

Take advantage of the proven, 20 million flex cycle capabilities of any of *flexlife-20* cable designs and eliminate the risk of plant downtime due to cable failure.

TURCK
works

Industrial
Automation

flex
life[®]-20

**Continuous
High-Flex Cable
for Automated
Systems**

- Shorten Installation Time with Quick Disconnect Options
- Reduce Equipment and Plant Downtime
- Provide Higher Reliability with Longer Cable Life
- Lower Maintenance and Operating Costs

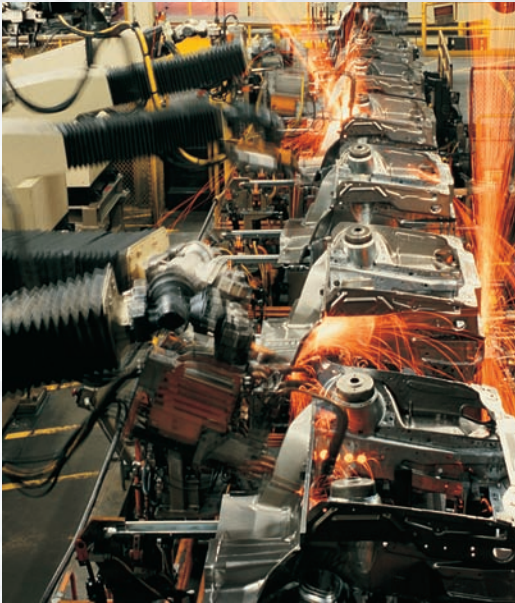


www.turck.com

High Performance Wiring Solution for Automated Systems

The selection of high performance cable for automated equipment, often an afterthought in system design, is an effective solution that can reduce costly plant downtime due to cable failure. As a manufacturer of connectivity, sensing and network products, **TURCK** takes plant downtime seriously. At **TURCK**, we create specific cable and wiring designs for automated robotic, material handling and assembly systems used for product manufacturing and processing applications in the automotive, food/beverage, biotechnology and semiconductor industries. These plants can experience downtime costs from hundreds to thousands of dollars per minute, and depend on the reliability of **TURCK** products to keep their automated systems running.

flexlife-20



Specified by a major automotive manufacturer for all robotic applications.

We Build "Flex" into Every Cable We Design

Our standard PVC and PUR control cables are designed to meet a minimum of 2 million flex cycles. These control cables are still in use years and 7 to 8 million flex cycles later. *flexlife-20*, our latest innovation in high flex cable design, guarantees increased performance to 20 million cycles of continuous flexing, bending and twisting motion found in C-track, robotic and other motion systems.

Your Choice: *flexlife-20* Spooled Cable or Molded Connector Cordsets

Selecting the best cable design can be confusing and costly. Some cable manufacturers assign a different cable to each axis of motion, which may not accurately reflect your application needs. *flexlife-20* cable provides the same superior performance for all types of motion. Choosing *flexlife-20* takes the risk out of specifying for motion applications.



Spooled Cable

reel
fast[®]

minifast[®]

7/8", 1" and 1-1/8" UN thread connector, 2 to 12-pins for AC and DC systems up to 600 V.

multifast[®]

M23 connector, 12 and 19-pins for AC and DC systems, wire consolidation and multi-pin devices.

eurofast[®]

M12 connector in 3-6, 8, 10 and 12-pins for DC systems up to 300 V standard to extra heavy duty designs.

versafast[®]

M16 connector, 5-8, 10, 12 and 14-pins for AC and DC systems up to 125 V.

picofast[®]

M8 connector in 3, 4 and 6-pins for AC and DC systems, snap-lock or threaded metal coupling nut.

