



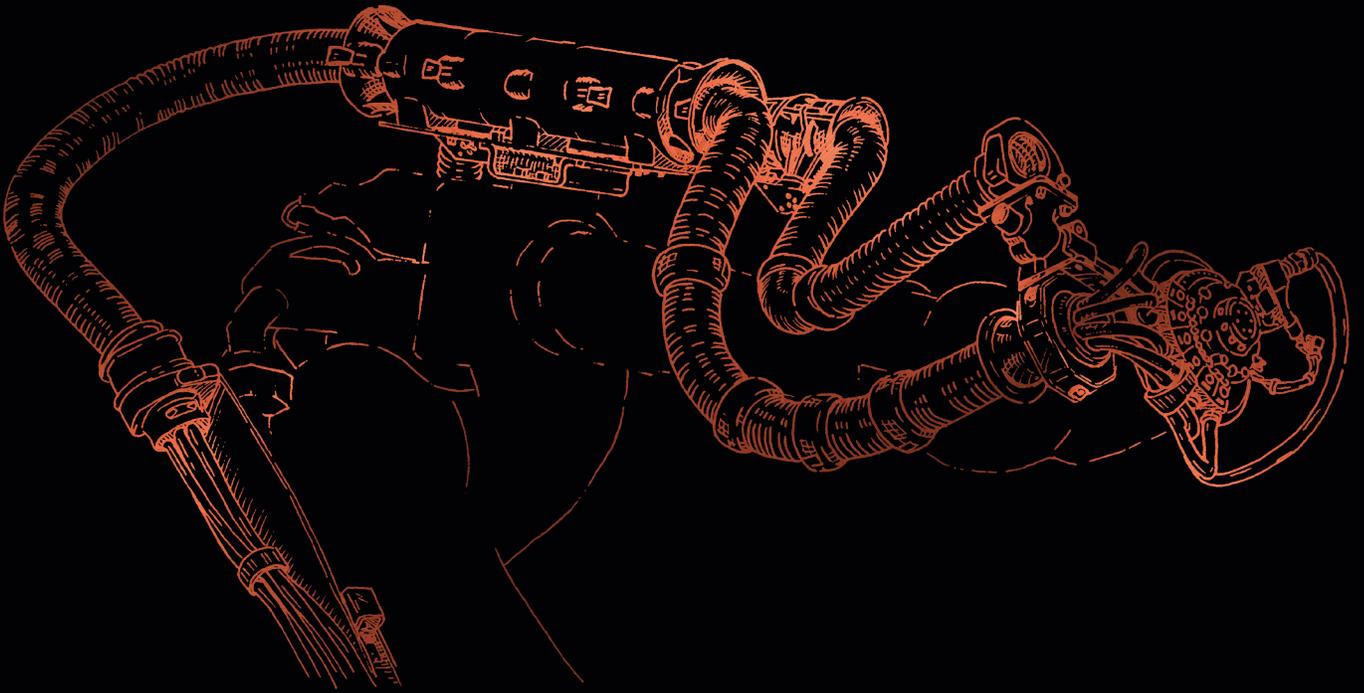
HELUKABEL®



RAM SOLUTIONS, LLC

HELUROBOTICS®

ROBOTIC DRESS PACKS



**(Channeling
POWER)** 

HELUROBOTICS®

Electrical system solutions for industrial robots

In the industrial automation sector, robotics are at the forefront of innovation, allowing companies to enhance efficiency and safety to reshape the manufacturing and production landscapes. Sophisticated robotic systems have enabled unparalleled levels of precision and consistency in applications such as spot, laser, and inert gas welding, material handling, and tool-changing systems. With their ability to execute intricate tasks with repetitive accuracy, robots are now indispensable in industries requiring meticulous attention to detail, from electronics assembly to automotive manufacturing.

The 3D motion sequences of an industrial robot are only as good as the cables that transmit power and data, as well as the guidance and protection systems that prevent these pivotal components

from being interfered with by environmental hazards. Between its ROBOFLEX® portfolio of torsion-resistant control, data, motor and sensor cables, and its Robotec Systems dress packs, HELUKABEL has over 25 years of experience developing electrical system solutions for the robotics field.

