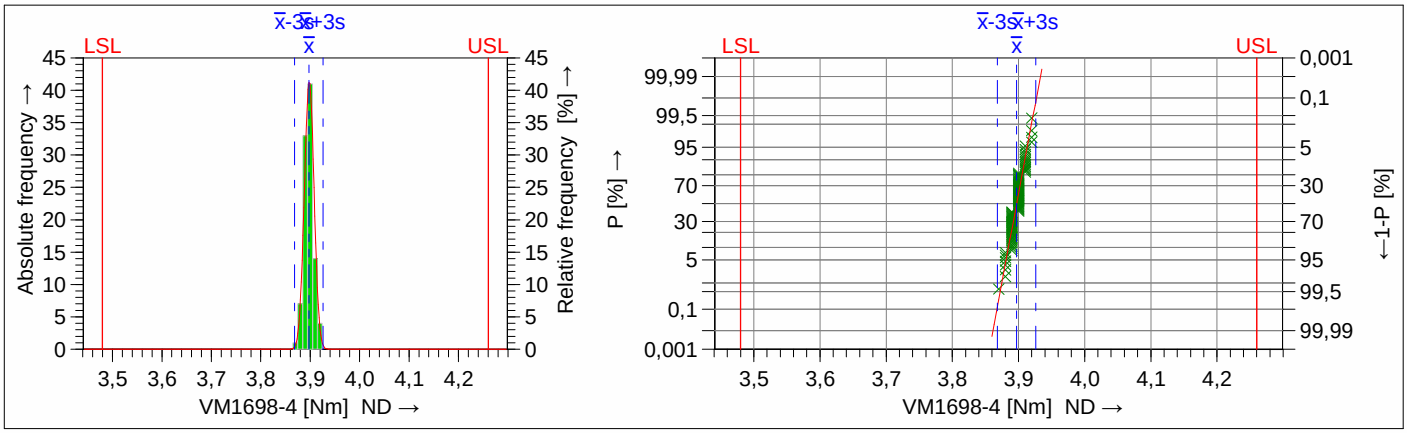
Plant	ATG Westhausen	Operator Name	Stölzle
Date	10.11.2023		

Ord. No.	CLBP08Q	Part type	CLBP08Q	Contr.item	yes
Serial No.	IJJ1016c	Char.Descr.	VM1698-4	Nom.val. 3,87 0,39	USL 4,26
		Serial No.	1024210	Unit Nm -0,39	LSL 3,48
Char.Type	variable			Tolerance value 10 %	Decimal Pl. 2
Cust.Name	ATG	Reference System	VM1698-4	Test Electronic	---
Contr.No.	Homologation	Reference Transducer	10/1026388	nges.	100

Evaluation from 10.11.2023 14:39:42 to 10.11.2023 14:51:15

Rem. TQ 30% soft +/-10% * Speed: 600 rpm





Drawing Values		Collected Values		Statistics	
T_m	3.87			$\bar{x}$	3.8972
LSL	3.48	x_{min}	3.87	$\bar{x}$-3s	3.8683
USL	4.26	x_{max}	3.92	$\bar{x}$+3s	3.9261
T	0.78	R	0.05	6s	0.0579
		$n_{<T>}$	100	$p_{<T>}$	100.00000 %
		$n_{>USL}$	0	$p_{>USL}$	0.00000%
		$n_{<LSL}$	0	$p_{<LSL}$	0.00000%
		n_{eff}	100		
		n_{tot}	100		

Model distribution			Normal Distribution
Calculation method			M1.1.4 $\hat{\sigma} = s_{tot}$
Potential Capability index	=	C_m	13.47
Critical capability index	=	C_{mk}	12.53

The requirements were met (C_m,C_{mk})

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Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016c	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	3,87
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	3,48
				USL	4,26
Remark	TQ 30% soft +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
1024210	VM1698-4	Nm	3,89	3,89	3,90	3,88	3,92	3,88	3,90	3,91	3,91	3,89
1024210	VM1698-4	Grad	357,25	360,50	363,00	364,25	359,25	359,75	356,75	362,75	355,25	363,00

Char.No.	Char.Descr.	Unit	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}	x_{18}	x_{19}	x_{20}
1024210	VM1698-4	Nm	3,90	3,89	3,89	3,90	3,90	3,91	3,91	3,89	3,90	3,90
1024210	VM1698-4	Grad	361,50	362,75	365,25	358,00	360,50	362,25	365,25	359,75	356,25	362,75

Char.No.	Char.Descr.	Unit	x_{21}	x_{22}	x_{23}	x_{24}	x_{25}	x_{26}	x_{27}	x_{28}	x_{29}	x_{30}
1024210	VM1698-4	Nm	3,90	3,90	3,91	3,89	3,89	3,90	3,90	3,90	3,90	3,89
1024210	VM1698-4	Grad	367,25	358,00	363,25	355,00	360,75	362,25	356,00	363,75	361,25	356,25

Char.No.	Char.Descr.	Unit	x_{31}	x_{32}	x_{33}	x_{34}	x_{35}	x_{36}	x_{37}	x_{38}	x_{39}	x_{40}
1024210	VM1698-4	Nm	3,88	3,90	3,89	3,89	3,90	3,89	3,90	3,91	3,89	3,89
1024210	VM1698-4	Grad	350,50	363,75	356,75	361,75	361,25	354,00	356,25	364,50	354,75	358,00

Char.No.	Char.Descr.	Unit	x_{41}	x_{42}	x_{43}	x_{44}	x_{45}	x_{46}	x_{47}	x_{48}	x_{49}	x_{50}
1024210	VM1698-4	Nm	3,89	3,89	3,88	3,90	3,92	3,89	3,90	3,89	3,92	3,89
1024210	VM1698-4	Grad	361,00	361,75	359,25	361,50	358,75	358,75	362,00	357,50	355,25	357,25

Char.No.	Char.Descr.	Unit	x_{51}	x_{52}	x_{53}	x_{54}	x_{55}	x_{56}	x_{57}	x_{58}	x_{59}	x_{60}
1024210	VM1698-4	Nm	3,90	3,89	3,90	3,88	3,90	3,89	3,91	3,89	3,90	3,90
1024210	VM1698-4	Grad	354,00	358,50	361,50	358,75	354,25	360,00	362,25	362,75	357,00	361,25

Char.No.	Char.Descr.	Unit	x_{61}	x_{62}	x_{63}	x_{64}	x_{65}	x_{66}	x_{67}	x_{68}	x_{69}	x_{70}
1024210	VM1698-4	Nm	3,90	3,90	3,91	3,89	3,89	3,91	3,90	3,90	3,91	3,89
1024210	VM1698-4	Grad	360,75	360,50	355,75	359,25	364,25	362,00	363,50	361,75	363,25	360,50

Char.No.	Char.Descr.	Unit	x_{71}	x_{72}	x_{73}	x_{74}	x_{75}	x_{76}	x_{77}	x_{78}	x_{79}	x_{80}
1024210	VM1698-4	Nm	3,90	3,89	3,91	3,90	3,90	3,90	3,90	3,89	3,89	3,90
1024210	VM1698-4	Grad	363,25	361,50	353,75	359,25	360,25	360,75	359,50	353,25	359,00	354,25

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016c	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	3,87
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	3,48
				USL	4,26
Remark	TQ 30% soft +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_{81}	x_{82}	x_{83}	x_{84}	x_{85}	x_{86}	x_{87}	x_{88}	x_{89}	x_{90}
1024210	VM1698-4	Nm	3,89	3,87	3,90	3,89	3,88	3,92	3,90	3,91	3,91	3,89
1024210	VM1698-4	Grad	359,50	358,25	364,00	360,00	359,75	355,75	355,50	355,25	360,50	361,00

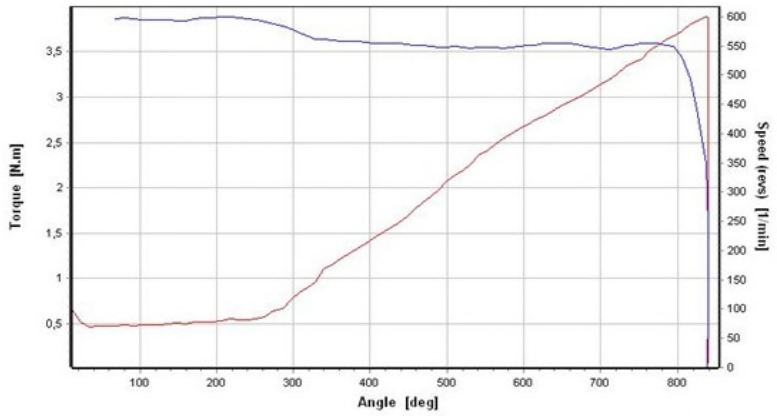
Char.No.	Char.Descr.	Unit	x_{91}	x_{92}	x_{93}	x_{94}	x_{95}	x_{96}	x_{97}	x_{98}	x_{99}	x_{100}
1024210	VM1698-4	Nm	3,89	3,88	3,90	3,90	3,91	3,89	3,90	3,90	3,90	3,90
1024210	VM1698-4	Grad	357,50	360,00	360,00	353,00	362,00	354,00	360,50	356,00	362,25	362,75

