



CAST NYLON PA 12C LAURAMID®

MOVING CONSTRUCTION IDEAS!



LAURAMID® MOVES!

PA 12C kick-starts engineering applications

Why is Lauramid® an ideal material for moving applications?

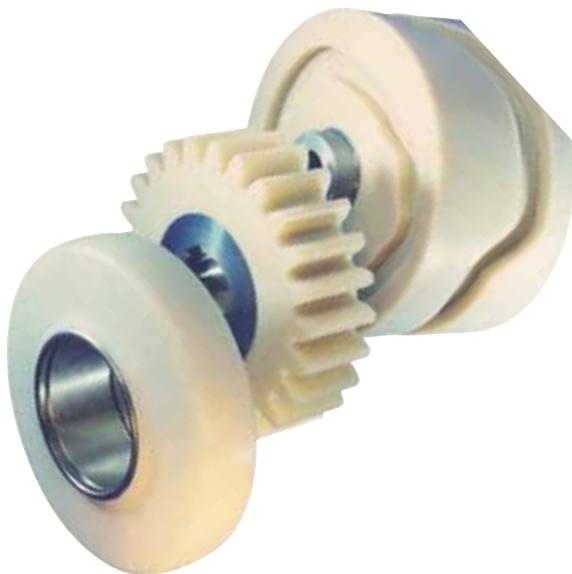
The material characteristics of our special polyamide are convincing for innovative engineers: Versatile, net-shape castable, extremely lightweight, abrasion resistant, dimensionally stable, virtually maintenance-free. Components made of PA 12C Lauramid® perform in machines in numerous applications for relative and sliding motions, in highly dynamic applications, in dry-running conditions or for plastic-steel combinations.

Whether it's for sliding, lifting, pulling, rolling, stirring or for specific dynamics, PA 12C Lauramid® is the ideal material for sophisticated component solutions. Typical components made of Lauramid® are for example rollers and gear wheels with and without metal compounds, cam discs, near-net components like robot arms and portioning units, seal rings or other sliding components.

Due to the special non-pressurized casting process it is possible to produce even complex components with cavities or freeform surfaces without expensive post-processing. So Lauramid® often replaces components made of metal or other plastics.

Have a look at our „moving“ design ideas on the following pages!

NEW LAURAMID®
MOVES!

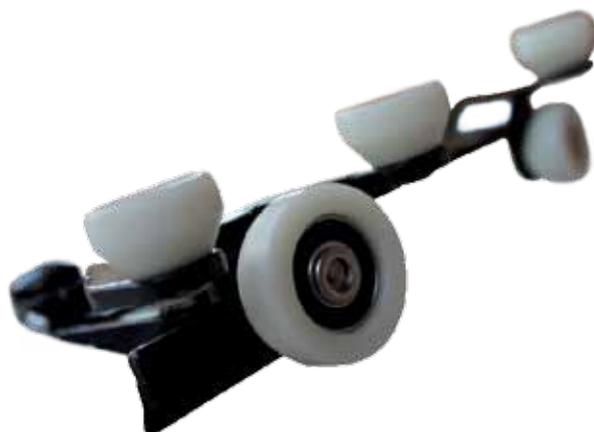


PA 12C Lauramid®:

- lubricant-free use
- low weight for lightweight constructions
- low roller resistance, excellent sliding behaviour
- wide temperature spectrum (-50 °C to +120 °C)
- good chemical and UV resistance
- cost reduction due to ideal construction sizes

Properties of Lauramid® guide rollers in sliding car doors:

- lubrication free
- high resistance to abrasion, high durability
- outstanding concentricity
- low rolling resistance
- extreme temperature tolerance
- delivery with integrated ball bearings possible



SMOOTH OPERATOR

Lauramid® rollers in sliding car doors

NEW LAURAMID®
MOVES!

They roll reliably by every day, year in, year out on guide rails: Lauramid® rollers move the sliding car doors of every leading car company in Europe. It is no coincidence that manufacturers choose precisely these rollers which, depending on the model, have a diameter of just 15 - 30 mm. Because PA 12C is truly revolutionary: In this application it can withstand abrasion, flattening and large variations in temperature. This, along with the minimum moisture absorption of 0.9 percent by weight, creates a particularly accurate roller runout. These rollers are also delivered with integrated ball bearings.

For car manufacturers, using Lauramid® rollers is a comprehensive economic solution over the vehicle's whole operating life, which helps to please end customers. Thanks to Lauramid® on the inside sliding doors continue to open and close smoothly and effortlessly, even after long operation periods, as shown by the sliding door model presented at the trade fair stand. And with their lubricant-free operation, Lauramid® rollers also perform exceptionally clean.

Material: Lauramid® B

Models: Guiding rollers without ball bearings, carrier rollers with ball bearings

Delivery forms: Custom-made sizes

Properties of Lauramid® gear wheels:

- lubricant-free application
- optimal sliding characteristics
- outstanding noise and damping properties
- nearly maintenance-free
- inseparably integrated hubs of all kinds possible



TOP PERFORMER

Lauramid® gear wheels

NEW LAURAMID®
MOVES!

