

MOTION**ROBOTLINE**



DYNAMIC RELIABILITY ENGINEERED FOR ANTHROPOMORPHIC ROBOTICS
THREE TORSIONAL FAMILIES · SIX AXES · ONE PLATFORM

TECHNICAL SALES BROCHURE · EDITION 2026



MOTION **CABLES**: LEADING THE WAY IN **SPECIAL CABLE SOLUTIONS**

Our strength lies in **three elements**:

1. An in-house engineering team that speaks the same language as our customers' designers;
2. A dedicated research and test centre — **MOTIONTECHCORE** — that validates every construction through over 60 specific tests;
3. A controlled supply chain that allows us to guarantee quality and delivery times even on custom configurations.

OUR COMMITMENT TO THE CUSTOMER

Verified products, not merely compliant. Every **ROBOTLINE®** cable passes durability tests that go beyond compliance requirements.

A technical interlocutor, not a commercial intermediary. When you bring us a problem, you speak with an engineer.

Continuous support. From pre-specification to field follow-up, we stand alongside the project.

Specialisation, not generalism. We don't do everything: we do exceptionally well what we have focused on.

Forty years inside industrial automation, not beside it. Working every day on the technical problems that arise when drives, motors, and robots interact with their cabling in ways that standard constructions do not anticipate.

FIVE ADVANTAGES THAT MAKE THE DIFFERENCE

MOTION**CABLES** leverages its MOTION**TECHCORE** research centre to deliver high-performance special cables, validated and differentiated from the competition.

GUARANTEED LONG-TERM RELIABILITY

Products are qualified through accelerated ageing tests and dynamic tests in the order of millions of cycles, to guarantee stable performance throughout the operational life and minimise unplanned downtime.

OBJECTIVE PERFORMANCE CLASSIFICATION

Cables are categorised across four classes (Electrical, Dynamic, Environmental, Safety) on the basis of real test data, enabling rapid and precise selection against specific application requirements.

SYSTEM-LEVEL VALIDATION

Validation covers the complete Drive–Cable–Motor system, confirming reliable performance and compatibility in the customer's real industrial environment, not just the individual component.

SUPERIOR ENVIRONMENTAL RESISTANCE

Demonstrated resistance to oils, chemicals, extreme thermal cycles, UV radiation, and salt spray. The cable maintains its integrity even in severe and contaminated environments: machine tools, offshore applications, food environments.

REDUCED TOTAL COST OF OWNERSHIP

High durability, predictable expected service life, and validated technical parameters simplify design and maintenance, reducing failures and inventory costs. The customer pays more per unit; they pay far less over the lifecycle.

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THE CHALLENGES OF MODERN INDUSTRIAL ROBOTICS

TORSION, FREQUENCY, AND RELIABILITY IN A SINGLE COMPONENT.

Modern industrial robots subject their cabling to a combination of stresses that no other industrial context reproduces with the same intensity and duration:

- ⊙ **Torsion up to $\pm 360^\circ/\text{m}$** repeated millions of times over the machine's service life.
- ⊙ **Simultaneous multi-axis motion** with combined, unpredictable angles and velocities.
- ⊙ **High-frequency data transmission:** field-buses, encoder feedback, force sensors.
- ⊙ **Thermally demanding environments:** foundries, paint booths, food & beverage.
- ⊙ **Restricted installation spaces** requiring minimum bend radii.
- ⊙ **High availability requirements:** a single unplanned stoppage can cost thousands of Euros per hour.



SECTOR	APPLICATION	KEY CHALLENGE	RECOMMENDED FAMILY
Automotive	Welding, painting	Continuous torsion axes 4–6	ROBOTLINE 360
Foundry / Metal.	Hot part handling	Temperature + extreme torsion	ROBOTLINE 360
Food & Pharma	Pick & place, packaging	Hygiene + continuous cycles	ROBOTLINE 90 ROBOTLINE 180
Logistics	Palletizing, handling	High cycle frequency	ROBOTLINE 180
COBOTS	HRC in shared spaces	Tight radii, reliability	ROBOTLINE 90

ROBOTLINE® DESIGN PHILOSOPHY

TORSION. DURABILITY. RELIABILITY. THREE PRINCIPLES THAT GUIDE EVERY CONSTRUCTION DECISION.