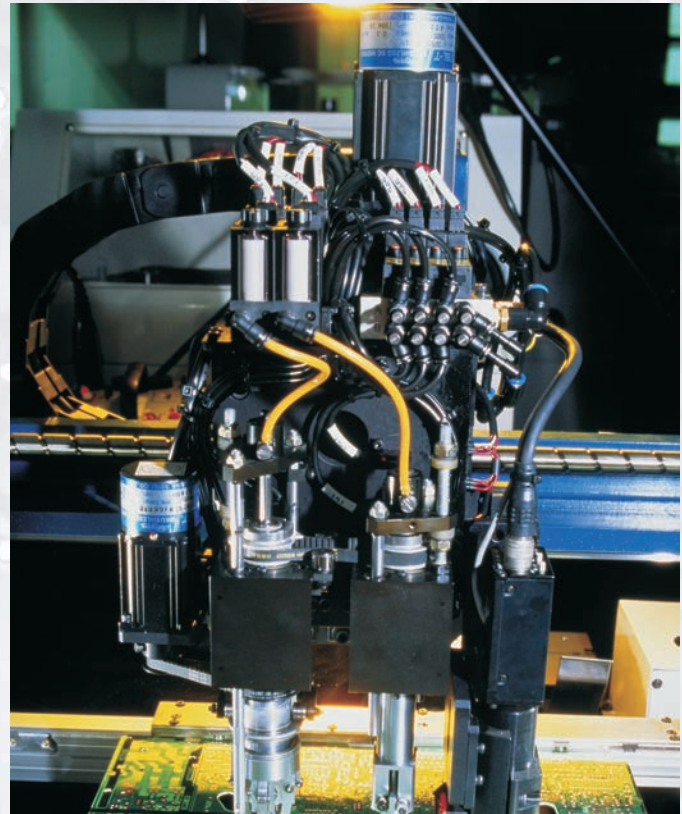


A Design So Revolutionary it Outperforms All Other Robotic Cable!

The superior performance of *flexlife-20* is due to a unique, low-stress cable construction using custom compounded TPE and PUR. The *flexlife-20* design generates less heat while flexing, which prevents deformation and stress to the cable. Other robotic cables often contain high amounts of fillers and less of the high cost base polymer as a cost savings measure. This compromises the flexing properties of the cable, lowering performance and product life.



Continuous Flex Products for Every Industry



TURCK's *flexlife-20* continuous flex cable offers a wide range of standard and custom connectivity solutions, from machine tools and automotive assemblies to medical devices and semiconductor manufacturing.

Industry Exclusive - 20,000,000 Cycle Warranty

To avoid costly downtime of your manufacturing operations, you need reliable cables and connectors. That is why **TURCK** has spent over 5 years developing *flexlife-20* cables and why **TURCK** can offer a 20,000,000 cycle warranty. If your cordset product made with *flexlife-20* cable fails before 20,000,000 cycles, we will replace it. The warranty becomes effective when you complete the 20,000,000 Cycle Warranty Registration and return it to **TURCK**. A **TURCK** authorized representative will visit your site to make any recommendations necessary on the proper installation of your cordset product. Contact **TURCK** at 1-800-544-7769 for the full details of the warranty.



flexlife-20 Cable Specification Guidelines for Motion Systems

Automation systems have special cable design requirements. When making a cable selection it is essential to consider the operating environment, the type of motion and any special mechanical requirements of the system. Understanding the environmental factors of the application will help determine cable insulation materials, bend radius and other essential cable characteristics.

Environmental Operating Conditions

Automation systems operate under a variety of environmental conditions that require cable insulation to be resistant to extremes in temperature, chemicals and abrasion.

- **TURCK Thermoplastic Elastomer (TPE)** is a specially blended polymer of high molecular weight that provides the flexibility of PVC with the wear and chemical resistance of rubber. Excellent for use in most automated applications.
- **TURCK Polyurethane (PUR)** provides the highest abrasion resistance and is impervious to hydraulic fluids and hydrocarbons. Recommended for use in automotive manufacturing applications.

All flexlife-20 Cables Provide:

- Excellent oil resistance
- Cold temperature flexibility to -40°C (-40°F)
- Flame retardant designs - CSA FT-1
- Meets UL and CSA approvals



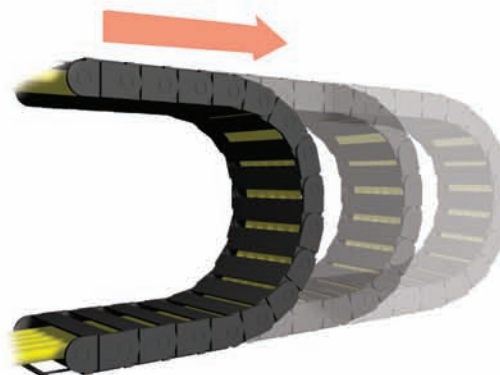
Special Mechanical Requirements

Mechanical considerations for applying the proper bend radius, termination and strain relief need to be observed from system design through installation and first flex cycle. The best method of termination and stress relief for flex cable is molded connectors. Cordsets with molded connectors provide dependable termination and built-in strain relief. Specifying cable with molded connectors will provide added value later by reducing installation time, preventing miss-wiring and making system changes and maintenance a more efficient process.