The outstanding tribological properties of this cast polyamide are demonstrated by another trade fair exhibit: Lauramid® gear wheels. Lubricant-free operation, optimum sliding properties and outstanding noise behaviour and absorbability make Lauramid® gear wheels the ideal partner, particularly in plastic-steel combinations. As a result, many applications can be operated more economically.

Gear wheels made from this high-performance plastic allow for even greater power transmission (higher torque) and therefore the ability to move more weight.

High torque and the dynamic acceleration that occurs as a result are just two of the demands required by tyre manufacturing plants, in which PA 12C Lauramid® works as a pinion shaft, or in a barley turning facility where 1,300 Nm of torque is required.

The cast polyamide even retains its form under water: As a gear wheel in an underwater turntable it withstand loads of 150 kN at 6 rpm – and that while maintaining complete form stability despite the damp environment.

Low maintenance and reliable performance, for example, are particularly important when the PA 12C Lauramid® is employed for components in machines that run 24/7. This applies e.g. to gear wheels in the packaging or food industry. In cooperation with moulded metal hubs, low-cost comprehensive solutions are also possible with Lauramid® FS, designed for food contact. These components can, for example, also be used in medical technology or food production. In these sensitive areas, the dry-running capabilities of Lauramid® become particularly important: for hygienic reasons, no external lubrication is permitted.

Material: Lauramid® A, Lauramid FS® A (food-safe)

Models: Gear wheels in individual design made of Lauramid® or Lauramid® FS with and without steel hubs

Properties of Lauramid® robotic arms:

- low net weight
- realization of a vast variety of net-shaped designs possible
- high electrical insulation capability
- high chemical resistance

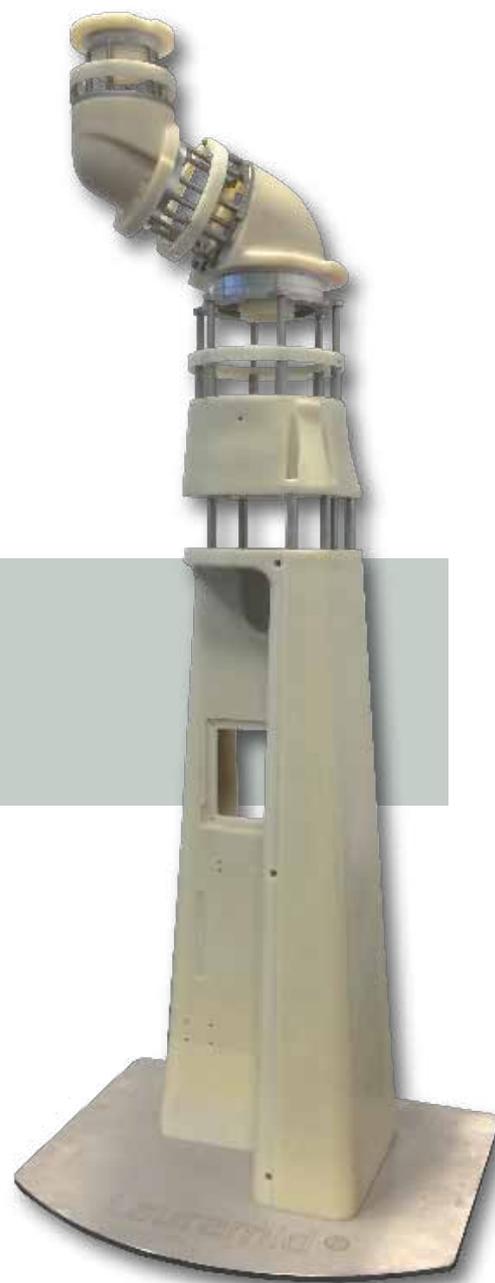
THE DYNAMIC Lauramid® robot arm

Robots are put in motion in a wide variety of fields of application. One of the factors of reliable performance is therefore making the right choice of materials to be used. With its low dead weight (20 % weight advantage vs. POM or PA6) and practically unlimited casting possibilities, the high-performance nylon Lauramid® is predestined for dynamic components in moving applications. Just like this 3D original of a robot arm presented at Hannover Fair. For daily use in a paint shop, the lubricant-free operation of the Lauramid® components is a bonus as well as their chemical resistance to the paints and solvents used in this process and their electric insulation capacity of up to 100,000 V.

The chest-high arm displays individual parts, connectors and hinges cast from Lauramid®. The visible metal spacers on this model are for visualisation only, and are not components of the original unit in which the parts presented here are directly connected. In this representation, the hollow wrist design of every Lauramid® component is also visible from the inside. The hollow design was also moulded using casting technology, as were the sophisticated external freeform surfaces. With this type of manufacturing, an additional machining of the single parts is not necessary. At heavily stressed points on both of the robot's hinges, aluminium inserts were cast-in directly during the manufacturing process. In this example, these act as slots for the ball bearing.