ROBOTLINE® is designed according to a precise logic: not indiscriminate over-engineering, but an exact correspondence between construction and the torsion level of each robot axis. The result is optimal performance, compact dimensions, and controlled costs for every specific application..

TORSION	Differentiated constructions for every torsional level. The internal geometry, conductor structure, and outer jacket are all optimized for the specific torsion rating of each axis.
DURABILITY	Service life aligned to the robot's lifetime. The design target is that the cable is never replaced before the robot, eliminating replacement and downtime costs.
RELIABILITY	Stable electrical performance throughout the cable's service life. The Motion EM-Torsion® Mesh Shield ensures consistent signal integrity even after millions of torsional cycles.

ONE PLATFORM, THREE LEVELS

AXES	MOTION TYPE	STRESS LEVEL	ROBOTLINE® FAMILY
A1-A3	Rotation, translation	Moderate torsion, limited angles	ROBOTLINE 90 ($\pm 90^\circ/\text{m}$)
A4-A5	Compound internal rotation	High torsion, simultaneous motion	ROBOTLINE 180 ($\pm 180^\circ/\text{m}$)
A6 (wrist)	Continuous axial rotation	Extreme and continuous torsion	ROBOTLINE 360 ($\pm 360^\circ/\text{m}$)

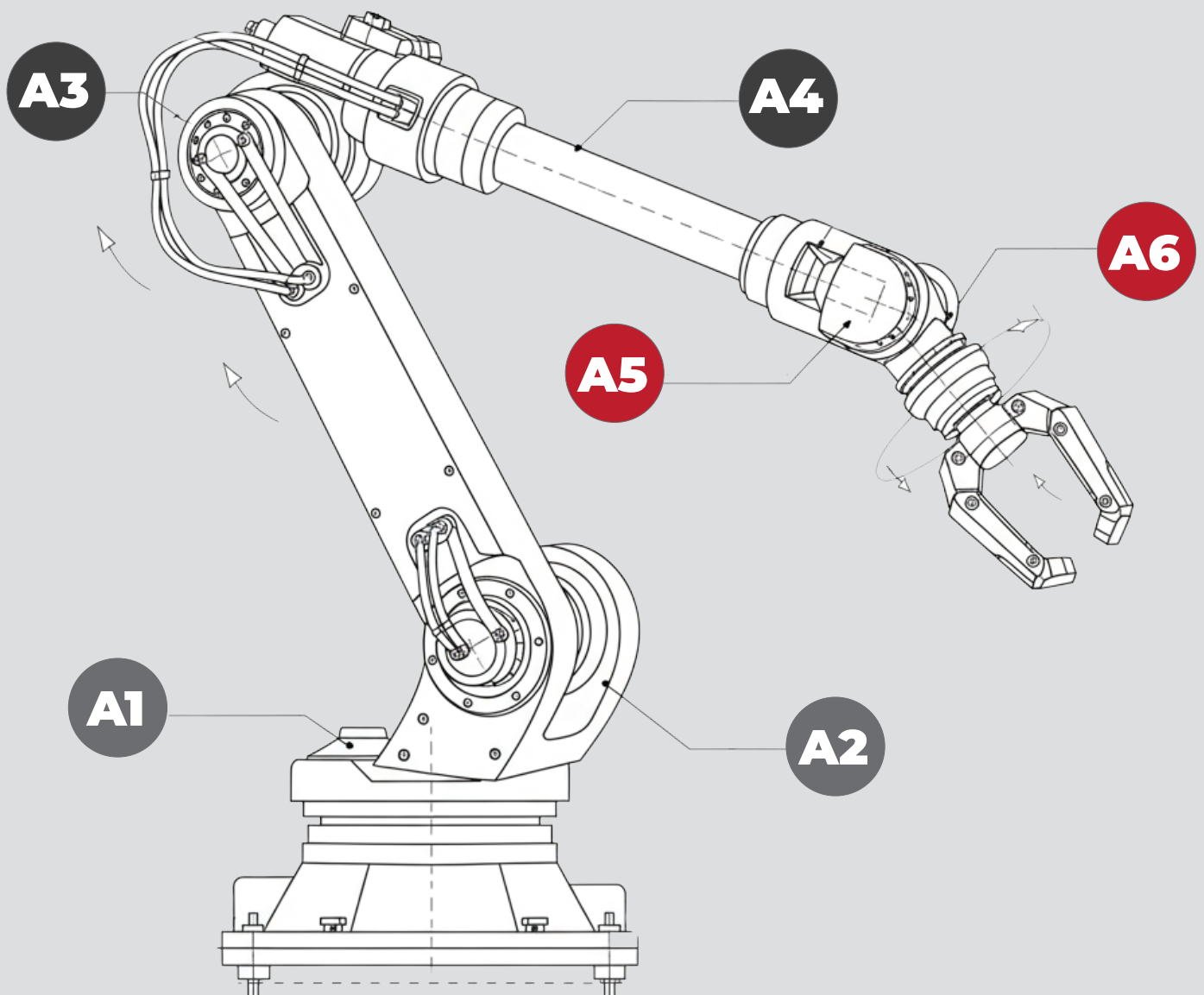
Same electrical function, dedicated torsional constructions for every axis. Not a single oversized solution, but a system calibrated to the real kinematics of the robot.