With the industrial robot market growing rapidly around the globe, the HELUKABEL Group decided to rebrand its robotics business under a new name – HELUROBOTICS®. By unifying under a single brand, HELUKABEL can enhance customer recognition of its robotic capabilities while also strengthening its competitive position by being able to adapt and respond more rapidly and efficiently to evolving customer demands in dynamic markets.

WHAT ARE ROBOTIC DRESS PACKS

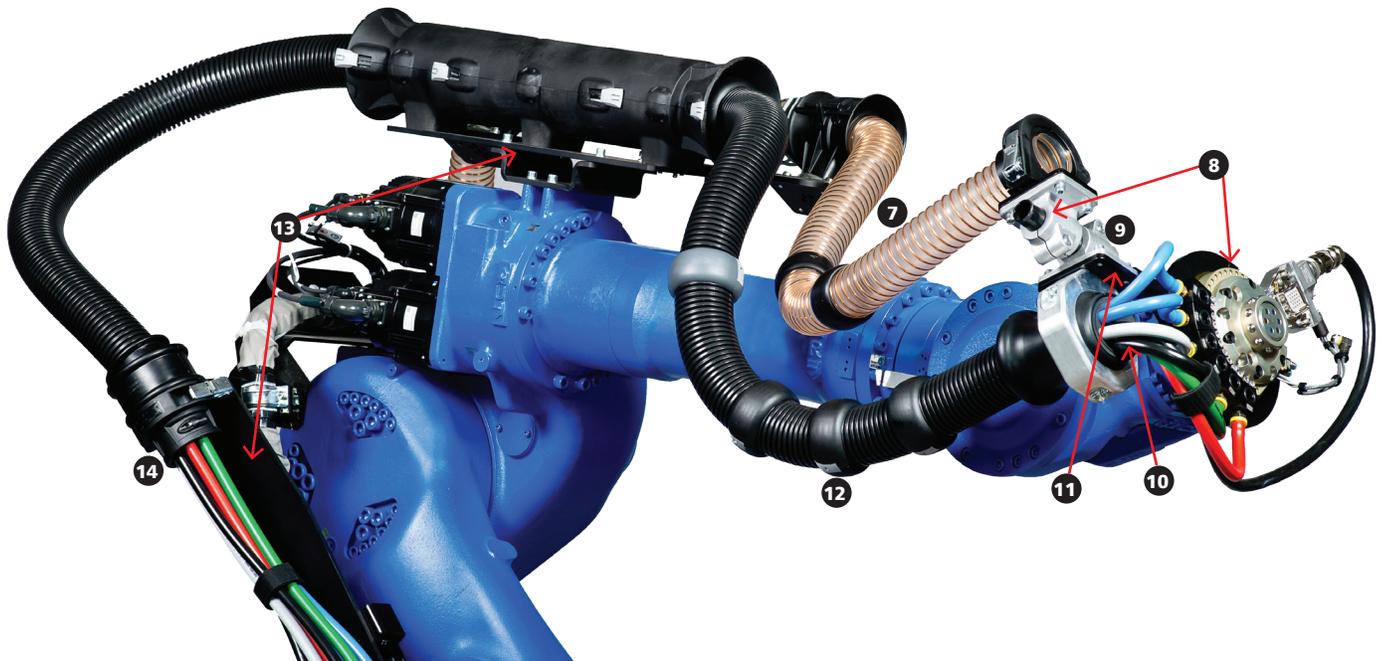
