We are the Reinforcers of Life!

Founded in 1973, Kordsa operates from North America to Asia Pacific as a global reinforcement player in three reinforcement market:
- Tire reinforcement technologies with its industrial nylon and polyester yarn, tire cord fabric and single end cord products
- Construction reinforcement with its macro and micro synthetic fiber reinforcements
- Composites technologies with innovative fabrics and prepreg

Kordsa’s innovative technologies are very much integrated in everyday life to make it safer, more efficient, comfortable and convenient. Kordsa, the reinforcer of 1 out of every 3 automobile tires and 2 out of every 3 aircraft tires, strives for making life more sustainable by reducing the rolling resistance to decrease the fuel consumption with its tire reinforcement technologies as well as lightening the vehicles with its composite technologies and offering low carbon emission and long-lasting durability for successful and sustainable construction projects. With its value-added products, Kordsa not only improves the lives of individuals and families but also “reinforces life”.

Innovation Oriented Approach

Kordsa is the global player of the industry with its process based know-how, leading position in tire reinforcement market, intense R&D activities, open innovation culture, and strategic approach to reinforcement market/technologies. Operating in 5 countries with its 11 manufacturing facilities, Kordsa aims to generate sustainable value for its customers, employees, stakeholders and the communities by offering them high value added and innovative reinforcement solutions.

With an intensive focus on research and development, Kordsa currently has two R&D Centers, operating as an innovation kitchen for both global market and Turkish market. The R&D Center in İzmit, established in 2008 develops new products, processes and technologies for the tire and construction reinforcement markets. Kordsa’s second R&D center is located at the Composite Technologies Center of Excellence. The Center, jointly established by Kordsa and Sabancı University is the meeting point of the industry and the university where basic research, applied research, technology development, product development, entrepreneurship, and production take place under the same roof.

Developing the reinforcement technologies of the future with a team of nearly 100 people at R&D centers, Kordsa increased the number of its patent applications by 60% in 2017 compared to the previous year. Kordsa currently has over 170 inventions and over 200 approved patents in total.
Global Footprint

NORTH AMERICA
NY6.6, TCF

SOUTH AMERICA
PET, SEC, TCF

EMEA
NY6.6, PET, SEC, TCF, Kratos, Composite

ASIA PACIFIC
NY6.6, PET, TCF
**Beyond Conventional**

Extreme conditions require extreme performances. Twixtra®, customized according to customers’ reinforcement needs, is the solution for requirements that cannot be met by standard tire cord fabrics.

Twixtra® product range is the combination of different kinds of fibers in one cord to design a new set of properties, which is impossible to obtain from a single material. Kordsa has been the world’s leading supplier of textile reinforcement materials for the tire industry since 1973.

**High Performance Cap Ply**

AR/NY Hybrid cords deliver high modulus where you require dimensional stability. Compared to conventional cap ply material, mono layer Twixtra cap ply is sufficient for UHP performance. Due to less material consumption, RR will be relatively lower.

**Lighter Cords, Lighter tires**

Twixtra® with light cord design reveals high modulus and high impact absorption capability. Compared to conventional cap ply material, Twixtra® LD will perform better.

**Tire protection**

Twixtra® will enhance cut resistant property in AR/NY hybrid cords as aramid has higher cut resistance than multifilament Nylon6-6.
SAVE IN EVERY DETAIL

Capmax® is ready to use reinforcement tape designed to eliminate calendaring process in tire production. Tire with Capmax® consumes less resources, energy and raw materials contributing to reduce carbon foot print of the tire.

- **Up to 2% Cost Saving Per Tire**
  - Reduce labor cost and scrap

- **2-3% Rolling Resistance Improvement**
  - Less fuel consumption, decrease in CO₂ emission by weight reduction

- **1-4% Weight Reduction**
  - 100-400 gr compound reduction potential

*Capmax provides cost saving by reducing rubber and scrap as well as minimizing calendaring and calendering processes.
Capmax® is engineered as a replacement for calendared tire cord fabric as the cap-ply material. Capmax® strips can be directly applied to the tire during the manufacturing stage, reducing the use of rubber in cap-ply as well as eliminating many stages in tire production. Capmax® greatly simplifies the manufacturing process, optimizes raw material usage and significantly reduces costs. Tires manufactured with Capmax® consume less resources, energy and raw materials contributing to reducing the carbon footprint of the tire.

