



**CAST NYLON LAURAMID®**

**PACKAGING &  
FOOD INDUSTRY**



# CAST NYLON LAURAMID®

## The superior PA 12C

Handtmann Elteka is your expert for machine components made of high-performance cast nylon. We have established ourselves as the worldwide leading producer of Polyamide 12 C: The pressureless cast Lauramid®.

Latest production processes and the know-how of experienced technicians and engineers guarantee individual and customized machine components for you.

Lauramid® has successfully been employed in the packaging and food industries in a wide variety of applications. Well-known customers worldwide rely on our cast solutions for components.

**Rely on Lauramid® components of Handtmann Elteka, too!**

### Your benefits

- Extremely good reproduction of the outer outlines by non-pressurized casting process of the low-viscosity molten mass
- No material strains due to direct and non-pressurized polymerization in the cast mould
- Cavity-free material with high mechanical load tolerance as result of the crystallization
- Continuous quality control provides functionality and reliability of all components

### Application example:

#### Cam discs for clipping machine

#### Requirements

- Resistance to chemicals
- Lubricant-free operation
- High abrasion resistance even in dry running

#### Solution

- Lauramid® B

#### Customer Benefits

- Due to dry running food cannot contaminate
- Lighter than steel (factor 7), thus lower mass moment of inertia
- Noise reduction compared to steel on steel contact
- Sharply lower production costs compared to V2A
- Dimensional stability despite of high dimensions and extremely asymmetric mechanical machining





# CAST NYLON LAURAMID®

## for components in packaging and food sector

Packaging and clipping machines have to run 24/7 - there's no room left for abrasion or malfunction. To ensure the productivity of these machines Lauramid® is a compelling solution. Long life circles reduce the cost of maintenance and downtimes and provide for the stable function of the machines. Furthermore the good mechanical and tribological characteristics of Lauramid® enables even dry running. So there's no danger of contamination for products in the food section.

### Application example: Cam disk for sealing machine

#### Requirements

- Extreme abrasion resistance
- Dimensional stability
- High loading capacity
- No lubrication

#### Solution

- Lauramid® B

#### Customer Benefits

- Highly cost-effective due to extremely long lifetime
- Stress peaks at the dead centers can be avoided thanks to the material elasticity
- Noise reduction
- Lubricant-free application possible



### Application example: Drive sprocket for packaging machines

#### Requirements

- Lubrication not permitted due to food industry regulations
- Corrosion and chemical resistance
- Abrasion resistant to steel in dry running
- High operating speeds

#### Solution

- Lauramid® A stainless steel hub (V2A)

#### Customer Benefits

- No risk of contamination of food due to dry running
- One single drive sprocket for two different chain circuits
- Stainless steel hub as a shaft-to-hub connection as an economic solution





# CAST NYLON LAURAMID®

## Engineering at Handtmann Elteka

Decades of experience in the application of PA 12 Lauramid® make it possible for us to provide detailed answers to your questions.

In order to consistently further develop our specific Lauramid® knowledge, we conduct numerous benchmark trials and initiate research projects at Technical Universities.

The results are special calculation programs such as the dimensional analysis of rollers, gear wheels and material developments for new application fields.

Taking the application conditions into consideration, we optimize all relevant features of your components for you, such as

- Roll resistance
- Gear wheel geometry
- Temperature development
- Composite construction
- Wall thickness

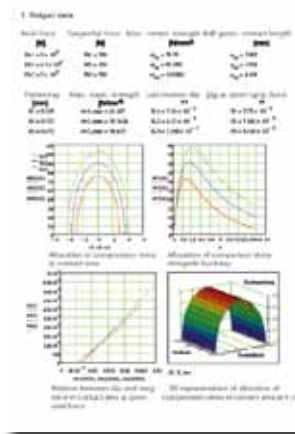
### Consultation, Design, Production and Quality Control

A matter still worthy of mention: Quality assurance plays a major role at Handtmann Eleka. Amongst other things, we utilize

- Raw material checks for compliance with our quality requirements
- X-raying of all raw parts
- Contourographs for manufactured components
- 5-axis-coordinates measurements for complex components

### Benefit from perfect components, benefit from our experience and passion!

→ In-house calculation programs were developed for the optimum calculation of components such as rollers and gear wheels