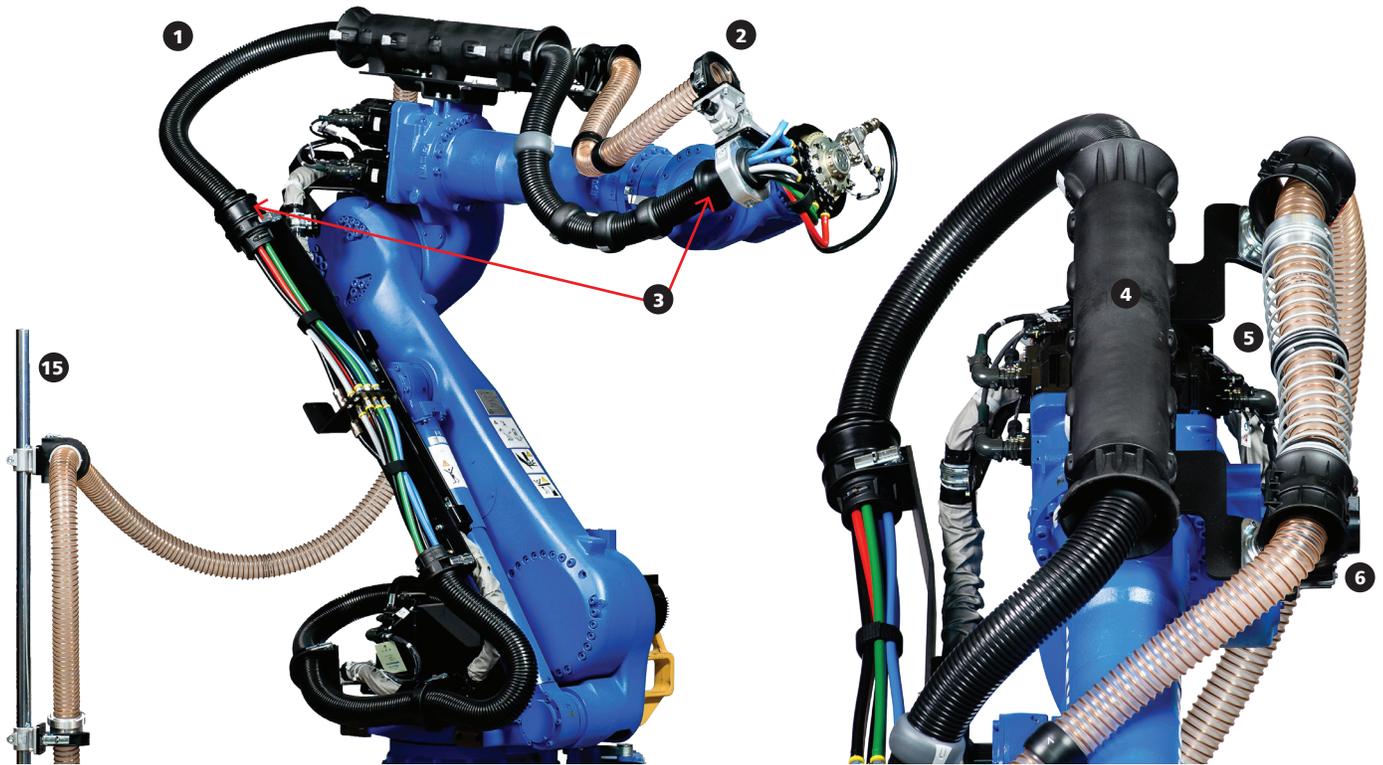
Dress packages (a.k.a. dress outs, umbilicals, utility supply systems, etc.) provide an organized way of protecting the fill package from environmental hazards, which helps reduce time spent on preventative maintenance. Any industrial robotic application where an End Of Arm Tool (EOAT) needs various power or data transmission such as servo power, welding power, water supply, Ethernet communication, etc. needs a dress pack.