Torque graphs

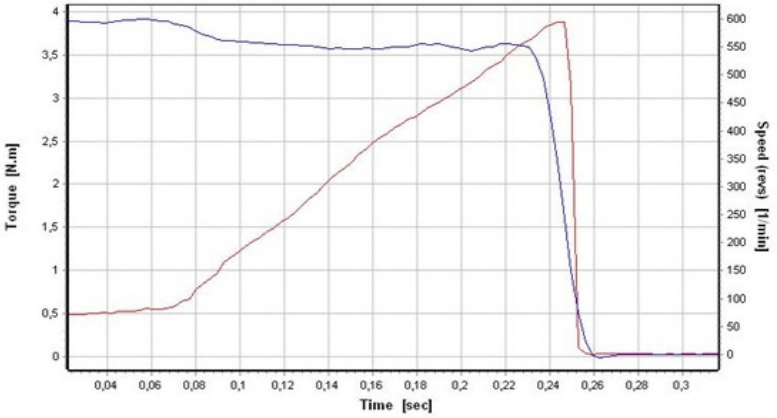
Machine Capability Study 30 %

Model: **CLBP08Q**
Serial no: **IJJ1016**

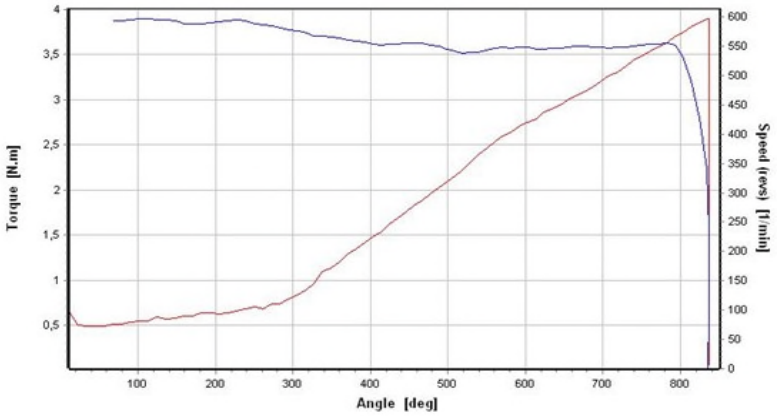
Angle degree: **360°**
Test torque: **3,9 Nm**



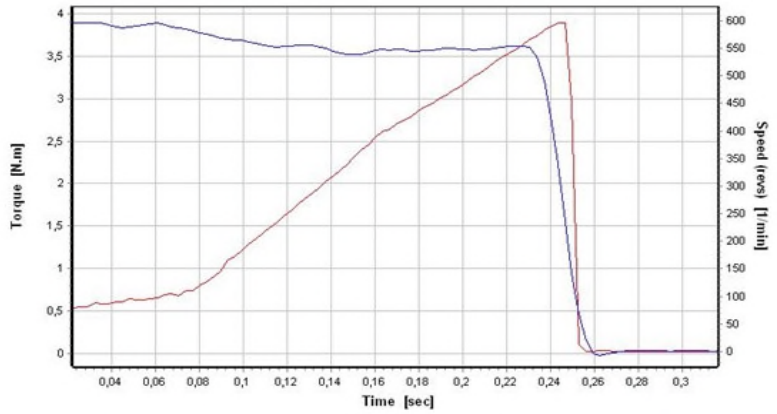
Value no. 1
Graph
Torque / Angle / Speed



Value no. 1
Graph
Torque / Time / Speed



Value no. 100
Graph
Torque / Angle / Speed



Value no. 100
Graph
Torque / Time / Speed

Test sheet no. 3

Machine Capability Study 80 %

Multi-stage tightening system	☑	Speed 600 rpm	60,9 %
Single-stage tightening system	☐	Speed 100 %	985 rpm

Manufacturer: Apex Tool Group Serial no: **IJJ1016**

Test torque: Tq min. + 0.8 (Tq max. - Tq min.) 6,82 Nm

Hard joint (H)	41,59	Nm / Revolution	Angle degree	30°
Soft joint (L)	3,47	Nm / Revolution	Angle degree	360°

		H	L
a)	Tolerance down / up	6,14 - 7,50 Nm	6,14 - 7,50 Nm
	Tolerance down / up	10 %	10 %
	Average torque	6,93 Nm	6,93 Nm
	Standard deviation	0,04 Nm	0,04 Nm
	Torque scatter (99,73%)	0,26 Nm	0,26 Nm
	C_m	5,33	5,33
	C_{mk}	4,45	4,45

b)	Min. C_m hard/soft (lowest value)	5,33
	Min. C_{mk} hard/soft (lowest value)	4,45

Capability is reached if minimum C_{mk} value ≥1.67

Note:

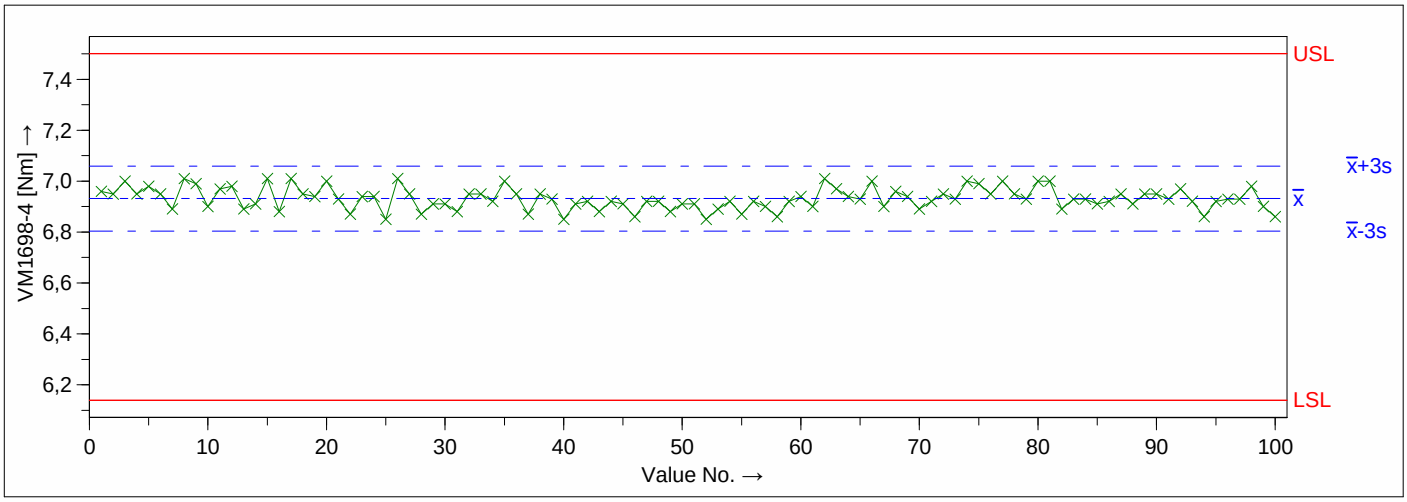
Machine Capability Study
Control System

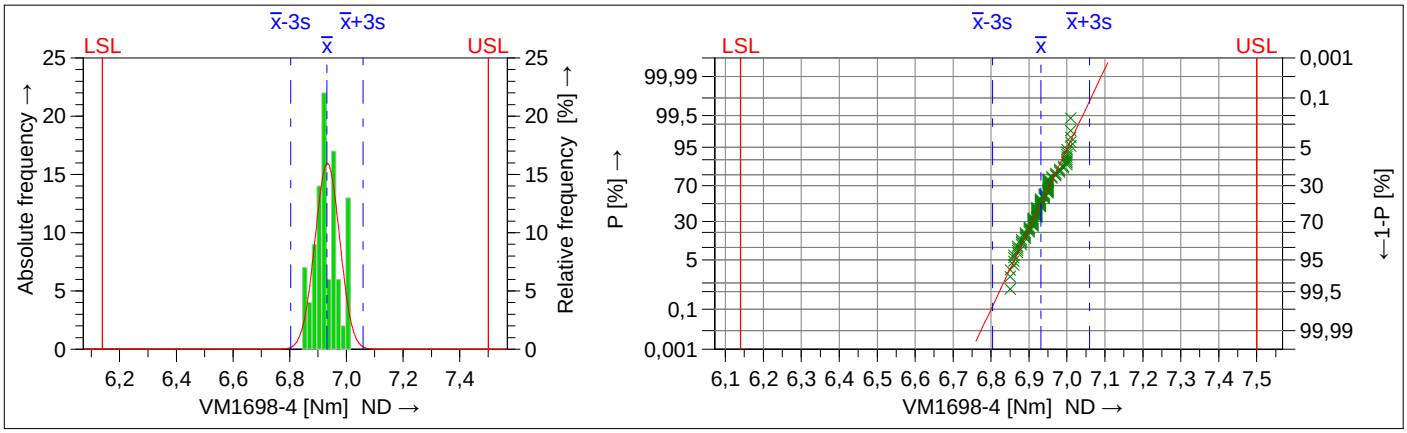
Plant	ATG Westhausen	Operator Name	Stölzle
Date	10.11.2023		

Ord. No.	CLBP08Q	Part type	CLBP08Q	Contr.item	yes
Serial No.	IJJ1016g	Char.Descr.	VM1698-4	Nom.val. 6,82 / 0,68	USL 7,50
		Serial No.	1024210	Unit Nm / -0,68	LSL 6,14
Char.Type	variable			Tolerance value 10 %	Decimal Pl. 2
Cust.Name	ATG	Reference System	VM1698-4	Test Electronic	---
Contr.No.	Homologation	Reference Transducer	10/1026388	nges.	100