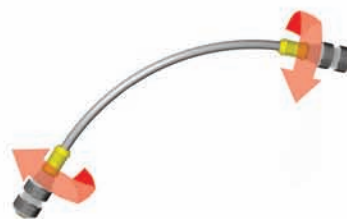
Typical Flexing Motions



Bend Flexing The cable flexes back and forth with one end of the cable in a stationary position. This type of motion is often the result of installation around fixed objects in addition to the applications listed below.



Continuous Flex The cable is rolling or flexing back and forth in a linear motion. C-track is a typical continuous flex application.



Torsional Flex (longitudinal twisting) The cable is twisting and flexing continuously in a clockwise-counter clockwise fashion. Angles can range from 90° to 360°. Torsional flexing is typically found in robotic applications.

Proper installation techniques will maximize the full service life of continuous flex cable. Good installation practices include adhering to local codes and following the installation recommendations of cable, conduit, cable tray and flexible carrier manufacturers.

Due to its high quality construction, *flexlife-20* can be directly installed into C-tracks and other applications without prior steps to un-stress the cable. Many cable manufacturers recommend suspending or laying out cable prior to installation for a minimum of 24 hours. With *flexlife-20*, you can skip this step and shorten the installation time. By installing cable with connectors, you can be up and running even faster. Whether you use cordsets or spooled cable, the following installation guidelines should be observed.

Installing Spooled Cable

Unwind cable from the outer layer of the spool without twisting or creating loops. Do not pull directly from a fixed reel.



Bend Radius and Free Movement of Cable

The recommended bend radius for *flexlife-20* is 10 x cable diameter. The cable must be able to move freely along the bend radius when installed in C-tracks and other motion applications. Check for adequate freedom of movement through several test flex cycles to verify proper installation.

Cables of various diameters installed in cable carriers need a minimum space allowance of 10% of the cable diameter and even weight distribution. *flexlife-20* will not adhere to other cables in a cable carrier. Cables secured with ties to a stationary support or bundled together need to slide freely under the tie without pinching conductors or cables. Whether a molded connector or hardwired cable is used, each end of the cable needs proper strain relief.

Cable Bundling Techniques



Bend Radius for Moving Applications



C-Track










Providing sufficient bend radius will allow the cable to absorb the energy of bending over a greater portion of its length, increasing its effective working life. Small increases in the radius of the bend can produce substantial increases in cable life.

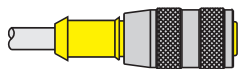
flexlife-20 is available in 30, 100 and 200 meter lengths in spooled, self-feeding packages, or as cordsets, with a choice of industry standard molded connectors. *flexlife-20* cable specifications, part numbers and suitable connector styles are listed below. Consult **TURCK's** Connectivity Catalog for more information on connector styles and cordset options or contact **TURCK** application support at 1-800-544-7769 for custom designs.

flexlife-20, TPE cable styles, UL and CSA approvals, operating temperature, +105°C (+221°F), cold flexibility -40°C (-40°F), 600 V.

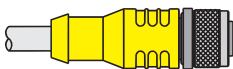
flexlife-20, PUR cable styles, UL and CSA approvals, operating temperature, +90°C (+194°F), cold flexibility -40°C (-40°F), 600 V.