Robotic dress packs are tasked with protecting, managing, securing and guiding cables and hoses over millions of work cycles. These high demands

place an enormous amount of stress on every component within the system. Unfortunately, failures will occur. It's a matter of when, not if a problem will arise. Over 85 percent of robotic downtime is attributed to fill package failure.

In order to mitigate failures in the best way possible, it is important to select solutions from an application-specific, as well as an overall system, point of view. In other words, each robot has a task to perform. Therefore, dress packs should be specifically designed around the complete work cycle of each task.

Robotic Dress Pack System



- 1. Corrugated Tubing / Flexible Conduit
- 2. System Holder
- 3. Articulating Joints
- 4. Spring Return System - Enclosed
- 5. Spring Return System - External

- 6. Trumpet
- 7. Vacuum Hose
- 8. Ring Clamp with Pipe
- 9. Pipe Clamp
- 10. Cable & Hose Strain Relief

- 11. Adapter Plate
- 12. Impact Protector
- 13. Metal Support Bracket
- 14. Strain Relief Retainer
- 15. Precision Tubing

Dress Pack Components

SPRING RETURN SYSTEM

Sometimes called a recirculation system, the spring return system allows safe movement of the service loop portion of the corrugated tubing between Axis 3 and Axis 6. There are two types: enclosed and external.

(A) Enclosed

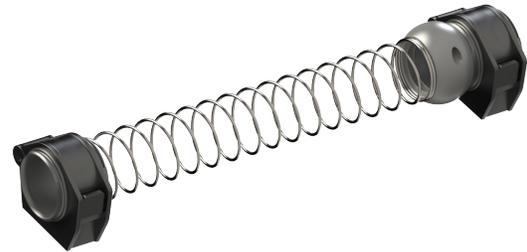
The HELUKABEL Ro-Box can be stacked three high with no additional support brackets, employs a more efficient/durable compression spring technology, and has three spring tension specifications to match force calculations based on the fill package. Additionally, it utilizes the “quick clip” system, which are plastic clips that join the half shells together. This allows for quicker installation and changeout of the essential dress pack components (corrugated tubes, fitted wires/hoses) without tools or other hardware.



(A)

(B) External

Operates on the same concept as the enclosed system without the addition of the energy tube. The external system is less robust; therefore, it's typically used for vacuum tubing or when lighter hoses are added to accommodate EOAT retrofits.



(B)

ARTICULATING JOINTS

Articulating joints are used when spherical movement of the corrugated tubing is needed at Axis 6. Structurally, the articulating joint must be very robust in order to withstand the mechanical stress it will endure. Two styles of joints are seen in the field.

(A) Two-piece

This joint offers angular movements ranging between +/- 11°.



(A)

(B) Ball and socket

Similar to a Heim joint, ball joint or gimbal, it provides spherical “relief” at the exit point of the fill package. It offers angular movements ranging between +/- 15°.



(B)

SYSTEM HOLDER

This one piece system joins the corrugated tubing to the metal support brackets or pipe holders. It can be installed in a fixed position or on a pivot bearing/rotating flange allowing movement when needed.



TRUMPET

Used for guiding corrugated tubing as well as part of an external spring return system. The trumpet can be secured to a pivot bearing when movement is needed in the midsection of a corrugated tubing run.



CORRUGATED TUBING / FLEXIBLE CONDUIT

This is the fill package's first level of protection. The corrugated tubing covers the cables and hoses for the majority of their length starting at the base plate below Axis 1 to their exit at Axis 6. The most widely used material is polyamide (PA12). Polyvinyl (PV), polyurethane (PU), and other materials can be utilized based on the environment and/or the application. It is important to allow enough slack in order to avoid catastrophic failures, unnecessarily exposing the fill package.



IMPACT PROTECTOR

Used to minimize wear and tear of the corrugated tubing as it "snakes" over the robot arm. It can also be utilized in repair situations as a way to connect two pieces of corrugated tubing. It is important to consider using versions without screws as this will damage the paint and sometimes the robot's aluminum casting. HELUKABEL offers the "quick clip" system, which secures the two halves without tools, and can rotate freely on the corrugated tube.



STRAIN RELIEF RETAINER

This component marries the corrugated tubing or the system holder and the cable star. These are installed on each end of the robot.



CABLE & HOSE STRAIN RELIEF

This is widely known as a cable star. It is essentially a custom engineered grommet, similar to a multi-hole cable gland, that is placed at each end of a corrugated tubing run. This ensures the fill package is securely held in place and minimizes lateral push/pull movement. Due to the variations of fill packages, this component is custom designed and cut to each dress pack.



RING CLAMP WITH PIPE

This metal support item secures the dress pack to Axis 6 with the use of a pipe clamp. Typical failures are weld breakage and bending of the pipe section. These failures could possibly cause irreparable damage to the EOAT. It is also referred to as the tennis racket, frying pan and/or wrist support within the industry.