Material: Lauramid® A, Lauramid® B, Lauramid FS® A and B (food-safe)

Models: Individual, near-net components, cavities and wide variations in wall thickness possible, directly-cast hubs of all kinds possible



NEW LAURAMID®
MOVES!

Properties of Lauramid® rollers in cranes:

- little dead weight (7x lighter than steel)
- low roller resistance
- extremely low flattening characteristics
- high abrasion resistance
- lubricant-free application possible

LIGHT AS A FEATHER

Lauramid® rollers in crane carriages

NEW LAURAMID®
MOVES!

The streamlining of production processes brings with it an increased requirement for material handling and transportation: Components have to be moved to the respective installation location even faster and easier. Eepos GmbH is a specialist in this field. Their solution: Super-lightweight cranes made of aluminium and carbon.

The carriages of these cranes are a perfect example of use for rollers made of the extremely light cast nylon Lauramid®. The state-of-the-art rollers design in combination with a special design of the crane system guarantees the smoothest possible operation at all times.

The Hannover Fair exhibit shows the design specials: On a standard trolley, 8 wheels with ball bearings (Ø 50 mm, width 15 mm) assist smooth and easy and almost silent running. For 100 kg of load a worker needs only 0.5 to 0.8 kg power to bring the system in motion, and only 0.2 to 0.4 kg in order to keep it in motion. Due to the optimal interaction of the aluminium crane runway and the Lauramid® rollers of the crane trolleys, components up to 1,500 kg can be moved not only faster but also more ergonomically.

Lauramid® rollers - even of large sizes - move high loads for numerous manufacturers in other material handling applications. So for example in storage devices or in harbor cranes .

- Material: Lauramid® A
- Models: Rollers in individual designs with ball bearings
- Delivery forms: Rollers available in custom-made sizes with and without directly-cast steel hubs or with and without ball bearings



LAURAMID® MATERIAL DATA

| | Test procedure | Units/data | Lauramid® A / Lauramid® FS with metal composite | Lauramid® B / Lauramid® FS without metal composite |
|--|--|----------------------|--|---|
| General properties | | | | |
| Density | DIN EN ISO 1183 | kg/m ³ | 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 |
| Mechanical properties | | | | |
| 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 ² | 15 - 28 | 5 - 12 |
| -30 °C | | | 8 - 18 | 4 - 9 |
| Coefficient of sliding friction | | Lauramid®/metal | 0.3 | 0.3 |
| Electrical properties | | | | |
| Surface resistance | DIN IEC 93 | Ω | 6.6 · 10 ¹⁵ | 6.6 · 10 ¹⁵ |
| Spec. contact resistance | DIN IEC 93 | Ω cm | 3 · 10 ¹⁴ | 3 · 10 ¹⁴ |
| Dielectric constant | DIN IEC 250 | | 3.5 | 3.5 |
| Dissipation factor | DIN IEC 250 | | 3.8 · 10 ⁻⁴ | 3.8 · 10 ⁻⁴ |
| Tracking Resistance KB | | | 550 | 550 |
| Tracking Resistance KC | DIN EN 60112 | CTI A | 600 | 600 |
| Dielectric strength | IEC 243-1 | kV / mm | 24.4 | 24.4 |
| Thermal properties | | | | |
| Lin. expansion coefficient | | | | |
| -50 - (-30) °C | DIN 53752 | 10 ⁻⁴ /°C | 0.8 - 1.0 | 0.8 - 1.0 |
| +30 - (+80) °C | DIN 53752 | 10 ⁻⁴ /°C | 1.0 - 1.8 | 1.0 - 1.8 |
| Application temperature max. short-term | | °C | to 150 | to 150 |
| Continuous service temperature (< 10 ⁴ h) | IEC 60216-1 in oil IEC 60216-1 in water IEC 60216-1 in air | °C | 140 90 120 | 140 90 120 |
| Vicat | DIN EN ISO 306/B | °C | 172 - 180 | 185 - 191 |
| Thermal resistance | DIN EN ISO 75/A DIN EN ISO 75/B | °C °C | 80 - 115 186 | 176 - 190 194 |
| 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

HIGH-TECH PLASTICS

by Handtmann Elteka

Lauramid®:

Wear-resistant, temperature-resistant and light construction polyamide (PA 12C). In-gate steel hubs possible, food safe modifications available.

Lauramid Hybrid®:

With Lauramid® cast-in metal foam which enables very firm, yet extremely light components.

Lauramid Inject® 970:

Lauramid® chips re-granulated in a special process, suitable for producing injection-moulded components. Different material properties are almost equivalent to Lauramid®.

Albert Handtmann Elteka GmbH & Co. KG

is a subsidiary of German Handtmann Holding. The traditional company was founded more than 135 years ago and is internationally active in engineering and construction. Handtmann Elteka develops technical plastics. The materials Lauramid®, Lauramid Hybrid® and Lauramid Inject® 970 are employed in engineering as parts or complete systems in a large number of different fields.



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