eurofast[®] *flexlife-20*

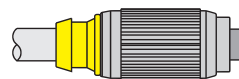
| TPE FL-20 Cable | No. Of Cond. | AWG | Jacket | ID Number | Ship Wt. (lbs) | Conductor Colors | UL | CSA | Type | Temp. (°C) | Connector |
|---|--------------|-----|----------------------------------|---|----------------|--|----|-----|-----------|--------------|-----------|
|  | 3 | 20 | 5.7 mm OD, TPE, GY, FL-20 600 V | RF50940-30M RF50940-100M RF50940-200M | 3 10 20 | BN, BU, BK | • | • | AWM 21002 | 105° -40° | A |
|  | 4 | 18 | 7.2 mm OD, TPE, YE, FL-20 600 V | RF50968-30M RF50968-100M RF50968-200M | 6 19 37 | BK, BU, WH, BN | • | • | AWM 21002 | 105° -40° | B, C |
|  | 4 | 22 | 5.7 mm OD, TPE, GY, FL-20 600 V | RF50941-30M RF50941-100M RF50941-200M | 3 10 20 | BN, WH, BU, BK | • | • | AWM 21002 | 105° -40° | A |
|  | 5 | 22 | 5.7 mm OD, TPE, GY, FL-20 600 V | RF50909-30M RF50909-100M RF50909-200M | 3 10 20 | GY, BN, WH, BU, BK | • | • | AWM 21002 | 105° -40° | A |
|  | 6 | 24 | 5.7 mm OD, TPE, GY, FL-20 600 V | RF50910-30M RF50910-100M RF50910-200M | 3 10 19 | GY, BN, WH, PK, BU, BK | • | • | AWM 21002 | 105° -40° | B |
|  | 6 | 24 | 5.7 mm OD, TPE, BK, FL-20 600 V | RF51111-30M RF51111-100M RF51111-200M | 3 10 20 | GN, YE, GY, BN, BU, WH | • | • | AWM 21002 | 105° -40° | B |
|  | 8 | 24 | 5.7 mm OD, TPE, GY, FL-20 600 V | RF50911-30M RF50911-100M RF50911-200M | 4 11 21 | BU, WH, BN, GN, YE, GY, PK, RD | • | • | AWM 21002 | 105° -40° | B, C |
|  | 10 | 24 | 7.0 mm OD, TPE, BK, FL-20, 600 V | RF51077-30M RF51077-100M RF51077-200M | 5 15 30 | GN, GY, OG, YE, TN, WH, RD, BN, PK, BU | • | • | AWM 21002 | 105° -40° | B |
|  | 12 | 24 | 7.0 mm OD, TPE, BK, FL-20 600 V | RF50943-30M RF50943-100M RF50943-200M | 5 16 31 | RD, GN, OG, TN, GY, VT, YE, BK, WH, BN, BU, PK | • | • | AWM 21002 | 105° -40° | B |



A) Standard M12



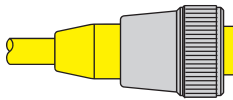
B) "C" Style Medium M12



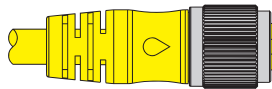
C) "G" Style Large M12

flexlife-20 cables are available in 30, 100 or 200 meter lengths, delivered to you in a spooled, self-feeding package or as a complete molded cordset. Consult factory for cordset options.

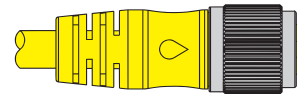
| TPE FL-20 Cable | No. of Cond. | AWG | Jacket | ID Number | Ship Wt. | Conductor Colors | UL | CS | Type | Temp. (°C) | Connector |
|-----------------|--------------|-----|----------------------------------|---|----------------|--|----|----|-----------|--------------|-----------|
| | 3 | 18 | 7.2 mm OD, TPE, YE, FL-20 600 V | RF51173-30M RF51173-100M RF51173-200M | 6 19 37 | BN, BU, GN/YE | • | • | AWM 21002 | 105° -40° | A |
| | 4 | 18 | 7.2 mm OD, TPE, YE, FL-20 600 V | RF50968-30M RF50968-100M RF50968-200M | 6 19 37 | BK, BU, WH, BN | • | • | AWM 21002 | 105° -40° | A |
| | 5 | 18 | 7.2 mm OD, TPE, YE, FL-20 600 V | RF51174-30M RF51174-100M RF51174-200M | 6 20 39 | BK, BU, GN/YE, BN, WH | • | • | AWM 21002 | 105° -40° | A |
| | 6 | 16 | 8.5 mm OD, TPE, YE, FL-20 600 V | RF51044-30M RF51044-100M RF51044-200M | 8 38 76 | BK, WH, RD, OG, BU, GN | • | • | AWM 21002 | 105° -40° | B |
| | 7 | 16 | 9.6 mm OD, TPE, YE, FL-20 600 V | RF51049-30M RF51049-100M RF51049-200M | 10 40 80 | BK, WH, RD, OG, GN, BU, WH/BL | • | • | AWM 21002 | 105° -40° | B |
| | 8 | 16 | 9.6 mm OD, TPE, YE, FL-20 600 V | RF51050-30M RF51050-100M RF51050-200M | 10 40 80 | RD, GN, OG, BU, WH/BK, BK, RD/BK, WH | • | • | AWM 21002 | 105° -40° | B |
| | 9 | 16 | 10.5 mm OD, TPE, YE, FL-20 600 V | RF51051-30M RF51051-100M RF51051-200M | 10 40 80 | BU, RD/BK, GN/BK, WH, RD, GN, BK, WH/BK, OG | • | • | AWM 21002 | 105° -40° | C |
| | 10 | 16 | 10.5 mm OD, TPE, YE, FL-20 600 V | RF51052-30M RF51052-100M RF51052-200M | 11 41 82 | OG/BK, RD, GN, OG, BU, WH/BK, RD/BK, GN/BK, BK, WH | • | • | AWM 21002 | 105° -40° | C |
| | 12 | 16 | 11.2 mm OD, TPE, YE, FL-20 600 V | RF51148-30M RF51148-100M RF51148-200M | 13 43 85 | OG, BU, WH/BK, RD/BK, GN/BK, OG/BK, BU/BK, BK/WH, GN, WH, RD, BK | • | • | AWM 21002 | 105° -40° | C |