PIPE CLAMP

Connects and secures the system holder to either an Axis 6 ring clamp or a precision tube. The mounting flange serves as a holder for the pivot bearing and base plate.



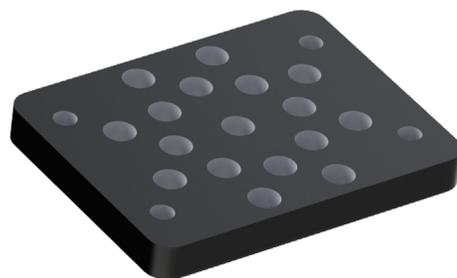
METAL SUPPORT BRACKET

The metal support brackets ensure the foundational strength of any dress pack system securing the entire system to the robot castings. Structural grade steel such as 1.0037 or A36 should be utilized. Aluminum extrusions are less expensive, but will fail prematurely.



ADAPTER PLATE

Secures the system holder to a pipe clamp. Multiple holes are drilled and tapped allowing the system holder to be placed at an optimum angle. This decreases stress on the corrugated tubing.



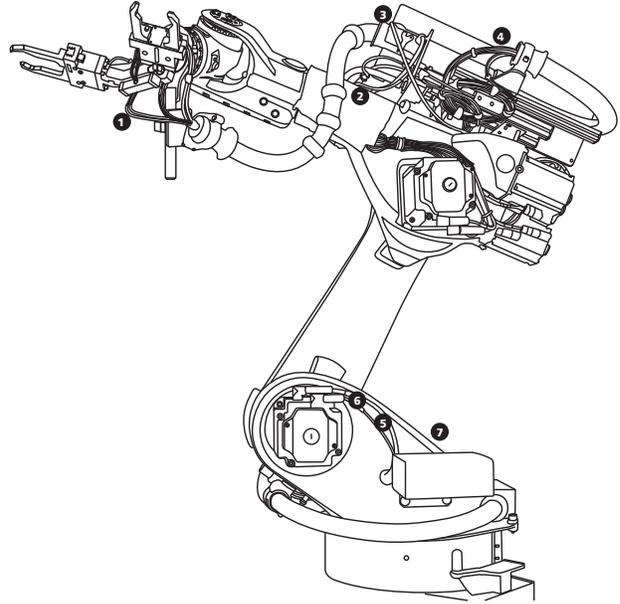
PRECISION TUBING

Galvanized steel pipe is utilized when metal brackets are not cost effective or may restrict movement of the dress pack. Most often used when a secondary dress pack bypasses the base plate of the robot.



Robot Power & Control

Cables and wires from HELUKABEL have many different purposes in robotics. They can transmit power, data and control signals – in some cases, all three at once. For robots to reliably perform every movement, the cables installed must have an appropriate design, e.g. torsion resistance if used in the dress pack or continuous flex if used within the robot's drive/control system, and be made of the appropriate materials.



1 Sensor cables such as HELUDATA® ROBOFLEX®-RECYCLE PUR UL/CSA transmit signals from the sensors fitted on the robot to the respective receiver. This is used for position detection as well as for displacement and force measurement, for example.



2 Data cables such as PROFINET Type R transmit a wide variety of information from the robot to the external systems – from sensor data to camera images and videos. Seamless data transmission is required for production and condition monitoring as well as for a smart production network.



3 Control cables such as HELUCONTROL® ROBOFLEX®-D PUR UL/CSA transmit signals that control individual components on the robot. When connected to a controller, you can instruct a gripper to open or close, for example.



4 Power cables such as a robot's PRIMARY CABLE have high torsion resistance and flexing capabilities that makes them suited for providing power to the EOAT in extreme automated applications such as welding and material handling.



5 Servo cables such as TOPSERV® 109 PUR supply power to the numerous servomotors on the various axes of the robot. Additionally, the tools fitted to the robot's arm are set in motion by these motors.



6 Feedback cables such as TOPGEBER® 512 PUR are used to control the servomotors. The electrical signals specify how far, at what speed, and in what direction a robot axis moves, for example.



7 Ground conductors such as the SINGLE 602-RC-J are used for grounding the robot. They protect the equipment and the operator against current leakage and electric discharge.





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