



## OF - Documents

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**Books  
Literature  
Additives**

## Documentation

The OF Documents describe the inspection technology of splines and gears as they are often not found in national or international standards. The documents show and explain more detailed information's and new knowledge. All OF documents expand existing and old standards, some definitions even contradict old standards and overcome habits.

FRENCO participates national and international standard committees and endeavours to include all new knowledges into valid standards. Meanwhile, a number of it has been transferred into new standart editions. Due to prolonged discussions in standard committees, these additions and changes will be made with considerable delay. The necessity of starting work to the ISO 9000 series has a high need of new regulations without waiting for years until new editions of old spline and gear standards. The OF Documents have been structured into 4 different groups:

<b>OFL Literature:</b>	<b>Easy understanding explanations of known knowledge</b>
<b>OFS Descriptions:</b>	<b>Explanations of technical correlations</b>
<b>OFD Definitions:</b>	<b>Definitions of not general proven correlations</b>
<b>Books</b>	

## FRENCO books


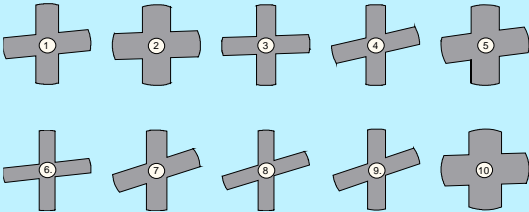
<b>Volume 1</b>	<p><b>Splines</b></p> <p><b>Quality assurance</b></p> <p>154 pages € 142.- <i>item no. KD-0101</i></p>	<ol style="list-style-type: none"> <li>1. Gears and splines (former OFL 01)</li> <li>2. Quality assurance of splines overview (former OFS 10)</li> <li>3. Inspection of splines with measuring machines (former OFD 13)</li> <li>4. Control of manufacturing process (former OFS 01)</li> <li>5. Actual and effective inspection methods (former OFS 04)</li> <li>6. Actual and effective inspection instruments (former OFS 05)</li> <li>7. Effective fit clearance (former OFS 03)</li> <li>8. Effective backlash tolerance limit (former OFS 18)</li> <li>9. One flank taper masters (former OFD 03)</li> <li>10. Helical Splines (former OFS 14)</li> </ol>
<b>Volume 2</b>	<p><b>Splines</b></p> <p><b>The position of the spline axis</b></p> <p>106 pages € 97.- <i>item no. KD-0102</i></p>	<ol style="list-style-type: none"> <li>1. Tolerances of location (former OFD 01 and OFS 06)</li> <li>2. Clamping systems for splines (former HWS-T)</li> <li>3. Variation of angularities (former OFD 04)</li> </ol>
<b>Volume 3</b>	<p><b>Splines</b></p> <p><b>Standards and Calculation</b></p> <p>122 pages € 111.- <i>item no. KD-0103</i></p>	<ol style="list-style-type: none"> <li>1. List of standards (former OFS 24)</li> <li>2. Summary of spline standards (former OFS 13)</li> <li>3. Explanation of spline standards (former OFL 03)</li> <li>4. Spline design without use of standards (former OFL 02)</li> </ol>
<b>Volume 4</b>	<p><b>Gears*</b></p> <p><b>Quality assurance</b></p> <p>178 pages € 163.- <i>item no. KD-0104</i></p>	<ol style="list-style-type: none"> <li>1. Gear train (former OFS 19)</li> <li>2. Dimensions and tolerances (former OFS 20)</li> <li>3. The evolvent (former OFS 17)</li> <li>4. History of gear measurment (OFS 2)</li> <li>5. Rolling Inspection (OFS 09)</li> <li>6. Inspection of individual deviation (OFS 11)</li> <li>7. Deviation analysis (former OFS 12)</li> <li>8. Different measurment methods – different results (OFD 12)</li> </ol>

\*These documents are not translated to English language till now. If they are ordered, it may take some time until delivery.

## OFL literature

nr.	subject	title	pages	version	price
OFL 01	Involute splines	<b>Quality assurance</b> also in Frenco book vol. 1	20	08/05 color	16,-
OFL 02	Splines	<b>Spline design without use of standards</b> also in FRENCO Book Volume 3	28	06/96 color	21.-
OFL 03*	Splines	<b>Explanation of spline standards</b> also in Frenco book vol. 3	70		19,-
OFL 04*	Splines and Gears	<b>Gears and splines</b> not available			
OFL 05	Involute Splines	<b>Inspection Rules for metrology instruments</b> <ol style="list-style-type: none"> <li>1. Statistical toleranz limit STA</li> <li>2. Spline gages</li> <li>3. Spline gage ring with one flank master plug gage</li> <li>4. Profiled setting master</li> <li>5. Master gears</li> <li>6. One flank taper arbor</li> <li>7. Variable 3-disc indicating gage</li> <li>8. Runout inspection</li> </ol>	68	01/02 color	55,-
OFL 06	Gears and Splines	<b>Formulas inspection dimensions</b> also in Frenco book vol. 3	12	02/02 color	10,-
OFL 07	Splines	<b>USA Standard ANSI B 92.1 - 1970</b> soft metric version	154	1970	198,-
OFL 07-1	Splines	<b>USA Standard ANSI B 92.1</b> Changes in 1996 edition	8	1997	-
OFL 08	Splines	<b>USA Standard ANSI B 92.2 M</b>	254	1989	198.-

