



Appendix 1

Order Description

Manufacture of Parts, Assembly, Testing and Documentation for two Body Clip Tool Application.

1. Introduction

The following SOW is for an automated feeding system for Automatic application of one-piece clips. The machine is intended to perform body clip application on cable harnesses with different cross-sectional diameters, in a moving line according with OEM's requirements or Aptiv's POS requirements for body clips process.

The machine shall come with all the necessary electronics and control logic ready to be integrated on an industrial robotic arm and perform the process in fully automatic with zero operator intervention.

The contract is for the supply of two robotic tools.

Tool arrangement:

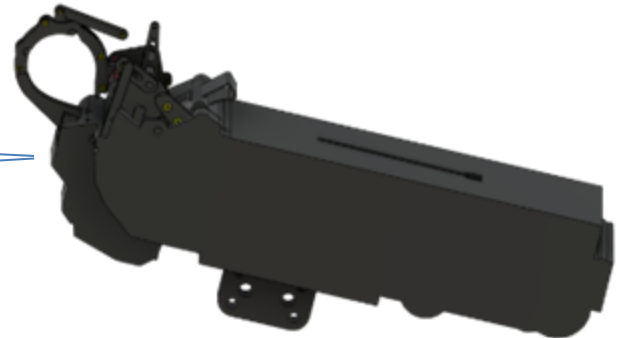
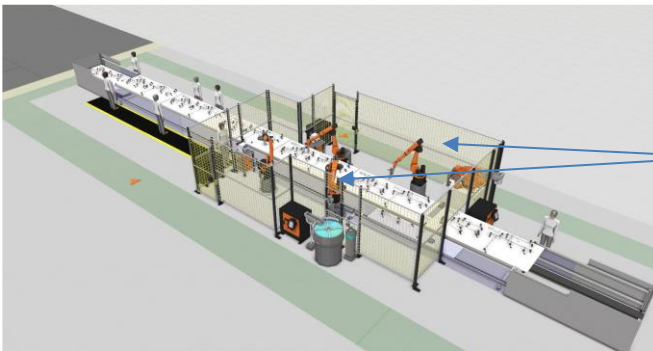


Figure 1 tools arrangement on the line

2. Corporate Specification and Legal Requirements

Supplier agrees to comply with the latest revisions (unless otherwise specified) of the following Core Safety Specifications and International Safety Standards. Compliance with International Safety Standards is required, which apply to specific types of custom-built machinery. Any deviation by the supplier from these specifications must be approved in writing by the Global Occupational Health and Safety Officer.

Specification / legal requirements	summary
1. Export Control Classification Number ECCN	US requirement The ECCN is an alphanumeric code such as 3A001 that describes the product and indicates the export license requirements.
2. Machinery Hazard Identification and Risk Assessment Requires Machinery Risk Assessment Analysis (or equivalent)	The risk assessment of machinery must comply with the requirements set out in ISO standards.



3. Aptiv Electrical/Electronic Architecture ESD Engineering Specification C-9000	Not applicable
4. Machinery EHS Checklist	The requirements of the machine EHS checklist must be followed.
5. Sound Level Specification for Equipment Suppliers 6. Sound Level Specification Test	The 8-hour time-weighted average (TWA) of the A-sound level must not exceed 80 dBA at ANY of the designated measurement locations within the machine's measurement envelope and within the operator's hearing zone while the machine is operating.
7. Design-In Ergonomics Guidelines and Design-In Ergonomics Checklist for Equipment or Workstation	Machines must meet all country-specific ergonomic requirements, or failing that, comply with Aptiv's ergonomic guidelines.
8. Equipment Energy efficiency guidelines	Energy efficiency is one of the procurement evaluation criteria. The supplier should consider opportunities to improve energy efficiency and operational control when designing new equipment. The supplier will consider opportunities to improve energy efficiency and operational control when designing new equipment in accordance with the Aptiv Equipment Energy Efficiency Guidelines.
<i>The latest version of the following ISO standards applies:</i>	
9. ISO 4413 Standard for hydraulics	
10. ISO 4414 Standard for pneumatics	
11. ISO 10218-1 Robots and their accessories	
12. ISO 10218-2 Integration of robots and robotic devices	
13. ISO/TS 15066 Robots and robotic devices - Collaborative robots	
14. ISO 1161 Safety of machinery - Integrated manufacturing systems - Basic requirements	
15. ISO 12100 Safety of machinery - general design principles - risk assessment and risk reduction	
16. ISO 13849-1:2006 Safety of machinery - Safety-related components of control systems - Part 1: General design principles	
17. ISO 13850 Safety of machinery - Emergency stop - Design principles	
18. ISO 13854 Safety of machinery - Minimum clearances to avoid crushing parts of the human body	
19. ISO 13855 Safety of machinery - Arrangement of safeguards in relation to the approach speed of parts of the human body	
20. ISO 13856 (all parts) Safety of machinery.	
21. ISO 13857 Safety of machinery - Safety distances to prevent upper and lower limbs from reaching danger zones	
22. ISO 14118 Safety of machinery - Prevention of unexpected start-up	