A) Standard 7/8"






B) "B" Style Heavy Duty 1"



C) "C" Style Heavy Duty 1-1/8"

flexlife-20 cables are available in 30, 100 or 200 meter lengths, delivered to you in a spooled, self-feeding package or as a complete molded cordset. Consult factory for cordset options.

picofast[®] *flexlife*-20

| PUR-FL-20 Cable | No. Of Cond. | AWG | Jacket | ID Number | Ship Wt. (lbs) | Conductor Colors | UL | CSA | Type | Temp. (°C) | Connector |
|---|--------------|-----|---------------------------------|---|----------------|------------------------|----|-----|------------|-------------|-----------|
|  | 3 | 24 | 4.5 mm OD, PUR, BK, FL-20 600 V | RF51166-30M RF51166-100M RF51166-200M | 2 6 11 | BN, BU, BK | • | • | AWM 20626 | 90° -40° | A, B |
|  | 4 | 26 | 4.4 mm OD, PUR, BK, FL-20 600 V | RF50935-30M RF50935-100M RF50935-200M | 2 6 11 | BN, WH, BU, BK | • | • | AWM 20626 | 90° -40° | A, B |
|  | 6 | 26 | 5.2 mm OD, PUR, BK, FL-20 600 V | RF51082-30M RF51082-100M RF51082-200M | 3 8 15 | BN, WH, BU, BK, GY, PK | • | • | AWM 220626 | 90° -40° | A, B |








A) M8 Threaded



B) M8 Snap-Lock

versafast[®] *flexlife*-20




| TPE FL-20 Cable | No. Of Cond. | AWG | Jacket | ID Number | Ship Wt. | Conductor Colors | UL | CS | Type | Temp. (°C) | Connector |
|--|--------------|-----|---------------------------------|---|---------------|--|----|----|-----------|--------------|-----------|
|  | 7 | 18 | 8.4 mm, OD TPE, YE, FL-20 600 V | RF51149-30M RF51149-100M RF51149-200M | 9 39 78 | BK, WH, RD, OG, BU, GN, WH/BK | • | • | AWM 21002 | 105° -40° | A |
|  | 10 | 24 | 7.0 mm, OD TPE, BK, FL-20 600 V | RF50954-30M RF50954-100M RF50954-200M | 5 15 30 | GN, GY, VT, YE, BK, WH, RD, BN, PK, BU | • | • | AWM 21002 | 105° -40° | A |
|  | 12 | 22 | 7.6 mm, OD TPE, BK, FL-20 600 V | RF50999-30M RF50999-100M RF50999-200M | 6 19 38 | RD, PK, YE, GN, WH, BU, BN, OG, BK, GY, TN, VT | • | • | AWM 21002 | 105° -40° | A |
|  | 14 | 22 | 7.6 mm, OD TPE, BK, FL-20 600 V | RF51000-30M RF51000-100M RF51000-200M | 6 20 40 | BN, OG, TN, BU, GN, PK, RD, WH, BK, RD/BU, GY/BN, YE, GY, VT | • | • | AWM 21002 | 105° -40° | A |
|  | 19 | 22 | 8.5 mm, OD TPE, BK, FL-20 600 V | RF50997-30M RF50997-100M RF50997-200M | 8 26 52 | BN, TN, BU, YE/BN, GN, WH/YE, PK, BN, GN, BK, WH/GN, RD/BU, GY/PK, OG, GY, RD, WH, VT, GY/BN, YE | • | • | AWM 21002 | 105° -40° | A |