## OFL literature

nr.	subject	title	pages	version	price
OFL 09-2	Splines	<b>USA Standard ANSI B 92.2 M</b> part 3 in German language	27	10/94	26.- b/w
OFL 10	Recommendations	<b>Withdrawn</b> Has been transferred into new standard editions 2005		color	42.-
OFL 11	Splines and Gears	<b>Dictionary</b> German-English English-German	52	02/04	143.-
OFL 12	Splines and Gears	<b>Dictionary</b> German-English-Italian	28	10/02	8.-
OFL 13	Involute Serrations	<b>JIS B 1602 - 1961</b> Japanese Standard	22	1961	125.-
OFL 14	Involute Splines	<b>JIS D 2001 – 1959</b> Japanese Standard	40	1959	260.-
OFL 15*	Metrology of gears and splines	<b>FRENCO-pedia</b> Encyclopedia of metrology	16	2004	9.-
OFL 16*	Splines	<b>Manual for Technicians</b> For work shops	230	2004 color	156,-
OFL 17	Splines	<b>Effity</b> <b>Game to learn splines in the tolerance chart</b> 10 sample parts and 6 measuring instruments and colored manual		2005 color	469.-
					
					
OFL 17-1	Splines	<b>Effity</b> Spare colored manuals	36	2005	47.-

## OFS Prescriptions

nr.	subject	title	pages	version	price
OFS 01	Splines	<b>Control of manufacturing process</b> Also in Frenco book volume 1	28		21.-
OFS 02*	Cylindrical gear	<b>History of gear artifacts</b> Also in Frenco book volume 4			
OFS 03	Splines	<b>Effective fit clearance</b> Also in Frenco book volume 1	12		10.-
OFS 04	Splines	<b>Actual and effective inspection methods</b> Also in Frenco book volume 1	16		13.-
OFS 05	Splines	Actual and effective inspection instruments Also in Frenco book volume 1	16		13.-
OFS 06	Inspection	<b>Methods of determining the axis of spline and gear</b> Also in Frenco book volume 1	20	04/99	16,-
OFS 08*		<b>Correction of cold forming tools</b>			
OFS 09*	Gears	<b>Gear rolling inspection</b> Also in Frenco book volume 4	16	03/97	9.-
OFS 10	Gears and splines	<b>Quality assurance of gears and splines</b> Also in Frenco book volume 1	4		3.-
OFS 11	Gears and splines	<b>Analytical inspection</b> Also in Frenco book volume 4	60	02/02	32,-
OFS 12	Gears and splines	<b>Deviation analysis</b> Also in Frenco book volume 4	20	05/00 color	11.-
OFS 13	Splines	<b>Summary of spline standards</b> Also in Frenco book volume 3			
OFS 14	Splines	<b>Helical splines</b> Also in Frenco book volume 1			
OFS 15	Gears and splines	<b>Various types of gears and splines</b>	8	07/00	5.-
OFS 17*	Gears and splines	<b>The involute, simple explanation</b> Also in Frenco book volume 4	20	04/00	11.-
OFS 18	Splines	<b>Effective backlash tolerance limit</b> Also in Frenco book volume 1			
OFS 19*	Gears	<b>Mating gears, rolling condition, revolutions, center distance, profile shift</b> Also in Frenco book volume 4	12	04/00	7.-
OFS 20*	Gears	<b>Deviation of size, tolerances, ranges of quality</b> Also in Frenco book volume 4	8	04/00	5.-
OFS 21*	Gears	<b>One flank gear rolling topography</b> <b>Withdrawn</b>			
OFS 23*	Gears and splines	<b>Production methods</b>	20	01/06	6,-
OFS 24*	Splines	<b>Listing of standards</b> Also in Frenco book volume 3			
OFS 25*	Splines	<b>The position of the spline axis</b> Also in Frenco book volume 2	80	May 2005	42.-
OFS 26*	Splines	<b>Inspection of splines</b> Also in Frenco book volume 1			16.-
OFS 27*	Master Gears	<b>Design of master gears</b> New modern design	20	11/04	16.-
OFS 28*	Splines	<b>Splines with serrations</b> Calculation	40	03/09	
OFS 29*	Gears	<b>Quality assurance</b> Reading of semicolon-analysis	24	03/09	