Evaluation from 10.11.2023 10:02:11 to 10.11.2023 10:14:53

Rem. TQ 80% hard +/-10% * Speed: 600 rpm





Drawing Values		Collected Values		Statistics	
T_m	6.82			$\bar{x}$	6.9316
LSL	6.14	x_{min}	6.85	$\bar{x}$-3s	6.8039
USL	7.50	x_{max}	7.01	$\bar{x}$+3s	7.0593
T	1.36	R	0.16	6s	0.2554
		$n_{<T>}$	100	$p_{<T>}$	100.00000 %
		$n_{>USL}$	0	$p_{>USL}$	0.00000%
		$n_{<LSL}$	0	$p_{<LSL}$	0.00000%
		n_{eff}	100		
		n_{tot}	100		

Model distribution		Normal Distribution	
Calculation method		M1.1.4 $\hat{\sigma} = S_{tot}$	
Potential Capability index	=	C_m	5.33
Critical capability index	=	C_{mk}	4.45

The requirements were met (C_m,C_{mk})

APEX VDI/VDE 2647 V0.1

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016h	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	6,82
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	6,14
				USL	7,50
Remark	TQ 80% hard +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
1024210	VM1698-4	Nm	6,66	6,65	6,64	6,64	6,65	6,68	6,66	6,66	6,63	6,65
1024210	VM1698-4	Grad	28,75	31,00	29,75	28,75	30,50	31,75	29,50	30,25	30,50	30,50

Char.No.	Char.Descr.	Unit	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}	x_{18}	x_{19}	x_{20}
1024210	VM1698-4	Nm	6,66	6,63	6,64	6,64	6,71	6,69	6,64	6,69	6,65	6,64
1024210	VM1698-4	Grad	29,00	30,50	30,00	30,75	31,25	31,25	29,75	30,00	29,25	31,50

Char.No.	Char.Descr.	Unit	x_{21}	x_{22}	x_{23}	x_{24}	x_{25}	x_{26}	x_{27}	x_{28}	x_{29}	x_{30}
1024210	VM1698-4	Nm	6,64	6,65	6,62	6,67	6,68	6,65	6,65	6,63	6,67	6,64
1024210	VM1698-4	Grad	30,25	30,25	31,50	31,25	32,00	29,00	30,75	30,75	32,00	29,50

Char.No.	Char.Descr.	Unit	x_{31}	x_{32}	x_{33}	x_{34}	x_{35}	x_{36}	x_{37}	x_{38}	x_{39}	x_{40}
1024210	VM1698-4	Nm	6,68	6,61	6,60	6,62	6,64	6,67	6,68	6,65	6,62	6,68
1024210	VM1698-4	Grad	31,25	28,50	28,00	28,75	29,25	30,25	29,75	30,25	29,25	31,25

Char.No.	Char.Descr.	Unit	x_{41}	x_{42}	x_{43}	x_{44}	x_{45}	x_{46}	x_{47}	x_{48}	x_{49}	x_{50}
1024210	VM1698-4	Nm	6,64	6,62	6,67	6,62	6,63	6,66	6,64	6,64	6,67	6,63
1024210	VM1698-4	Grad	30,00	28,50	29,75	29,75	30,75	29,25	30,25	28,25	30,00	29,50

Char.No.	Char.Descr.	Unit	x_{51}	x_{52}	x_{53}	x_{54}	x_{55}	x_{56}	x_{57}	x_{58}	x_{59}	x_{60}
1024210	VM1698-4	Nm	6,67	6,64	6,67	6,70	6,67	6,64	6,72	6,69	6,69	6,73
1024210	VM1698-4	Grad	31,50	29,00	31,75	30,75	29,75	30,75	31,25	30,25	31,00	30,00

Char.No.	Char.Descr.	Unit	x_{61}	x_{62}	x_{63}	x_{64}	x_{65}	x_{66}	x_{67}	x_{68}	x_{69}	x_{70}
1024210	VM1698-4	Nm	6,73	6,68	6,72	6,68	6,69	6,69	6,66	6,68	6,68	6,68
1024210	VM1698-4	Grad	31,00	32,00	31,25	29,50	30,00	30,25	30,50	30,00	31,75	29,00

Char.No.	Char.Descr.	Unit	x_{71}	x_{72}	x_{73}	x_{74}	x_{75}	x_{76}	x_{77}	x_{78}	x_{79}	x_{80}
1024210	VM1698-4	Nm	6,66	6,70	6,66	6,68	6,71	6,70	6,68	6,71	6,65	6,66
1024210	VM1698-4	Grad	31,00	29,50	28,25	29,50	29,25	30,50	30,25	31,00	29,75	31,00

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016h	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	6,82
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	6,14
				USL	7,50
Remark	TQ 80% hard +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_{81}	x_{82}	x_{83}	x_{84}	x_{85}	x_{86}	x_{87}	x_{88}	x_{89}	x_{90}
1024210	VM1698-4	Nm	6,68	6,65	6,67	6,72	6,76	6,72	6,76	6,76	6,75	6,77
1024210	VM1698-4	Grad	30,00	30,25	31,25	32,00	29,75	31,75	30,00	30,75	33,00	30,00

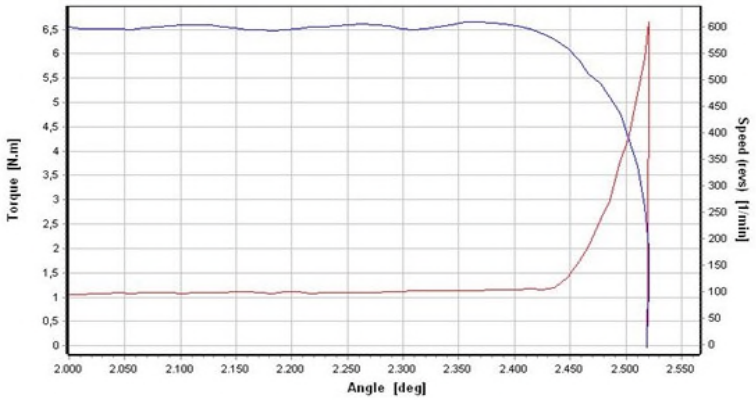
Char.No.	Char.Descr.	Unit	x_{91}	x_{92}	x_{93}	x_{94}	x_{95}	x_{96}	x_{97}	x_{98}	x_{99}	x_{100}
1024210	VM1698-4	Nm	6,74	6,72	6,73	6,74	6,76	6,73	6,76	6,73	6,74	6,74
1024210	VM1698-4	Grad	29,75	29,75	30,75	29,25	32,00	30,25	31,25	31,75	31,00	31,25

Torque graphs

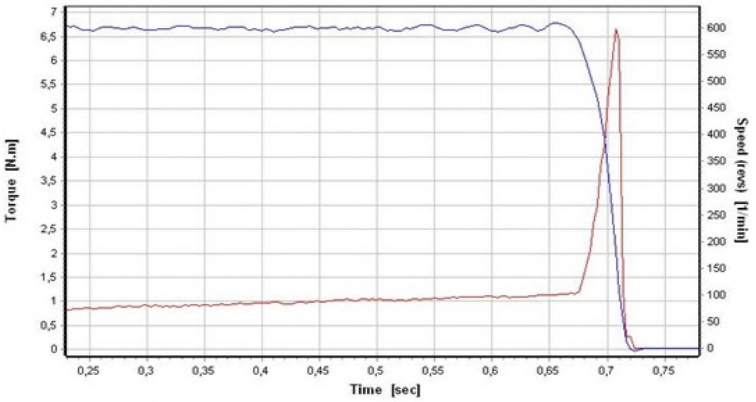
Machine Capability Study 80 %

Model: **CLBP08Q**
Serial no: **IJJ1016**

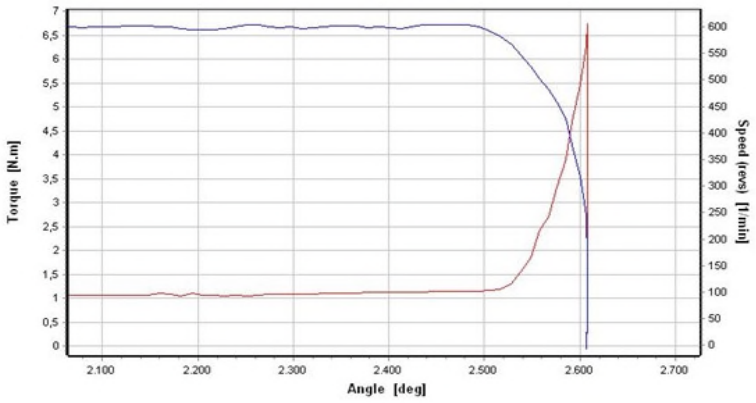
Angle degree: **30°**
Test torque: **6,8 Nm**