ROBOT ARCHITECTURE: **DIFFERENT AXES,** DIFFERENT STRESS

A 6-AXIS ANTHROPOMORPHIC ROBOT IS NOT A HOMOGENEOUS MACHINE.

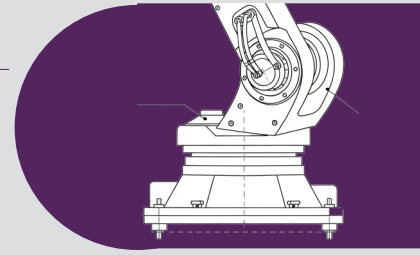
Every axis has its own kinematics, a specific angular travel, and a unique load profile.

Applying the same cable across all axes is inefficient: it over-engineers where it is not needed (axes 1–3), adding weight, stiffness, and cost; it under-engineers where it matters (axes 5–6), leading to premature failure.

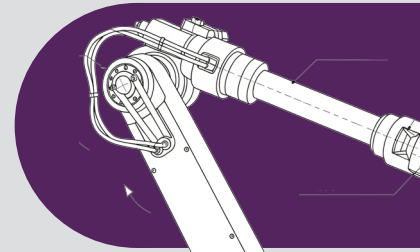


A1**A3****AXES A1-A3 (BASE, SHOULDER, ELBOW).**

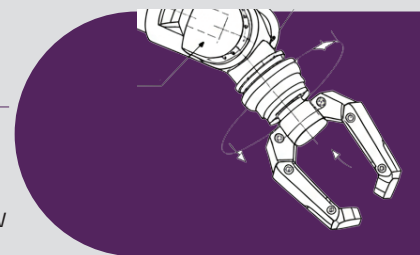
Primarily rotary and translatory movements, moderate angular travel. Torsion exists but is limited. A cable built for Axis 6 here is simply unnecessary weight and stiffness

**A4****A5****AXES A4-A5 (ARM ROTATION, INTERMEDIATE WRIST).**

Compound kinematics combining multiple movements. Significant torsion, but not at the level of the terminal wrist. Requires a balanced construction, not the maximum one

**A6****AXIS A6 (TERMINAL WRIST).**

Continuous axial rotation, often without an effective end stop. This is the point of maximum stress on the cabling, where standard construction technologies show their limits first.

**THE ROBOTLINE® LOGIC APPLIED**

The advantage of the platform is that an OEM can standardise the entire robot cabling with a single supplier, obtaining axis-by-axis differentiated constructions without managing multiple suppliers. For the system integrator, this means a leaner BOM, more predictable maintenance, and a stronger commercial argument towards the end customer.

Not every axis needs the same cable. But every axis needs the right cable.



ROBOTLINE®

PLATFORM: THREE TORSIONAL FAMILIES

ONE ENGINEERING LOGIC, THREE PERFORMANCE LEVELS

The **ROBOTLINE®** platform is structured around three families that respond with the right construction to every torsion level present in the robot.

The construction logic is shared: materials selected for torsion, anti-degradation internal geometry, high-resistance PUR jacket, optional Motion EM-Torsion® shielding.