## OFD Definitions

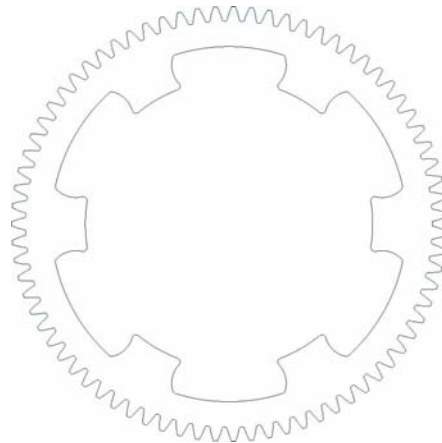
nr.	subject	title	pages	version	price
OFD 01	Splines	<b>Spline tolerances of location</b> Also in Frenco book volume 2	32	01/97 color	25.-
OFD 02*	Order conditions of spline gages	<b>Withdrawn</b> Also in Frenco brochure HPL			
OFD 03	Spline gages	<b>One flank taper masters</b> Also in Frenco book volume 1	12	04/94 color	10.-
OFD 04	Splines	<b>Spline variations of angularity</b> Also in Frenco book volume 2	16	02/98 color	13.-
OFD 05	Instruments VM	<b>Repeatability and reproducibility of Frenco measuring systems VM</b> Also in UPM certificate	4	08/98	3.-
OFD 06	Statistical tolerance limit STA	<b>Withdrawn</b> Has been transered to standards ISO 4156-2005 and DIN 5480-2005			
OFD 07*	Splines	<b>Total toleration of splines</b> <b>Withdrawn</b> , finally			
OFD 08	Tolerance limits STA	<b>Withdrawn</b> , finally			
OFD 09*	Terminology	<b>Deviations of gears and splines German – English, abbreviations</b> <b>Withdrawn</b> , finally			
OFD 10	Gear and spline high precision	<b>Acceptance or rejection of gauges and masters with regard to the tolerance limits of size and form variations</b>	24	05/02 color	13.-
OFD 11	Tolerance limits	<b>Acceptance or rejection of specimen with regard to tolerance limits (ISO 14253)</b>	12	05/02 color	7.-
OFD 12*	The dimension tooth thickness	<b>Various measuring methods</b>	24	11/00	13.-
OFD 13	Splines	<b>Inspection of splines by the use of inspection machines</b> Also in Frenco book volume 1			

The prices are net prices in EUR, ex works.