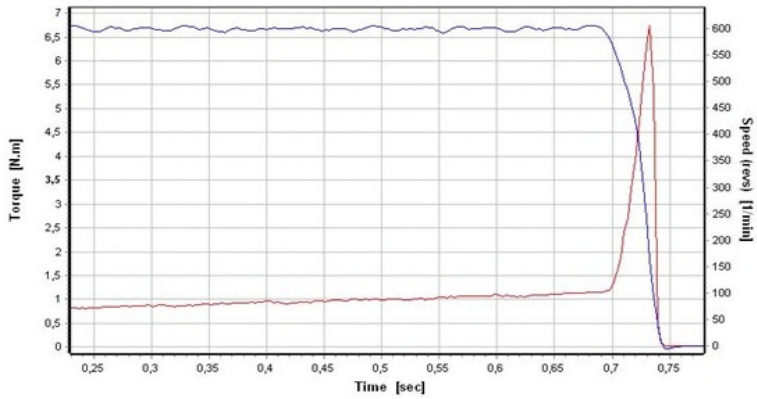
Value no. 1
Graph
Torque / Angle / Speed



Value no. 1
Graph
Torque / Time / Speed



Value no. 100
Graph
Torque / Angle / Speed



Value no. 100
Graph
Torque / Time / Speed

Machine Capability Study
Control System

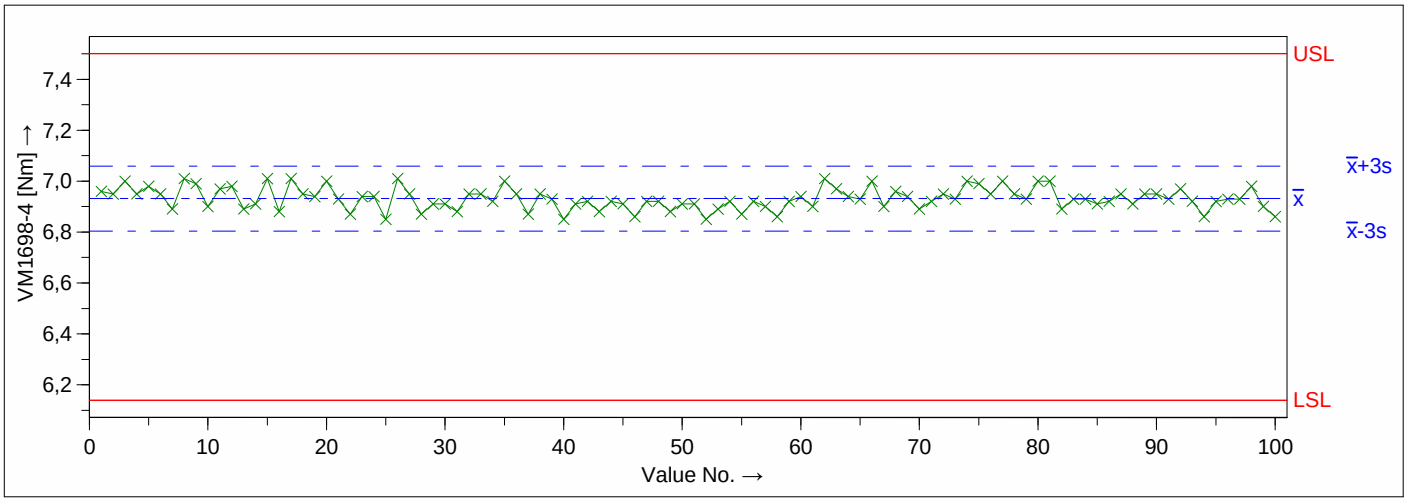
Cleco Production Tools

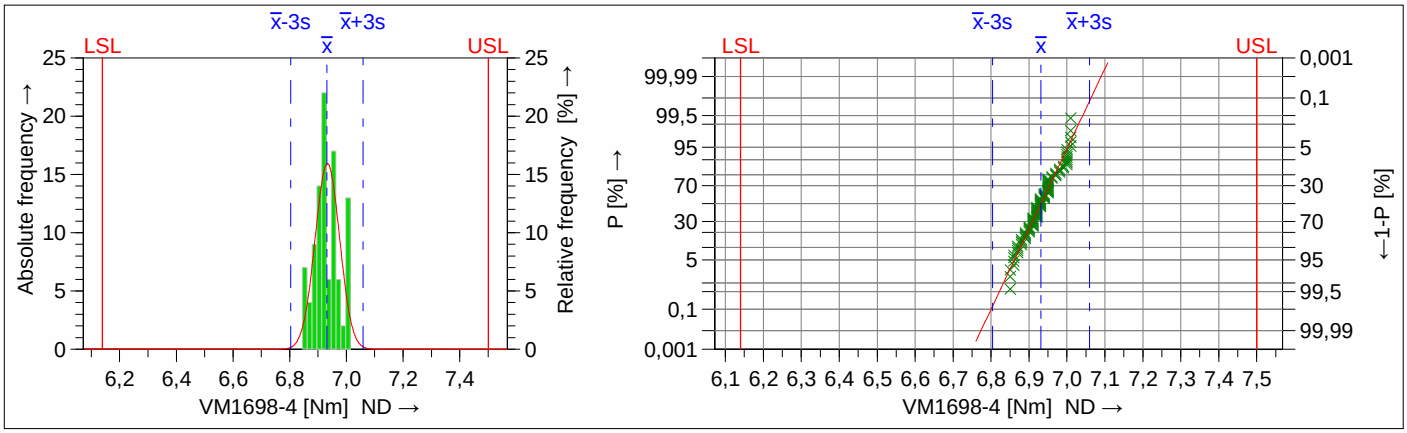
Plant	ATG Westhausen	Operator Name	Stölzle
Date	10.11.2023		

Ord. No.	CLBP08Q	Part type	CLBP08Q	Contr.item	yes
Serial No.	IJJ1016g	Char.Descr.	VM1698-4	Nom.val. 6,82 / 0,68	USL 7,50
		Serial No.	1024210	Unit Nm / -0,68	LSL 6,14
Char.Type	variable			Tolerance value 10 %	Decimal Pl. 2
Cust.Name	ATG	Reference System	VM1698-4	Test Electronic	---
Contr.No.	Homologation	Reference Transducer	10/1026388	nges.	100

Evaluation from 10.11.2023 10:02:11 to 10.11.2023 10:14:53

Rem. TQ 80% soft +/-10% * Speed: 600 rpm





Drawing Values		Collected Values		Statistics	
T_m	6.82			$\bar{x}$	6.9316
LSL	6.14	x_{min}	6.85	$\bar{x}$-3s	6.8039
USL	7.50	x_{max}	7.01	$\bar{x}$+3s	7.0593
T	1.36	R	0.16	6s	0.2554
		$n_{<T>}$	100	$p_{<T>}$	100.00000 %
		$n_{>USL}$	0	$p_{>USL}$	0.00000%
		$n_{<LSL}$	0	$p_{<LSL}$	0.00000%
		n_{eff}	100		
		n_{tot}	100		

Model distribution		Normal Distribution	
Calculation method		M1.1.4 $\hat{\sigma} = S_{tot}$	
Potential Capability index	=	C_m	5.33
Critical capability index	=	C_{mk}	4.45

The requirements were met (C_m,C_{mk})

APEX VDI/VDE 2647 V0.1

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016g	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	6,82
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	6,14
				USL	7,50
Remark	TQ 80% soft +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
1024210	VM1698-4	Nm	6,96	6,95	7,00	6,95	6,98	6,95	6,89	7,01	6,99	6,90
1024210	VM1698-4	Grad	357,75	355,75	359,50	352,25	356,00	352,00	344,75	357,50	354,75	345,25

Char.No.	Char.Descr.	Unit	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}	x_{18}	x_{19}	x_{20}
1024210	VM1698-4	Nm	6,97	6,98	6,89	6,91	7,01	6,88	7,01	6,95	6,94	7,00
1024210	VM1698-4	Grad	353,25	354,50	346,00	349,50	363,00	353,25	366,50	358,50	358,75	363,50

Char.No.	Char.Descr.	Unit	x_{21}	x_{22}	x_{23}	x_{24}	x_{25}	x_{26}	x_{27}	x_{28}	x_{29}	x_{30}
1024210	VM1698-4	Nm	6,93	6,87	6,94	6,94	6,85	7,01	6,95	6,87	6,91	6,91
1024210	VM1698-4	Grad	357,00	353,50	360,25	358,50	352,50	365,00	361,00	355,50	361,75	360,50

Char.No.	Char.Descr.	Unit	x_{31}	x_{32}	x_{33}	x_{34}	x_{35}	x_{36}	x_{37}	x_{38}	x_{39}	x_{40}
1024210	VM1698-4	Nm	6,88	6,95	6,95	6,92	7,00	6,95	6,87	6,95	6,93	6,85
1024210	VM1698-4	Grad	359,25	366,00	363,75	365,00	372,75	363,25	359,50	362,75	363,50	354,75

Char.No.	Char.Descr.	Unit	x_{41}	x_{42}	x_{43}	x_{44}	x_{45}	x_{46}	x_{47}	x_{48}	x_{49}	x_{50}
1024210	VM1698-4	Nm	6,91	6,92	6,88	6,92	6,91	6,86	6,92	6,92	6,88	6,91
1024210	VM1698-4	Grad	364,25	364,50	357,75	361,75	364,75	358,75	364,25	364,25	362,50	365,25

Char.No.	Char.Descr.	Unit	x_{51}	x_{52}	x_{53}	x_{54}	x_{55}	x_{56}	x_{57}	x_{58}	x_{59}	x_{60}
1024210	VM1698-4	Nm	6,91	6,85	6,89	6,92	6,87	6,92	6,90	6,86	6,92	6,94
1024210	VM1698-4	Grad	364,25	358,75	362,00	365,50	358,25	364,25	366,75	359,25	365,00	366,00