FEATURE	ROBOTLINE 90	ROBOTLINE 180	ROBOTLINE 360
Axes covered	Axes A1-A3	Axes A1-A4	A6 (recommended)
Nominal Torsion	±90°/m	±180°/m	±360°/m
Guaranteed cycles	>5 million	>7 million	>10 million
Operating temp.	-40/+90°C	-40/+90°C	-40/+90°C
EMC Mesh shield	Optional	Optional	Integrated
Compliance	UL AWM	UL AWM	UL AWM
Data Transmission	Up to 100 MHz	Up to 100 MHz	Up to 100 MHz

The **ROBOTLINE®** 360 family is recommended for Axis 6 and can be applied across all axes when the project requires construction standardisation.

The axis-differentiated combination of 90+180+360 remains the optimal choice when weight, cost, and footprint are the prevailing criteria.

ROBOTLINE® 90

MODERATE TORSION

TORSION: $\pm 90^\circ/\text{M}$ · AXES: A1-A3 · GUARANTEED CYCLES: >5 MILLION

APPLICATION SCOPE

- ⦿ Pick & place and light handling on low- to medium-dynamics robots.
- ⦿ Collaborative robots (cobots) in HRC applications.
- ⦿ Primary and secondary packaging.
- ⦿ Assembly of light electronic and mechanical components.

CONSTRUCTION FEATURES

- ⦿ Class 6 extra-flexible copper conductors (IEC 60228) with anti-torsion geometry.
- ⦿ XL-PE insulation for thermal and electrical stability.
- ⦿ High-resistance PUR outer jacket, mechanical and chemical grade.
- ⦿ Optional: Motion EM-Torsion® Mesh Shield for shielded variants.
- ⦿ Available in shielded and unshielded versions.



$\pm 90^\circ/\text{m}$

GUARANTEED TORSION



> 5 Mil

GUARANTEED CYCLES



- 40 / +90 °C

OPERATING TEMPERATURE

The balance point between sufficient torsional performance and optimised costs. The natural choice for applications that do not require the maximum torsional grade but have high long-term reliability requirements

ROBOTLINE® 180

HIGH PERFORMANCE

TORSION: $\pm 180^\circ/\text{M}$ · AXES: A1-A4 · GUARANTEED CYCLES: >7 MILLION

APPLICATION SCOPE

- ⦿ MIG/MAG and resistance robotic welding in automotive plants.
- ⦿ Painting and sealant application on body panels.
- ⦿ Automotive handling; transfer of body shells and large components.
- ⦿ Complex packaging lines with multi-axis motion profiles.
- ⦿ Manipulation on work cells with 4-5 active robot axes.

CONSTRUCTION FEATURES

- ⦿ Intermediate torsional construction with geometry optimized for $\pm 180^\circ/\text{m}$.
- ⦿ Reduced stranding length for enhanced torsional flexibility of conductors.
- ⦿ Calibrated XL-PE insulation wall thickness for optimal stress distribution.
- ⦿ Anti-spatter PUR jacket formulation for welding environments.
- ⦿ Optional Motion EM-Torsion® Mesh Shield.



$\pm 180^\circ/\text{m}$

GUARANTEED TORSION



> 7 Mil

GUARANTEED CYCLES



- 40 / +90 °C

OPERATING TEMPERATURE

Designed for the most common operating regimes in modern automotive. It combines the durability required across 4-5 active axes with a construction that remains manageable in terms of weight and footprint

ROBOTLINE® 360

MAX TORSION AXIS 6

TORSION: $\pm 360^\circ/\text{m}$ · AXIS: A6 · GUARANTEED CYCLES: >10 MILLION

THE MOST CRITICAL AXIS ON THE ROBOT

Axis 6 (wrist) is the most heavily stressed: it combines continuous $\pm 360^\circ/\text{m}$ torsion with high-speed motion in often hostile environments.

This is the axis where standard cables fail first, with the greatest impact on production uptime.

ROBOTLINE® 360 was designed specifically for this scenario.

- ⊙ **High-dynamics robots in foundry and metallurgy:** extreme temperatures combined with maximum torsion.
- ⊙ **Automated de-burring and grinding:** intense vibration plus continuous torsion.
- ⊙ **Manipulation in die-casting cells:** elevated temperatures and rapid cycle times
- ⊙ **Aerospace and precision manufacturing applications:** critical signal integrity requirements.