**handtmann**  
*Meas for the future.*

**Confirmation of load bearing for Lauramid cam rollers**

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**Cam rollers:**  
 roller (mm): D1 = 200 Width of roller (mm): L1 = 30  
 inner: d1 = E-modulus (N/mm<sup>2</sup>): E1 = 2250  
 v1 = 0,42 type of bearing: 608 - 2x  
 steel hub ball bearing (mm): d1 = 100

roller surface: steel E-modulus (N/mm<sup>2</sup>): E2 = 2,1x10<sup>5</sup>  
 width of trackway: L2 = 50  
 trackway (mm): R2 = 100 Friction factor: 0,31  
 roughness (Ra): 10 Joints/welded seams: none

span (h): 10.000  
 operation (C): 35  
 force (N): Fz1 = 10000  
 roller force (N): Fz1 = 200  
 rail speed (rpm): U1 = 167  
 key of switch on (%) w1 = 15

force (N): Fz2 = 15000  
 roller force (N): Fz2 = 300  
 rail speed (rpm): U2 = 167  
 key of switch on (%) w2 = 15

# LAURAMID® MATERIAL PROPERTIES

	Test procedure	Units/data	Lauramid® A / Lauramid® FS with metal composite	Lauramid® B / Lauramid® FS without metal composite
<b>General properties</b>				
Density	DIN EN ISO 1183	kg/dm <sup>3</sup>	1.025	1.025
Relative solution viscosity	DIN 53737	rel.	inseparable	inseparable
Water absorption (%) with standard climate	DIN EN ISO 62		0.9	0.9
Water absorption (%) with water storage	DIN EN ISO 62	23 °C/saturated	1.4	1.4
Extract content (ethanol)	Company standard	%	max. 1	max. 1
Melting point	DIN EN 3146	°C	183	190
<b>Mechanical properties</b>				
Ball impression hardness	DIN EN ISO 2039-1	H358	117	122
Shore hardness D	DIN EN ISO 868		76	76
Compressive strength	DIN EN ISO 604	Mpa	54 - 58	54 - 58
Modulus of elasticity (pressure)	DIN EN ISO 604	Mpa	1,400 - 1,800	1,600 - 2,000
Yield stress	DIN EN ISO 527	Mpa	51 - 58	65 - 62
Breaking strength	DIN EN ISO 527	Mpa	30 - 40	37 - 50
Modulus of elasticity (tensile)	DIN EN ISO 527	Mpa	1,800 - 2,000	2,000 - 2,400
Elongation for yield stress	DIN EN ISO 527	%	9 - 13	7 - 11
Elongation for breakage	DIN EN ISO 527	%	>200	15 - 22
Modulus of elasticity (flexion)	DIN EN ISO 178	Mpa	1,550 - 1,900	1,850 - 2,200
Flexural stress with conventional flexion	DIN EN ISO 178	Mpa	57 - 64	64 - 70
Notch resistance (Charpy) +23 °C	DIN EN ISO 179	KJ/m <sup>2</sup>	15 - 28	5 - 12
-30 °C			8 - 18	4 - 9
Coefficient of sliding friction		Lauramid®/metal	0.3	0.3
<b>Electrical properties</b>				
Surface resistance	DIN IEC 93	Ω	6.6 · 10 <sup>15</sup>	6.6 · 10 <sup>15</sup>
Spec. contact resistance	DIN IEC 93	Ω cm	3 · 10 <sup>14</sup>	3 · 10 <sup>14</sup>
Dielectric constant	DIN IEC 250		3.5	3.5
Dissipation factor	DIN IEC 250		3.8 · 10 <sup>-4</sup>	3.8 · 10 <sup>-4</sup>
Tracking Resistance KB	DIN EN 60112	CTI A	550	550
Tracking Resistance KC			600	600
Dielectric strength	IEC 243-1	kV / mm	24.4	24.4
<b>Thermal properties</b>				
Lin. expansion coefficient -50 - (-30) °C	DIN 53752	10 <sup>-4</sup> /°C	0.8 - 1.0	0.8 - 1.0
+30 - (+80) °C	DIN 53752	10 <sup>-4</sup> /°C	1.0 - 1.8	1.0 - 1.8
Application temperature max. short-term		°C	to 150	to 150
Continuous service temperature (< 10 <sup>4</sup> h)	IEC 60216-1 in oil		140	140
	IEC 60216-1 in water	°C	90	90
	IEC 60216-1 in air		120	120
Vicat	DIN EN ISO 306/B	°C	172 - 180	185 - 191
Thermal resistance	DIN EN ISO 75/A	°C	80 - 115	176 - 190
	DIN EN ISO 75/B	°C	186	194
Specific heat	DIN EN ISO 11357	kJ/kgK	2.4	2.4
Coefficient of thermal conductivity	DIN EN 52612	W/mk	0.27	0.27
Brittleness in cold		°C	-50	-50
Flammability	UL 94		≥10 mm V0 ≥6 mm HB	≥10 mm V0 ≥6 mm HB

Lauramid® A = Lauramid® with metal composite (LMV), Lauramid® B = Lauramid® without metal composite, Lauramid® FS = Food-safe Lauramid® with and without metal composite

# HANDTMANN ELTEKA

Individual machine components in the packaging sector



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