Char.No.	Char.Descr.	Unit	x_{61}	x_{62}	x_{63}	x_{64}	x_{65}	x_{66}	x_{67}	x_{68}	x_{69}	x_{70}
1024210	VM1698-4	Nm	6,90	7,01	6,97	6,94	6,93	7,00	6,90	6,96	6,94	6,89
1024210	VM1698-4	Grad	363,50	374,25	368,00	365,25	367,00	375,00	360,75	366,50	366,00	357,75

Char.No.	Char.Descr.	Unit	x_{71}	x_{72}	x_{73}	x_{74}	x_{75}	x_{76}	x_{77}	x_{78}	x_{79}	x_{80}
1024210	VM1698-4	Nm	6,92	6,95	6,93	7,00	6,99	6,95	7,00	6,95	6,93	7,00
1024210	VM1698-4	Grad	362,25	361,50	361,25	369,00	365,00	362,50	369,25	364,75	362,00	370,75

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016g	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	6,82
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	6,14
				USL	7,50
Remark	TQ 80% soft +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_{81}	x_{82}	x_{83}	x_{84}	x_{85}	x_{86}	x_{87}	x_{88}	x_{89}	x_{90}
1024210	VM1698-4	Nm	7,00	6,89	6,93	6,93	6,91	6,92	6,95	6,91	6,95	6,95
1024210	VM1698-4	Grad	368,50	356,50	360,00	359,00	357,75	361,00	361,25	359,00	360,25	361,75

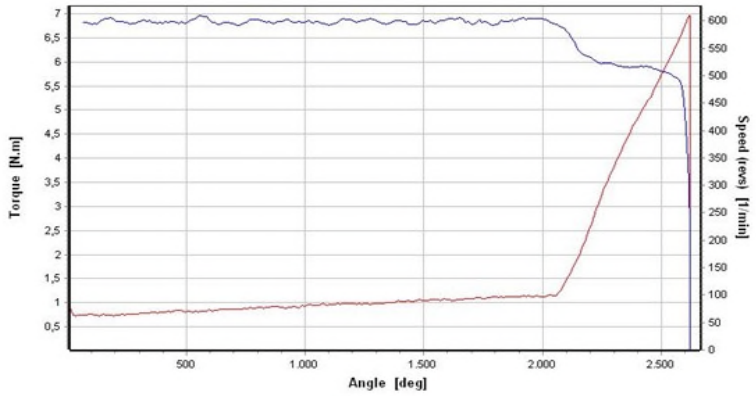
Char.No.	Char.Descr.	Unit	x_{91}	x_{92}	x_{93}	x_{94}	x_{95}	x_{96}	x_{97}	x_{98}	x_{99}	x_{100}
1024210	VM1698-4	Nm	6,93	6,97	6,92	6,86	6,92	6,93	6,93	6,98	6,90	6,86
1024210	VM1698-4	Grad	363,25	364,50	361,50	354,75	358,50	357,50	359,25	366,25	358,75	352,75

Torque graphs

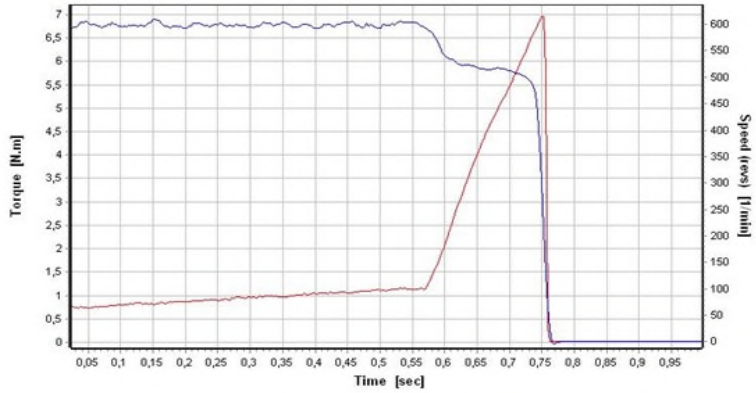
Machine Capability Study 80 %

Model: **CLBP08Q**
Serial no: **IJJ1016**

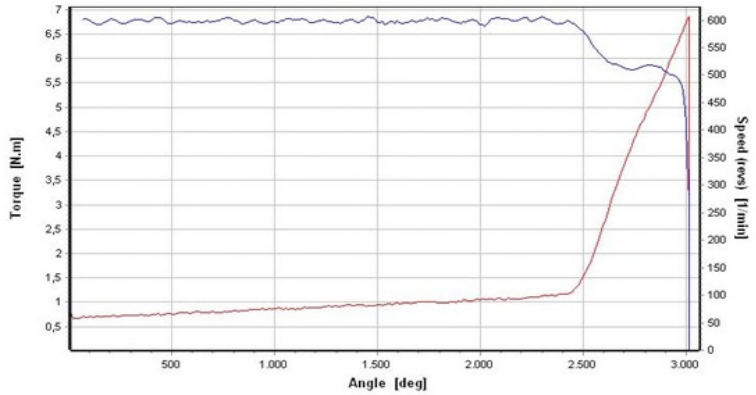
Angle degree: **360°**
Test torque: **6,8 Nm**



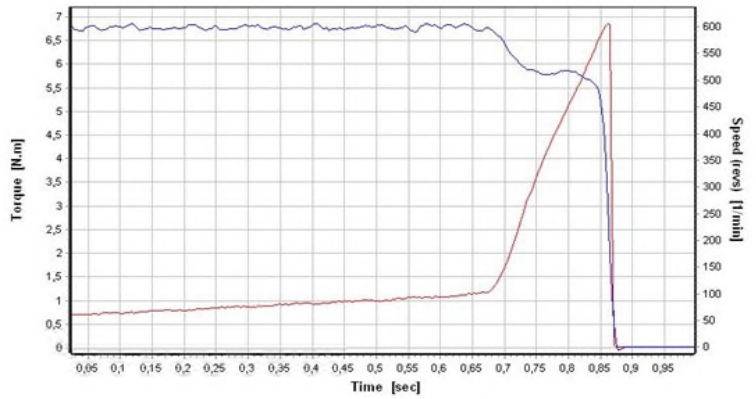
Value no. 1
Graph
Torque / Angle / Speed



Value no. 1
Graph
Torque / Time / Speed



Value no. 100
Graph
Torque / Angle / Speed



Value no. 100
Graph
Torque / Time / Speed

Test sheet no. 4

Machine Capability Study 100 %

Multi-stage tightening system	☑	Speed 600 rpm	60,9 %
Single-stage tightening system	☐	Speed 100 %	985 rpm

Manufacturer: Apex Tool Group Serial no: **IJJ1016**

Test torque: Tq max. 8,00 Nm

Hard joint (H)	46,54	Nm / Revolution	Angle degree	30°
Soft joint (L)	4,04	Nm / Revolution	Angle degree	360°

		H	L
a)	Tolerance down / up	7,20 - 8,80 Nm	7,20 - 8,80 Nm
	Tolerance down / up	10 %	10 %
	Average torque	7,76 Nm	8,09 Nm
	Standard deviation	0,03 Nm	0,06 Nm
	Torque scatter (99,73%)	0,18 Nm	0,33 Nm
	C_m	8,81	4,79
	C_{mk}	6,12	4,26

b)	Min. C_m hard/soft (lowest value)	4,79
	Min. C_{mk} hard/soft (lowest value)	4,26

Capability is reached if minimum C_{mk} value ≥1.67

Note:

Machine Capability Study
Control System

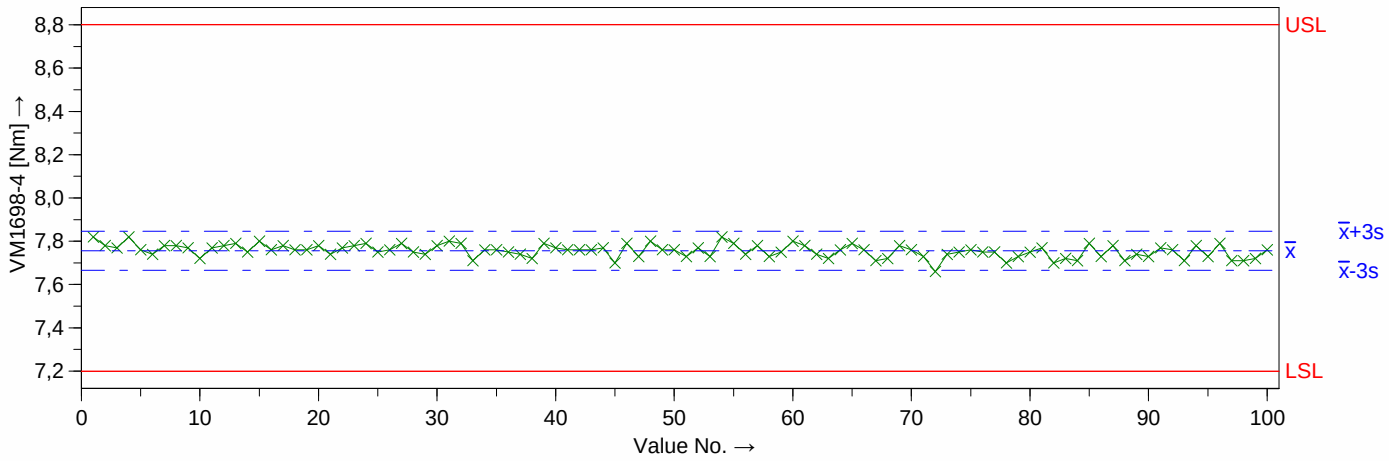
Page 1 / 1

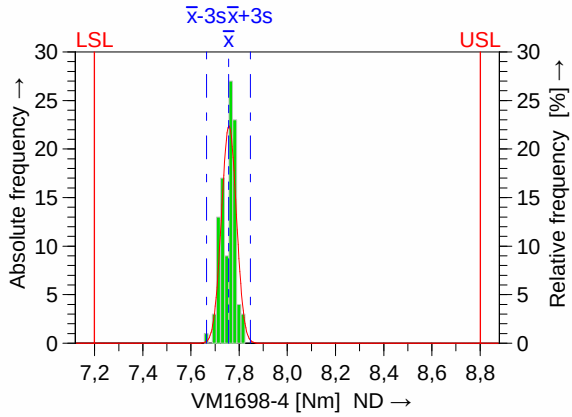
Plant	ATG Westhausen	Operator Name	Stölzle
Date	10.11.2023		