MAXIMUM-GRADE CONSTRUCTION FEATURES

- ⊙ **Extreme torsional construction:** every component engineered for continuous $\pm 360^\circ/\text{m}$.
- ⊙ **Symmetric anti-torsion geometry** on Class 6 copper conductors.
- ⊙ **Cross-linking-optimized XL-PE insulation** for stability under combined stresses.
- ⊙ **PUR HT (High Torsion) jacket compound** with anti-fatigue additives.
- ⊙ **Motion EM-Torsion® Mesh Shield** integrated in the shielded version.



$\pm 360^\circ/\text{m}$

GUARANTEED TORSION



> 10 Mil

GUARANTEED CYCLES



EMC
protected

EFFECTIVE EMC SHIELDING

HYBRID OCT

CONFIGURATIONS AND ADVANCED LAYOUTS

ROBOTLINE® is available in hybrid configurations (OCT: One Cable Technology) that integrate power conductors, control signals, and impedance-controlled data pairs within a single construction.

This solution dramatically reduces the number of cables on the robot, improving reliability, maintainability, and installation compactness.

Reduced cable count on the robot: fewer connectors, fewer failure points

- ⦿ Lower total cabling weight with direct benefits on robot dynamics and energy consumption.
- ⦿ Simplified field installation and replacement.
- ⦿ Impedance-controlled data pairs up to 100 MHz, stable even under torsion.
- ⦿ Compatibility with modern fieldbuses: EtherCAT, PROFINET, EnDat, HIPERFACE DSL.

CONFIGURATION	CONTENT	TYPICAL APPLICATION
Power + Feedback	Power conductors + encoder pair	Servo motor + resolver/encoder, no bus
Servo + Bus	Power + signals + data bus	Drives with digital feedback (EnDat, DSL)
Power + Control	Motor + control I/O	Axes with integrated joint sensors
Full Hybrid OCT	All in one: power, feedback, bus	Single-cable axis on next-gen robots

COMPATIBILITY WITH MOTIONCABLES CABLE FAMILIES

The **ROBOTLINE®** torsional characteristics can be applied to the following families within the MOTIONCABLES platform:

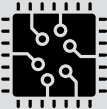
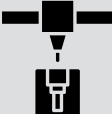
ROBOTLINE APPLICATION	TYPE	CABLE FAMILY
Axis drives, robot motor power supply	Servo motor power	MOTIONSERVO
Position, resolver, absolute encoder	Encoder feedback	MOTIONFEEDBACK
OCT: single cable per axis, reduced footprint	Hybrid power+signal	MOTIONHYBRID
EtherCAT, PROFINET, EnDat, HIPERFACE DSL	Field-bus data	MOTIONBUS
I/O, sensors, robot actuators	Multi-core control	MOTIONSTANDARD

One source, five functional families, three torsional classes. The broadest platform for robot cabling, managed by a single supplier

APPLICATION SECTORS

WHERE ROBOTLINE® WORKS

From automotive to foundry, from logistics to aerospace: the matrix indicates the recommended family for each sector based on the typical stress profile of the application.

			MOTION ROBOTLINE 90	MOTION ROBOTLINE 180	MOTION ROBOTLINE 360
	AUTOMOTIVE	Welding, painting, assembly, body shell handling			
	FOUNDRY & METALS	Casting, part extraction, deburring, grinding			
	FOOD & BEVERAGE	Pick & place, packaging, wrapping, palletizing			
	PHARMACEUTICAL	Assembly, inspection, aseptic packaging			
	LOGISTICS	Sorting, palletizing, depalletizing			
	ELECTRONICS	PCB assembly, optical inspection, selective soldering			
	AEROSPACE	Drilling, riveting, structural assembly			
	PLASTIC & RUBBER	Mold extraction, trimming, assembly			

Key:  not suitable

REDUCING THE **HIDDEN COSTS** OF ROBOT CABLING

THE CABLE PRICE IS ONLY ONE LINE ITEM OF THE TRUE COST.