**Benefits:**
- Direct load on cap strip service module in green tire building phase
- Elimination of compound mixing, calendering and slitting process for cap ply – utilized tire manufacturing process with waste reduction
- Minimized raw material expenses thru rubber saving
- Reduced energy consumption thru elimination of some process steps
- Less process and energy costs
- Reduced capital expenditure for the new investments and expansion projects (no extra slitting machines or calendering required)

**RF-FREE TIRE CORD FABRIC**

- Complete elimination of Resorcinol and Formaldehyde use in dipping solutions
- No formaldehyde emission
- Readily available chemicals that are compliant with regulations

**RF-free vs RFL**
- No special equipment for dipping process
- Similar 3T (Time – Temperature – Tension) dipping conditions
- Physical properties on target
- Same performance in tires

**RF-FREE TCF Results**

**NY66 940/2 370x370**
- RFL reference
- RF-free

**PET 1440/2 375x375**
- RFL reference
- RF-free

* RF-FREE TCF Results
  - Complete elimination of Resorcinol and Formaldehyde use in dipping solutions
  - No formaldehyde emission
  - Readily available chemicals that are compliant with regulations

**RF–free vs RFL**
  - No special equipment for dipping process
  - Similar 3T (Time – Temperature – Tension) dipping conditions
  - Physical properties on target
  - Same performance in tires

* 2 bath dipping process using NAG® PET*
Monolyx® is a multi-ply monofilament cord made of synthetic monofilament fibers with 3-7 plies for tire reinforcement. Each ply has a round shape cross-section with minimum 0.23mm and maximum 0.50mm thickness or minimum 460 dtex and maximum 2200 dtex. The properties of the cords are adjusted by changing the ply thickness and ply number within the available products range and structure of the cords are varied between 0.23mm - 0.50mm ply thickness and by number of plies from 3 to 7.

**Performance**
- UHP & SUV
- Aircraft Tires Belt
- Truck Radial Belt
- Forestry & Agro Tires Belt & Carcass

**Corrosion Protection**

**Cut Resistant**

**Low Weight**

**Cost Optimization**

**Rolling Resistance**

**Cut Resistant**

1.0 mm cord gauge ISO: 13977-1999

<table>
<thead>
<tr>
<th>Material</th>
<th>1.0mm Cord Gauge ISO</th>
<th>1.0mm Cord Gauge 13977-1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nylon 6.6</td>
<td>73.5N</td>
<td>73.5N</td>
</tr>
<tr>
<td>Aramid</td>
<td>55.6N</td>
<td>55.6N</td>
</tr>
<tr>
<td>Monolyx</td>
<td>24.9N</td>
<td>24.9N</td>
</tr>
</tbody>
</table>

**B. Strength Retention**

**Tensile Strength**

**Bending Stiffness**

For further information please contact us at market.development@kordsa.com
Kordsa® T728

Yarn Type: T728  Polymer: PA66

Yarn Count (dtex) 940 1400 1880 2100 2800
Breaking Strength (KG) 8.30 12.56 16.50 18.32 25.08
Tenacity (cN/tex) 86.2 87.1 85.2 84.4 86.6
Elongation @ 4.5 KG (%) 9.6 7.9 6.9 6.8 5.6
Elongation @ break (%) 18.6 18.8 19.5 20.2 21.0
Shrinkage @ 177°C, 2 MIN (%) 6.6 6.3 6.2 5.7 6.2

General specifications are given, all properties are adjusted to customer specifications.

Kordsa® T802

T802 cord fabric is a dominant material used in aircraft tire reinforcement. Kordsa Global is the market leader in aircraft tire cord reinforcement market.