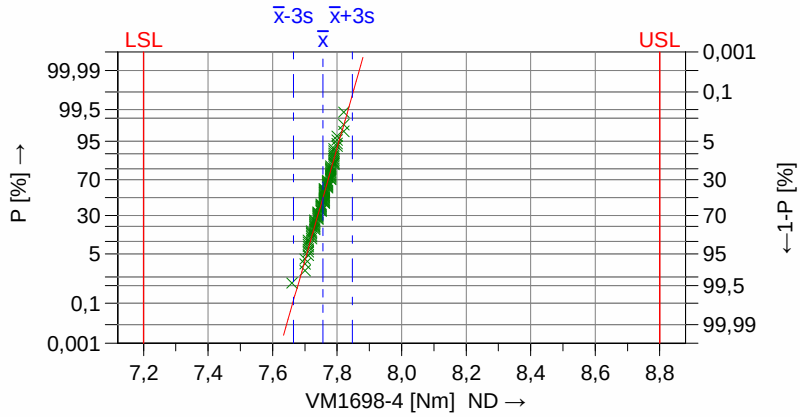
Ord. No.	CLBP08Q	Part type	CLBP08Q	Contr.item	yes
Serial No.	IJJ1016b	Char.Descr.	VM1698-4	Nom.val. 8,00 0,80	USL 8,80
		Serial No.	1024210	Unit Nm -0,80	LSL 7,20
Char.Type	variable			Tolerance value 10 %	Decimal Pl. 2
Cust.Name	ATG	Reference System	VM1698-4	Test Electronic	---
Contr.No.	Homologation	Reference Transducer	10/1026388	nges.	100

Evaluation from 10.11.2023 11:48:59 to 10.11.2023 12:01:52

Rem. TQ 100% hard +/-10% * Speed: 600 rpm







Drawing Values		Collected Values		Statistics	
T_m	8.00			$\bar{x}$	7.7560
LSL	7.20	x_{min}	7.66	$\bar{x}$-3s	7.6651
USL	8.80	x_{max}	7.82	$\bar{x}$+3s	7.8469
T	1.60	R	0.16	6s	0.1817
		$n_{<T>}$	100	$p_{<T>}$	100.00000 %
		$n_{>USL}$	0	$p_{>USL}$	0.00000%
		$n_{<LSL}$	0	$p_{<LSL}$	0.00000%
		n_{eff}	100		
		n_{tot}	100		

Model distribution		Normal Distribution	
Calculation method		M1.1.4 $\hat{\sigma} = S_{tot}$	
Potential Capability index	=	C_m	8.81
Critical capability index	=	C_{mk}	6.12

The requirements were met (C_m,C_{mk})

APEX VDI/VDE 2647 V0.1

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016b	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	8,00
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	7,20
				USL	8,80
Remark	TQ 100% hard +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
1024210	VM1698-4	Nm	7,82	7,78	7,77	7,82	7,76	7,74	7,78	7,78	7,77	7,72
1024210	VM1698-4	Grad	29,50	26,75	30,00	29,50	30,25	30,25	30,50	28,50	27,75	27,50

Char.No.	Char.Descr.	Unit	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}	x_{18}	x_{19}	x_{20}
1024210	VM1698-4	Nm	7,77	7,78	7,79	7,75	7,80	7,76	7,78	7,76	7,76	7,78
1024210	VM1698-4	Grad	28,75	28,50	30,25	30,00	28,75	30,50	30,75	30,50	30,00	28,00

Char.No.	Char.Descr.	Unit	x_{21}	x_{22}	x_{23}	x_{24}	x_{25}	x_{26}	x_{27}	x_{28}	x_{29}	x_{30}
1024210	VM1698-4	Nm	7,74	7,77	7,78	7,79	7,75	7,76	7,79	7,75	7,74	7,78
1024210	VM1698-4	Grad	30,75	28,00	27,50	30,25	27,75	29,00	28,75	27,75	30,75	31,50

Char.No.	Char.Descr.	Unit	x_{31}	x_{32}	x_{33}	x_{34}	x_{35}	x_{36}	x_{37}	x_{38}	x_{39}	x_{40}
1024210	VM1698-4	Nm	7,80	7,79	7,71	7,76	7,76	7,75	7,74	7,72	7,79	7,77
1024210	VM1698-4	Grad	31,00	28,50	29,75	30,75	30,00	31,00	30,00	30,75	29,50	29,75

Char.No.	Char.Descr.	Unit	x_{41}	x_{42}	x_{43}	x_{44}	x_{45}	x_{46}	x_{47}	x_{48}	x_{49}	x_{50}
1024210	VM1698-4	Nm	7,76	7,76	7,76	7,77	7,70	7,79	7,73	7,80	7,76	7,76
1024210	VM1698-4	Grad	30,00	28,75	29,75	29,50	30,25	29,00	30,75	30,75	30,50	31,25

Char.No.	Char.Descr.	Unit	x_{51}	x_{52}	x_{53}	x_{54}	x_{55}	x_{56}	x_{57}	x_{58}	x_{59}	x_{60}
1024210	VM1698-4	Nm	7,73	7,77	7,73	7,82	7,79	7,74	7,78	7,73	7,75	7,80
1024210	VM1698-4	Grad	30,00	29,50	30,00	31,25	28,50	29,75	30,50	29,75	28,75	32,00

Char.No.	Char.Descr.	Unit	x_{61}	x_{62}	x_{63}	x_{64}	x_{65}	x_{66}	x_{67}	x_{68}	x_{69}	x_{70}
1024210	VM1698-4	Nm	7,78	7,74	7,72	7,76	7,79	7,76	7,71	7,72	7,78	7,76
1024210	VM1698-4	Grad	31,00	30,75	30,25	28,50	31,25	31,25	31,00	29,00	32,00	29,75

Char.No.	Char.Descr.	Unit	x_{71}	x_{72}	x_{73}	x_{74}	x_{75}	x_{76}	x_{77}	x_{78}	x_{79}	x_{80}
1024210	VM1698-4	Nm	7,73	7,66	7,74	7,75	7,76	7,75	7,75	7,70	7,73	7,75
1024210	VM1698-4	Grad	31,75	31,25	30,75	28,75	31,00	31,00	29,50	29,75	31,25	29,75

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016b	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	8,00
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	7,20
				USL	8,80
Remark	TQ 100% hard +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_{81}	x_{82}	x_{83}	x_{84}	x_{85}	x_{86}	x_{87}	x_{88}	x_{89}	x_{90}
1024210	VM1698-4	Nm	7,77	7,70	7,72	7,71	7,79	7,73	7,78	7,71	7,74	7,73
1024210	VM1698-4	Grad	28,50	29,00	30,75	28,50	29,75	31,75	29,50	29,75	29,75	30,50

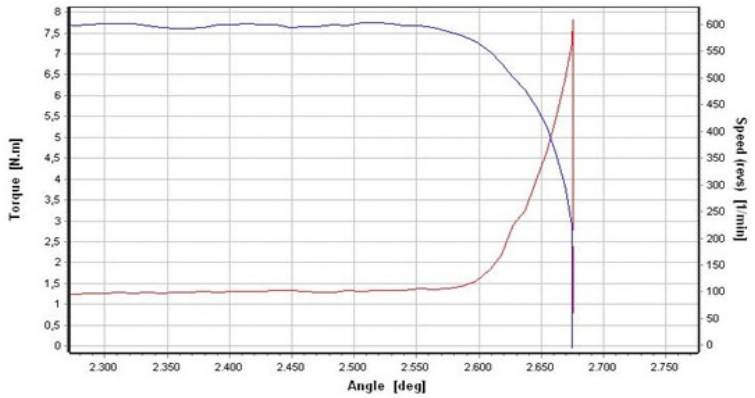
Char.No.	Char.Descr.	Unit	x_{91}	x_{92}	x_{93}	x_{94}	x_{95}	x_{96}	x_{97}	x_{98}	x_{99}	x_{100}
1024210	VM1698-4	Nm	7,77	7,76	7,71	7,78	7,73	7,79	7,71	7,71	7,72	7,76
1024210	VM1698-4	Grad	29,25	28,50	31,00	29,75	28,25	32,25	29,00	31,25	28,25	30,75