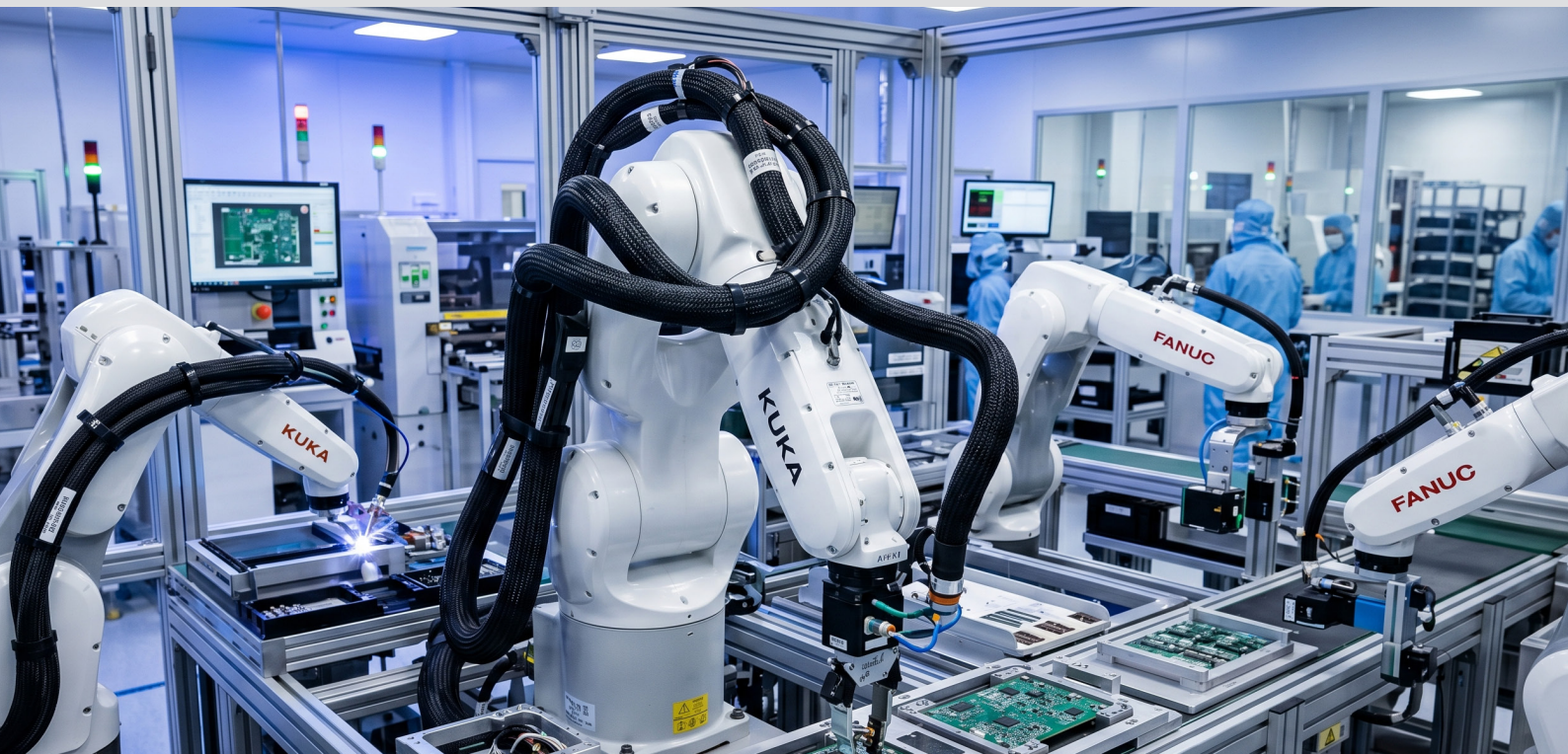
The right question is not how much the cable costs, but how much the cable that fails costs.

Hidden costs:

- ⦿ Production downtime.
- ⦿ Cable replacement.
- ⦿ Unplanned maintenance.
- ⦿ Quality losses.

They often exceed the initial price by a factor of 3–5x. **ROBOTLINE®** rebalances this equation.