T802 has superior tensile strength properties offering:
• Weight reduction
• Longer life
• Higher load capacity
• Better processibility
• Improved safety

Yarn Type: T802  Polymer: PA66

Yarn Count (dtex) 940 1400 1880 2100 2800
Breaking Strength (KG) 8.82 13.46 17.53 19.67 26.1
Tenacity (cN/tex) 91.7 93.3 90.5 90.7 90.3
Elongation @ 4.5 KG (%) 9.2 8.1 7.4 6.7 5.7
Elongation @ break (%) 17.5 18.2 20.6 19.4 20.0
Shrinkage @ 177°C, 2 MIN (%) 7.4 6.6 6.5 6.3 6.4

General specifications are given, all properties are adjusted to customer specifications.

Dipped Cord Properties

<table>
<thead>
<tr>
<th>Construction</th>
<th>940X1X2</th>
<th>1400x1</th>
<th>1400X1X2</th>
<th>1880X1X2</th>
<th>2100X1X2</th>
<th>2800X1X2</th>
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</thead>
<tbody>
<tr>
<td>Physical Properties (*)</td>
<td>UNIT</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Breaking strength kgf</td>
<td>13.5 min</td>
<td>10.5</td>
<td>20.5 min</td>
<td>28</td>
<td>43.0</td>
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</tr>
<tr>
<td>Breaking strength, average kgf</td>
<td>14.5 ave</td>
<td>12.00</td>
<td>22.50</td>
<td>29.50</td>
<td>44.0</td>
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<tr>
<td>3.4 kg EASL %</td>
<td>6.6 ± 0.8</td>
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<tr>
<td>4.5 kg EASL %</td>
<td>9.0 ± 0.8</td>
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<tr>
<td>6.8 kg EASL %</td>
<td>9.0 ± 0.8</td>
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<tr>
<td>9.1 kg EASL %</td>
<td>9.0 ± 0.8</td>
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<td></td>
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<tr>
<td>10.2 kg EASL %</td>
<td>9.0 ± 0.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>13.5 kg EASL %</td>
<td>9.0 ± 0.8</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shrinkage at 177°C, 2 min 0.05 grids/cm</td>
<td>%</td>
<td>5.0 ± 0.8</td>
<td>5.0 ± 0.8</td>
<td>5.0 ± 0.8</td>
<td>5.0 ± 0.8</td>
<td>5.0 ± 0.8</td>
</tr>
<tr>
<td>H adhesion kg/10 mm</td>
<td>10.0</td>
<td>5.5</td>
<td>15.0</td>
<td>16.5</td>
<td>17.0</td>
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<tr>
<td>Dip Pick up %</td>
<td>5.0 ± 1.0</td>
<td>5.0 ± 1.0</td>
<td>5.0 ± 1.0</td>
<td>4.5 ± 1.0</td>
<td>5.0 ± 1.0</td>
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<tr>
<td>Cord Thickness mm</td>
<td>0.54 ± 0.04</td>
<td>0.42 ± 0.05</td>
<td>0.45 ± 0.05</td>
<td>0.75 ± 0.05</td>
<td>0.8 ± 0.05</td>
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<tr>
<td>Ply Twist, Z tpm</td>
<td>470 ± 15</td>
<td>200 ± 15</td>
<td>390 ± 15</td>
<td>325 ± 15</td>
<td>315 ± 15</td>
<td></td>
</tr>
<tr>
<td>Cable Twist, Z tpm</td>
<td>470 ± 15</td>
<td>390 ± 15</td>
<td>325 ± 15</td>
<td>315 ± 15</td>
<td>320 ± 15</td>
<td></td>
</tr>
</tbody>
</table>

(*) all tensile properties are tested after conditioning 24 hrs in lab conditions.

Applications: Tire Reinforcement
Cap Ply Material : For passenger and light commercial vehicles
Carcass/Breaker Material : Bias tire applications

HARtech

High Adhesion Retention technology (HARtech) is an advance dipping technology specially designed to protect polyester adhesion properties.
HARtech eliminates sharp and significant adhesion drop during longer curing cycle and successfully protects polyester adhesion. HARtech guarantees a 100% adhesion retention during 1 hour of tire curing.
HARtech also improved the tire carcass life during harsh service conditions. (low air pressure and over loaded tire usage)

Polyurethane formation
We Reinforce Life

Reinforcing 2 out of every 3 aircraft tires and 1 out of every 3 automobile tires produced in the world.