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# Additives

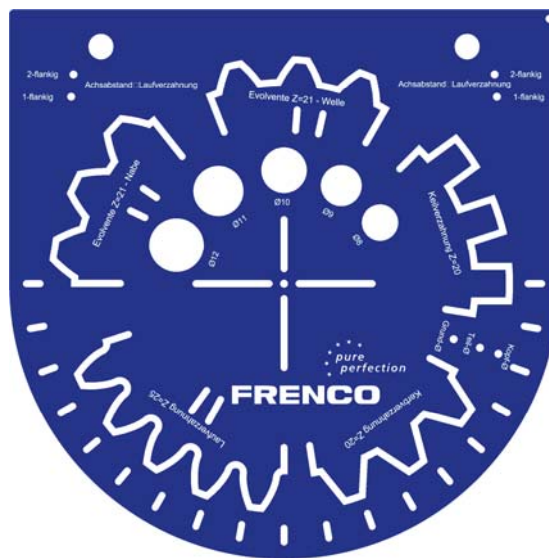
## Spline-files DXF and ISO



C51794.iso

N640	X6.366	Y0.307	I4.779	J3.144
N650	G03	X6.361	Y0.298	I6.371
N660	G02	X6.367	Y0.0	I0.0
N670	X6.361	Y-0.298	I0.0	J0.0
N680	G03	X6.366	Y-0.307	I6.371
N690	G02	X6.712	Y-0.531	I4.779
N700	X6.948	Y-0.721	I4.445	J-3.595
N710	X7.165	Y-0.924	I4.165	J-3.916
N720	X7.135	Y-1.133	I7.072	J-1.017
N730	X6.87	Y-1.266	I5.1	J2.584
N740	X6.589	Y-1.382	I5.278	J2.197
N750	X6.194	Y-1.498	I5.471	J1.67
N760	G03	X6.187	Y-1.506	I6.197
N770	G02	X6.11	Y-1.794	I0.0
N780	X6.019	Y-2.078	I0.0	J0.0
N790	G03	X6.021	Y-2.088	I6.028
N800	G02	X6.29	Y-2.4	I3.7
N810	X6.463	Y-2.649	I3.252	J-4.701
N820	X6.615	Y-2.905	I2.893	J-4.931
N830	X6.527	Y-3.097	I6.499	J-2.968
N840	X6.235	Y-3.15	I5.621	J1.043
N850	X5.933	Y-3.182	I5.683	J0.621
N860	X5.521	Y-3.183	I5.72	J0.061
N870	G03	X5.512	Y-3.188	I5.521
N880	G02	X5.357	Y-3.443	I0.0
N890	X5.19	Y-3.69	I0.0	J0.0
N900	G03	X5.189	Y-3.7	I5.198
N910	G02	X5.359	Y-4.075	I2.321
N920	X5.455	Y-4.363	I1.796	J-5.427
N930	X5.528	Y-4.651	I1.387	J-5.546
N940	X5.39	Y-4.81	I5.399	J-4.679
N950	X5.095	Y-4.779	I5.687	J-0.583
N960	X4.796	Y-4.725	I5.628	J-1.005

## Spline-Template



## Poster of quality features and tooth flank modifications

Qualitätsmerkmale von Verzahnungen			Zahnflankenmodifikationen		
<b>Zahnfläche</b> Die Zahnfläche ist als Linie des Freidrahtes zwischen zwei Zahnflanken eines Zahnes ein Teilchen im Netzwerk.		<b>Zahnflächenbearbeitung</b> Die Zahnflächenbearbeitung ergibt sich aus der Überlagerung der Zahnflächen der beiden Zahnräder.	<b>C</b> Kugelform		Zahn
<b>Profil</b> Die Konturform des Profils, wenn man sich nur auf die Endform bezieht und hinsichtlich der Lage und der Form der Endform eine gewisse mittlere Konturform.		<b>Profil</b> <b>Winkelbearbeitung</b> F <b>Profil</b> <b>Formbearbeitung</b> F	<b>C</b> Profil Winkelmodifikation		
<b>Flankfläche</b> Die Konturform der Flankfläche, wenn man sich auf die mittlere und hinsichtlich der Lage und der Form einer Zahnfläche eine gewisse mittlere Flankfläche bezieht.		<b>Flankflächen</b> <b>Winkelbearbeitung</b> F <b>Flankflächen</b> <b>Formbearbeitung</b> F <b>Flankflächen</b> <b>Gesamtbearbeitung</b> F	<b>C</b> Flankflächen-Einklinker (Stufe 1) <b>C</b> Flankflächen-Einklinker (Stufe 2)		Flankfläche
<b>Teilung</b> Die Konturform der Teilung, wenn man sich auf die Mitte der Zahnfläche bezieht und hinsichtlich der Lage und der Form einer Zahnfläche eine gewisse mittlere Teilung bezieht.		<b>Teilung</b> <b>Gesamtbearbeitung</b> F <b>Teilung</b> <b>Gesamtbearbeitung</b> F	<b>C</b> Flankflächen-Winkelmodifikation <b>C</b> Flankflächen-Balgen		
<b>Rundlauf</b> Die Rundlauf bearbeitung des Zahnes, wenn man sich auf die Zahnfläche bezieht.		<b>Rundlauf</b> <b>Gesamtbearbeitung</b> F	<b>C</b> Diagonaleinklinker (am Kopf) <b>C</b> Diagonaleinklinker (am Fuß) <b>S</b> Profilwinkelbearbeitung <b>S</b> Flankflächenbearbeitung		Profil (am Kopf, Flankfläche, am Fuß)

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# FRENCO Product Lines



## Gear and spline high precision

Spline gages  
Master gears, master wheels  
Artefacts, masters  
Profiled tools  
Clamping systems  
Gear and spline manufacturing



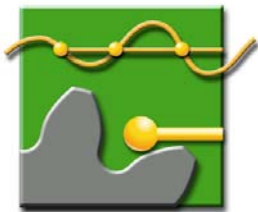
## Instruments for size inspection series V

Ball inserts and pins VRK  
Instruments for rocking VA  
Instruments with face stop VP  
Indicating Gages VM  
Variable 3-disc gages VD  
Customized solutions VS



## Rotation measuring systems

URM - K with balls and pins  
URM - R with master wheels  
EWP Single flank gear rolling  
WS Gear rollscan  
ZWP Double flank gear rolling



## Gear and spline inspection

DKD gear calibration  
Gage wear inspection  
Part inspections  
Deviation analysis



## Know-how transfer

Software for gear and spline calculating  
Training, seminars and workshops  
Consulting and calculations  
Literature and documents  
National and international standards

*pure  
perfection*

**FRENCO**

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**gear + spline technology**

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