COST ITEM	STANDARD CABLE	ROBOTLINE®
Initial price	Low	Competitive per performance
Expected service life	12–24 months	Machine lifetime (>8 years)
Replacements over lifecycle	4–8 times	0–1 times
Downtime costs	High	Minimized
TCO over 8 years	3–5x cable price	1x cable price



QUICK SELECTION GUIDE

THREE SUMMARY PARAMETERS TO GUIDE THE SELECTION.

For cases requiring in-depth evaluation, the MotionCables technical team responds within 2 working days with a preliminary assessment.

AXIS	TORSION	FAMILY	TYPICAL APPLICATIONS	CYCLES
A1-A3	±90°/m	ROBOTLINE 90	Pick & place, packaging, cobots	>5 million
A1-A4	±180°/m	ROBOTLINE 180	Welding, painting, automotive	>7 million
A6	±360°/m	ROBOTLINE 360	Foundry, metallurgy, high dynamics	>10 million

ADDITIONAL SELECTION PARAMETERS

- ⦿ **Operating environment:**
extreme temperatures, presence of oil or chemicals: consider special jacket grade.
- ⦿ **EMC requirements:**
if the robot transmits data (bus, encoder), specify shielded version with Motion EM-Torsion®.
- ⦿ **Configuration:**
single cable or hybrid OCT (power + feedback + bus in one cable).
- ⦿ **Certifications:**
UL AWM for USA/Canada export, sector-specific compliance for food, pharma.

INSTALLATION GUIDELINES

- ⦿ Observe the minimum bend radii specified for each family (data sheet).
- ⦿ Use floating clamps that allow movement without twisting the cable at fixed points.
- ⦿ Eliminate parasitic torsion during laying: verify the cable is not pre-twisted.
- ⦿ Provide adequate cable length to absorb movement without tension.
- ⦿ Technical material ready for quotes and presentations.

VALUE FOR OEMS AND SYSTEM INTEGRATORS

WE PROVIDE STRATEGIC SOLUTIONS DESIGNED TO STREAMLINE ENGINEERING, REDUCE OPERATIONAL COSTS, AND ENSURE MAXIMUM RELIABILITY ACROSS THE ROBOTICS INDUSTRY

VALUE FOR OEMS

We support Original Equipment Manufacturers in simplifying their supply chain and enhancing final product quality through:

- ③ **BOM Optimization:**
Reduce cable variants within the bill of materials.
- ③ **Guaranteed Reliability:**
Predictable, documented service life for every component.
- ③ **Design Support:**
Technical assistance throughout the entire design phase.
- ③ **Global Compliance:**
UL AWM documentation ready for global markets.
- ③ **Streamlined Sourcing:** A single supplier for the entire robot platform.

VALUE FOR SYSTEM INTEGRATORS

Defensible reliability in pre-sales

We empower integrators with the data and support needed to win bids and minimize post-installation risks:

- ③ **Data-Driven Sales:**
Quantified technical arguments for end customers.
- ③ **Commercial Leverage:**
Documented TCO (Total Cost of Ownership) to prove long-term value.
- ③ **Risk Mitigation:**
Significantly reduced post-installation warranty claims.
- ③ **Expert Validation:**
Specialized support for component selection and validation.

Our Goal: To build a more efficient, secure, and manageable robotic ecosystem, from the initial design to the end user.

TALK TO OUR ENGINEERS

MOTIONCABLES: SPECIAL CABLE SOLUTIONS FOR INDUSTRIAL ROBOTICS.
FORTY YEARS INSIDE AUTOMATION, NOT BESIDE IT

MotionCables is not a catalogue supplier: it is a specialist in dynamic applications. When you bring a technical problem, you speak with an engineer — not with a commercial intermediary.

RESPONSE COMMITMENT

The MOTION**CABLES** technical team responds to enquiries within 2 working days with a preliminary assessment of construction feasibility and applicable certification path. For standard configurations, commercial proposals are issued within 5 working days.

WHAT TO PREPARE FOR THE FIRST CONVERSATION

- ⦿ Robot type and brand, if available.
- ⦿ Axes on which the cable must operate and motion characteristics.
- ⦿ Expected torsion profile and estimated daily cycles.
- ⦿ Required electrical function: power, feedback, data bus, hybrid.
- ⦿ Installation environment: temperature, chemicals, contaminants.
- ⦿ Standards and certifications applicable to the project.