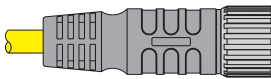


A) M16 Threaded

flexlife-20 cables are available in 30, 100 or 200 meter lengths, delivered to you in a spooled, self-feeding package or as a complete molded cordset. Consult factory for cordset options.

multifast® flexlife-20

| TPE FL-20 Cable | No. Of Cond. | AWG | Jacket | ID Number | Ship Wt. | Conductor Colors | UL | CS | Type | Temp. (°C) | Connector |
|---|--------------|----------|--|---|---------------------|--|----|----|-----------|-------------|-----------|
|  | 12 | 18 | 9.3 mm OD, TPE, YE, FL-20 600 V | RF50915-30M RF50915-100M RF50915-200M | 13 43 85 | BU/WH, GN/YE, BN, BU, WH, OG, YE, GN/WH, BN/WH, GY, PK, RD | • | • | AWM 21002 | 105° -40 | A |
|  | 19 | 18 22 | 9.3 mm OD, TPE, YE, FL-20 600 V | RF50916-30M RF50916-100M RF50916-200M | 12 38 75 | (22 = WH, GN, YE, GY, PK, RD, BK, VT, GY/PK, RD/BU, WH/GN, BN/GN, WH/YE, YE/BN, WH/GY, GY/BN), (18 = BN, BU, GN/YE) | • | • | AWM 21002 | 105° -40 | A |
|  | 19 | 18 | 12.2 mm OD, PUR, YE, FL-20 600 V | RF50926-30M RF50926-100M RF50926-200M | 19 63 12 6 | WH, GN, YE, PK, RD, BK, VT, BU, GY, BN, GY/BN, YE/BN, GN/YE, GY/PK, RD/BU, BN/GN, WH/GN, WH/YE, WH/GY | • | • | AWM 20626 | 105° -40 | A |



A) M23 Threaded

flexlife-20 cables are available in 30, 100 or 200 meter lengths, delivered to you in a spooled, self-feeding package or as a complete molded cordset. Consult factory for cordset options.

flexlife-20 Tests to 20,000,000 Flex Cycles and Beyond

Our Flex Testing Protocol is designed to replicate the application environment continuous flex cables would endure while installed in the most abusive automated systems. Applications such as robotic assembly in automotive plants, pick-and-place machines, packaging equipment and automated medical test equipment where the combined multi-axis motions of twisting, bending and continuous flexing occurs 24/7 for many millions of cycles.

Torsional Flex Test

The cable is subjected to 360° torsion “twisting” while the cable rolls back and forth over a pulley at a rate of 30 cycles per minute. This test runs continuously to replicate an abusive robotic application.

Bend Flex Test

This test simulates cable installed to fit around devices where the cable repeatedly bends on a 180° plane, back and forth over a 6-8 inch radius at a rate of 30 cycles per minute. This “tic-toc” motion simulates many different extreme motion applications.

TURCK flexlife-20 cables are tested on our internal cable 'torture' machine. Test parameters and results are as follows. Note that the cables are still in test as there have not been any failures yet!



See test in motion at www.turck-usa.com/products/connectivity/reelfast/

| Rolling/Torsional Test (Twist and Roll) | |
|---|--|
| Parameters | |
| Bending Radius | 10 x OD |
| Travel Distance | 1.0 ft (30.5 cm) |
| Cycle Time | 2 seconds |
| Acceleration | Varies up to 26 ft/s ² (792 cm/sec ²) |
| Temperature Range | +16°C to +23°C (+61°F to +73°F) |
| Speed of Travel | 6.5 to 13 ft/s (198 – 396 cm/s) |
| Torsional Stress | ±160°/ft (±520°/meter) |
| Results | |
| 6 Conductor 24 AWG | 31 million (still going) |
| 12 Conductor 18 AWG | 36 million (still going) |

| Bending Flex Test (Tic-Toc) | |
|-----------------------------|--|
| Parameters | |
| Bending Radius | 10 x OD |
| Bending Angle | ±90° from horizontal |
| Cycle Time | 2 Seconds |
| Acceleration | Varies up to 26 ft/s ² (792 cm/s ²) |
| Temperature Range | +16°C to +23°C (+61°F to +73°F) |
| Results | |
| 6 Conductor 24 AWG | 33 million (still going) |
| 12 Conductor 18 AWG | 38 million (still going) |
| 19 Conductor 18 AWG | 30 million (still going) |

TURCK
works

Industrial
Automation

flexlife-20
UNFAIR!