Torque graphs

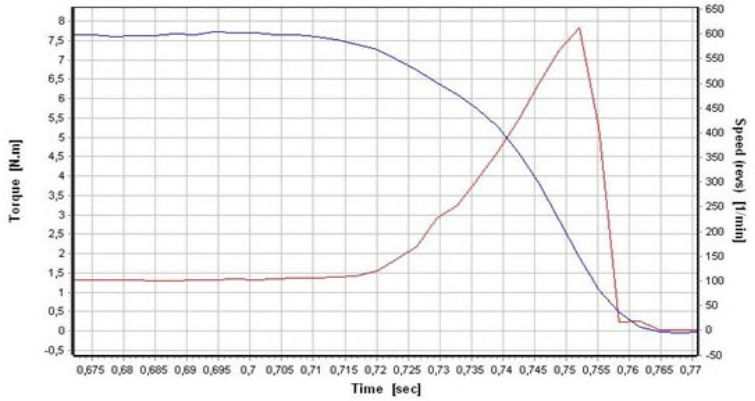
Machine Capability Study 100 %

Model: **CLBP08Q**
Serial no: **IJJ1016**

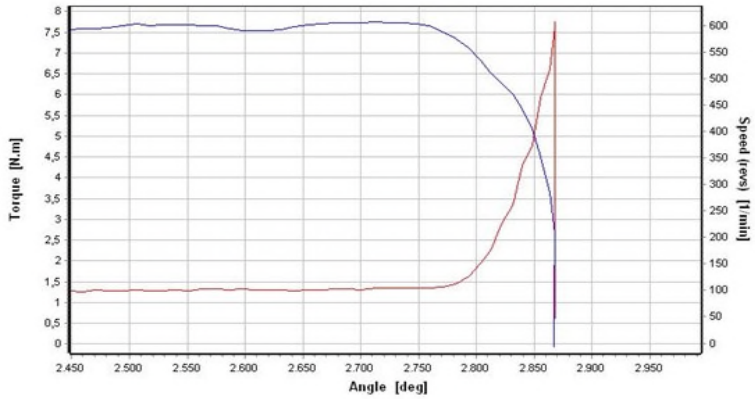
Angle degree: **30°**
Test torque: **8,0 Nm**



Value no. 1
Graph
Torque / Angle / Speed



Value no. 1
Graph
Torque / Time / Speed



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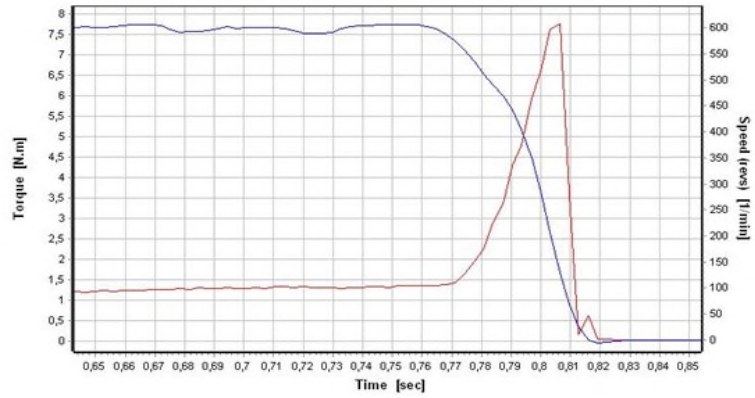
Graph
Torque / Angle / Speed



Value no. 100
Graph
Torque / Time / Speed

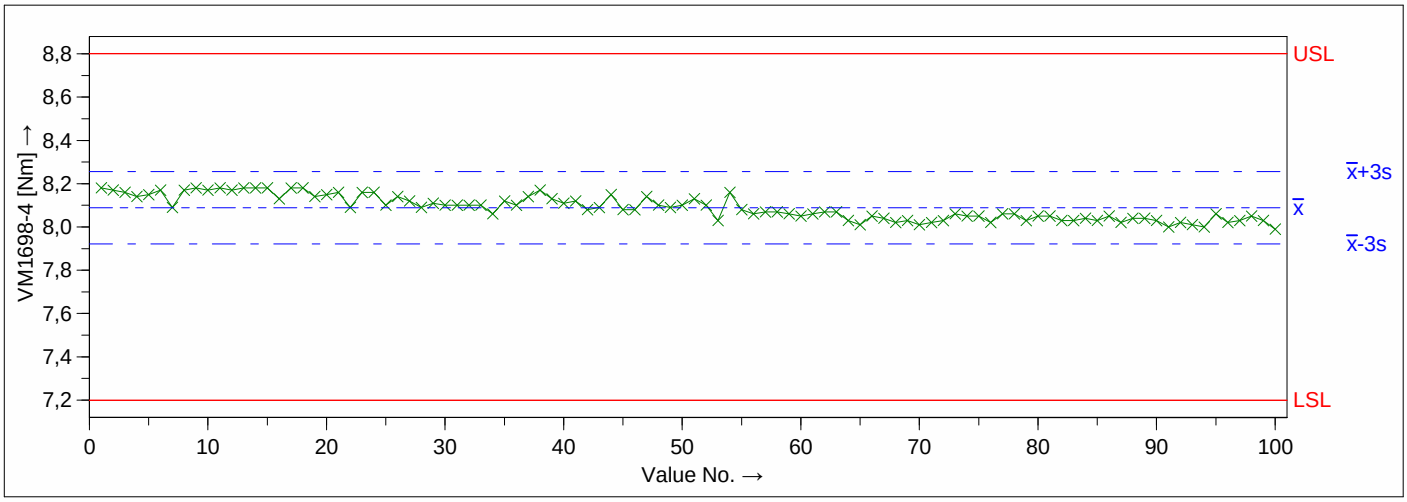
Machine Capability Study
Control System

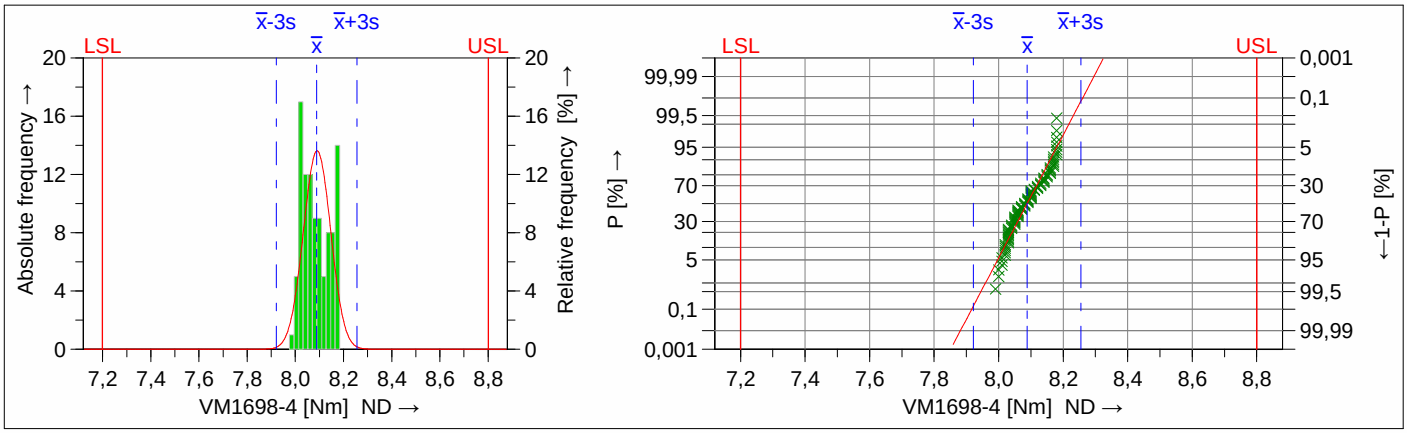
Plant	ATG Westhausen	Operator Name	Stölzle
Date	10.11.2023		

Ord. No.	CLBP08Q	Part type	CLBP08Q	Contr.item	yes
Serial No.	IJJ1016a	Char.Descr.	VM1698-4	Nom.val. 8,00 0,80	USL 8,80
		Serial No.	1024210	Unit Nm -0,80	LSL 7,20
Char.Type	variable			Tolerance value 10 %	Decimal Pl. 2
Cust.Name	ATG	Reference System	VM1698-4	Test Electronic	---
Contr.No.	Homologation	Reference Transducer	10/1026388	nges.	100

Evaluation from 10.11.2023 12:37:29 to 10.11.2023 12:50:22

Rem. TQ 100% soft +/-10% * Speed: 600 rpm





Drawing Values		Collected Values		Statistics	
T_m	8.00			$\bar{x}$	8.0884
LSL	7.20	x_{min}	7.99	$\bar{x}$-3s	7.9215
USL	8.80	x_{max}	8.18	$\bar{x}$+3s	8.2553
T	1.60	R	0.19	6s	0.3338
		$n_{<T>}$	100	$p_{<T>}$	100.00000 %
		$n_{>USL}$	0	$p_{>USL}$	0.00000%
		$n_{<LSL}$	0	$p_{<LSL}$	0.00000%
		n_{eff}	100		
		n_{tot}	100		

Model distribution			Normal Distribution
Calculation method			M1.1.4 $\hat{\sigma} = S_{tot}$
Potential Capability index	=	C_m	4.79
Critical capability index	=	C_{mk}	4.26

The requirements were met (C_m,C_{mk})