GIVE US OUR
BREAKS

DOWN
TIME
IS OUR
TIME

ROBOTS
UNITE!

WE
WANT
A
REST!

Say **NO** to
Longer
Service
Intervals

MACHINE
RIGHTS!

EN
ALF
Y!!

Guaranteed for
20,000,000 cycles

Extend your service intervals with *flexlife*[®]-20 cordsets

**20-million cycle warranty and the
most durable connectors virtually
eliminate unplanned downtime.**

In two years of continuous torsion stress and flexing tests, the new *flexlife-20* outperformed every other cable in robotic, continuous flex, bending, twisting, high speed and C-track applications.



Contact your local
TURCK Distributor for details.



- Select from connector styles for cordsets in any length
 - M8 *picofast*[®]
 - M12 *eurofast*[®]
 - M16 *versafast*[®]
 - 7/8-16 UN *minifast*[®]
 - 1-16 UN *minifast*[®]
 - 1 1/8-16 UN *minifast*[®]
 - M23 *multifast*[®]

- Cable diameters from 4.4 to 12.2 mm and gauges from 16 to 26 AWG; conductors from 3 to 19

Call us with your next application:
1-800-544-7769
email: turckusa@turck.com
www.turck.com

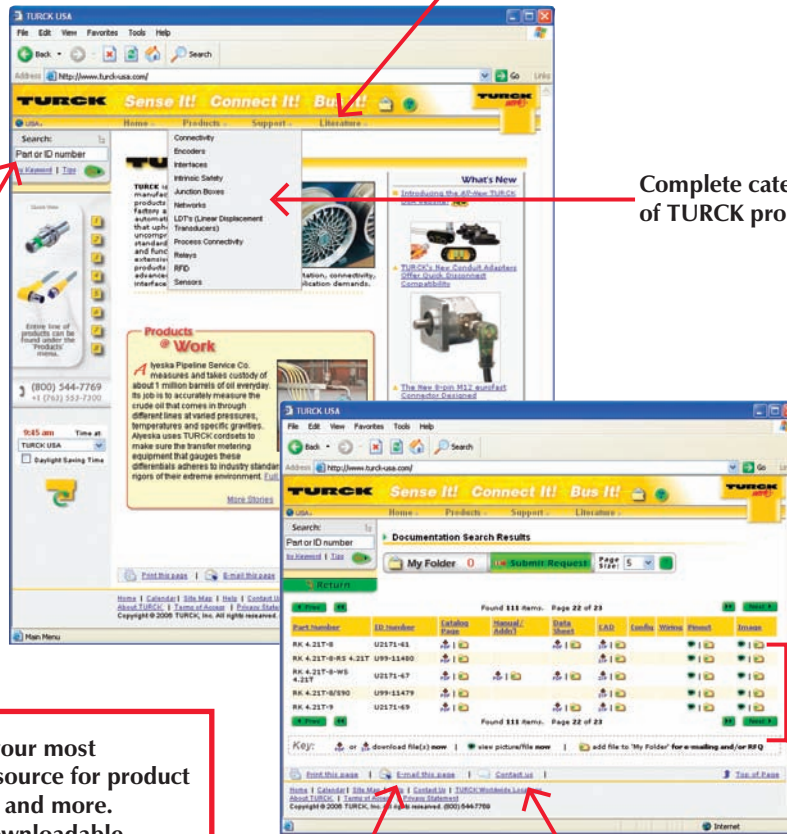
....**Sense It!**....**Connect It!**....**Bus It!**

....Sense It!....Connect It!....Bus It!

Access to all TURCK catalogs, press releases, white papers and tutorials

Complete category listing of TURCK products

Search for products by part number, ID number or key word



Access to CAD, wiring and pinout diagrams

Download or e-mail files, request for quote

Option to e-mail pages

Contact a TURCK representative

TURCK's USA website is your most complete and up-to-date source for product documentation, CAD files and more. Search results produce downloadable documentation or request for quote (RFQ). Additional product information or CAD files are easily requested and promptly filled.

Visit our site for new product releases, approvals, white papers, application support and more.

www.turck.com

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