APEX VDI/VDE 2647 V0.1

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016a	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	8,00
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	7,20
				USL	8,80
Remark	TQ 100% soft +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
1024210	VM1698-4	Nm	8,18	8,17	8,16	8,14	8,15	8,17	8,09	8,17	8,18	8,17
1024210	VM1698-4	Grad	365,50	366,50	365,00	365,50	365,25	366,25	361,00	368,25	368,00	367,50

Char.No.	Char.Descr.	Unit	x_{11}	x_{12}	x_{13}	x_{14}	x_{15}	x_{16}	x_{17}	x_{18}	x_{19}	x_{20}
1024210	VM1698-4	Nm	8,18	8,17	8,18	8,18	8,18	8,13	8,18	8,18	8,14	8,15
1024210	VM1698-4	Grad	370,50	368,00	369,25	369,25	361,75	359,50	363,00	361,25	358,50	358,25

Char.No.	Char.Descr.	Unit	x_{21}	x_{22}	x_{23}	x_{24}	x_{25}	x_{26}	x_{27}	x_{28}	x_{29}	x_{30}
1024210	VM1698-4	Nm	8,16	8,09	8,16	8,16	8,10	8,14	8,12	8,09	8,11	8,10
1024210	VM1698-4	Grad	360,75	357,00	361,00	361,25	355,00	361,75	358,25	354,25	355,75	358,00

Char.No.	Char.Descr.	Unit	x_{31}	x_{32}	x_{33}	x_{34}	x_{35}	x_{36}	x_{37}	x_{38}	x_{39}	x_{40}
1024210	VM1698-4	Nm	8,10	8,10	8,10	8,06	8,12	8,10	8,14	8,17	8,13	8,11
1024210	VM1698-4	Grad	357,00	357,25	358,25	355,50	358,00	357,50	357,50	362,50	357,50	355,25

Char.No.	Char.Descr.	Unit	x_{41}	x_{42}	x_{43}	x_{44}	x_{45}	x_{46}	x_{47}	x_{48}	x_{49}	x_{50}
1024210	VM1698-4	Nm	8,12	8,08	8,09	8,15	8,08	8,08	8,14	8,10	8,09	8,10
1024210	VM1698-4	Grad	355,75	354,50	354,00	359,25	352,75	352,00	359,75	356,00	356,00	353,75

Char.No.	Char.Descr.	Unit	x_{51}	x_{52}	x_{53}	x_{54}	x_{55}	x_{56}	x_{57}	x_{58}	x_{59}	x_{60}
1024210	VM1698-4	Nm	8,13	8,10	8,03	8,16	8,08	8,06	8,07	8,07	8,06	8,05
1024210	VM1698-4	Grad	360,50	355,50	351,25	360,75	354,75	355,00	354,00	355,75	353,50	353,25

Char.No.	Char.Descr.	Unit	x_{61}	x_{62}	x_{63}	x_{64}	x_{65}	x_{66}	x_{67}	x_{68}	x_{69}	x_{70}
1024210	VM1698-4	Nm	8,06	8,07	8,07	8,03	8,01	8,05	8,04	8,02	8,03	8,01
1024210	VM1698-4	Grad	355,00	353,75	355,75	353,00	350,00	351,50	360,75	360,00	358,25	357,50

Char.No.	Char.Descr.	Unit	x_{71}	x_{72}	x_{73}	x_{74}	x_{75}	x_{76}	x_{77}	x_{78}	x_{79}	x_{80}
1024210	VM1698-4	Nm	8,02	8,03	8,06	8,05	8,05	8,02	8,06	8,06	8,03	8,05
1024210	VM1698-4	Grad	356,00	357,50	358,00	358,25	358,75	355,00	359,25	358,50	356,75	357,50

Machine Capability Study
Control System

Plant	ATG Westhausen		Operator Name	Stölzle	Date 10.11.2023

Serial No.	IJJ1016a	Characteristic			
Part type	CLBP08Q	Char.Descr.	VM1698-4	Nom.val.	8,00
Ord. No.	CLBP08Q	Serial No.	1024210	LSL	7,20
				USL	8,80
Remark	TQ 100% soft +/-10% * Speed: 600 rpm				

Char.No.	Char.Descr.	Unit	x_{81}	x_{82}	x_{83}	x_{84}	x_{85}	x_{86}	x_{87}	x_{88}	x_{89}	x_{90}
1024210	VM1698-4	Nm	8,05	8,03	8,03	8,04	8,03	8,05	8,02	8,04	8,04	8,03
1024210	VM1698-4	Grad	360,50	357,75	355,50	355,00	357,00	360,25	357,25	358,75	355,50	357,25

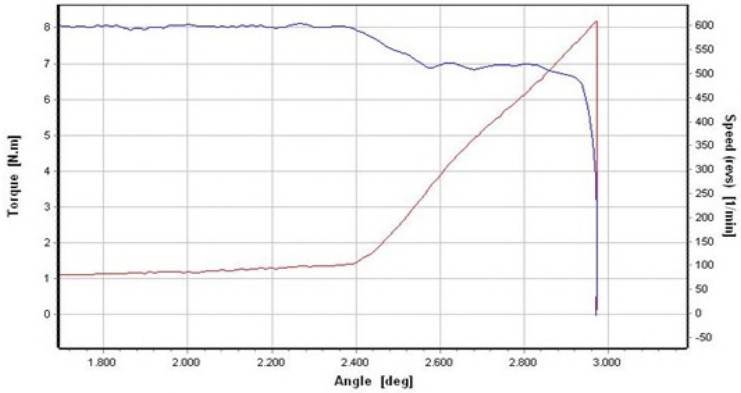
Char.No.	Char.Descr.	Unit	x_{91}	x_{92}	x_{93}	x_{94}	x_{95}	x_{96}	x_{97}	x_{98}	x_{99}	x_{100}
1024210	VM1698-4	Nm	8,00	8,02	8,01	8,00	8,06	8,02	8,03	8,05	8,03	7,99
1024210	VM1698-4	Grad	354,00	356,50	354,25	353,75	358,75	355,00	356,50	359,00	357,50	353,75

Torque graphs

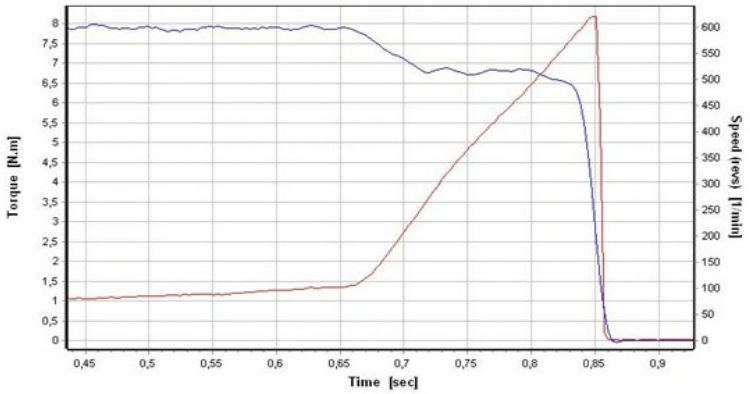
Machine Capability Study 100 %

Model: **CLBP08Q**
Serial no: **IJJ1016**

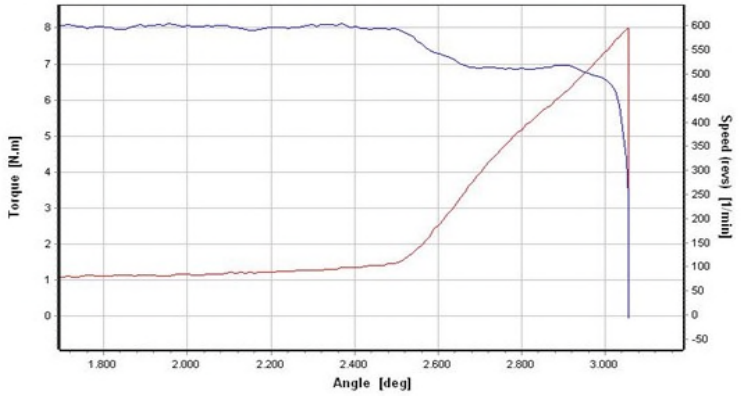
Angle degree: **360°**
Test torque: **8,0 Nm**



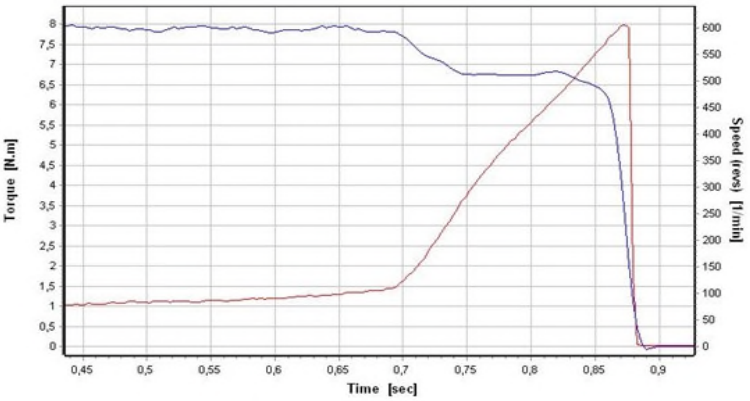
Value no. 1
Graph
Torque / Angle / Speed



Value no. 1
Graph
Torque / Time / Speed



Value no. 100
Graph
Torque / Angle / Speed



Value no. 100
Graph
Torque / Time / Speed