23.	ISO 14119 Safety of machinery - Locking devices associated with guards - Principles of design and selection	
24.	ISO 14120 Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards	
25.	ISO 14122 (all parts) Safety of machinery - Permanent means of access to machinery	
26.	IEC 60204-1 Safety of machinery - Electrical equipment of machines - Part 1: General requirements	
27.	IEC 61496-1 Safety of machinery - Electrosensitive. Protective equipment - Part 1: General requirements and tests	
28.	IEC 61800-5-2 Adjustable speed electrical drive systems - Part 5-2: Safety requirements - Functional	
29.	IEC/TS 62046 Safety of machinery - Use of protective equipment to detect the presence of persons.	
30.	IEC 62061 Safety of machinery - Functional safety of safety-related electrical, electronic and programmable electronic control systems	
31.	ISO 3864-1 Graphical symbols - Safety colors and safety signs - Part 1: Design principles for safety signs and safety markings	
32.	ISO 11151-1 and ISO 11151-2 - Lasers and laser equipment - Standard optics	
33.	IEC 60825-SER Ed. 1.0 b - Safety of laser products	
34.	ISO 11553-1 - Safety of machinery - Laser processing machines	
35.	ISO 11929; ISO 7212 - Ionizing radiation	
36.	IEC 61340-5-1 - Electrostatics - Part 5-1: Protection of electronic devices against electrostatic phenomena - General requirements	
37.	IEC/TR 61340-5-2 - Electrostatics - Part 5-2: Protection of electronic devices against electrostatic phenomena - User's manual	

3. Operation sequence and operator interface

4. Process

The process involved is body clip application and consists of applying clips in the harness with the correct application.

Raw material:



Figure 2 - Firtree Clips

Process Quality points in consideration:

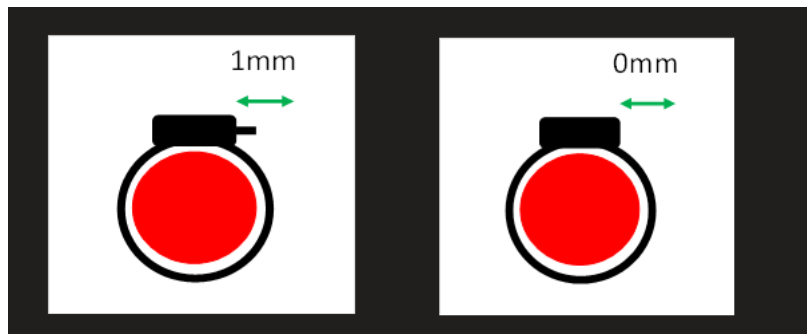


Figure 3 - Tie Cut

Figure 4 - Body Clip movement in the Harness

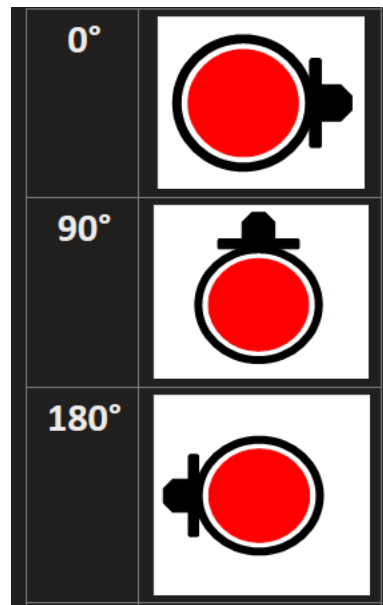


Figure 5 - Body Clip Orientation

5. MACHINE REQUIREMENTS

The machine shall work properly without any disturbance that affect the result of the process and/or capacity and respect the following list of requirements:

- I. The machine shall detect the presence of the body clips in the tool.
- II. The machine shall have a system to detect a jam in the gripper.
- III. The machine need to have pressure control to apply the clips.
- IV. The machine need to have cutting adjustment for the tie (0 to 2 mm).

6. SOFTWARE REQUIREMENTS

The machine shall be programmable/adjustable in the following parameters:

- I. Torque force application
- II. Tie Cutting end
- III. Log file data

7. APPROVAL REQUIREMENTS

7.1 MACHINERY BUYOFF OR ACCEPTANCE TEST

- 7.1.1 Agreement between Aptiv and the supplier before the design approval process. Include any specific Aptiv procedure in this section as necessary.

7.2 DESIGN APPROVAL

- 7.2.1 A Risk Assessment is required to be completed per the Aptiv Design In Health and Safety Specification. The requesting manufacturing engineer is responsible for ensuring the risk assessment is completed prior to completion of the Design Review.
- 7.2.2 Aptiv Business Unit's employees may visit the supplier's facility for a design review. Interim design reviews can be arranged as needed throughout the design process. Design approval



does not relieve the supplier of the responsibility for the proper operation of this system and conformance to this specification.

- 7.2.3 Design and build must conform to the most recent revision of the applicable specifications. The ordering engineer must approve any deviation.
- 7.2.4 Prior to machinery build, the supplier is **REQUIRED** to send all drawings for power distribution, controls, panel layouts, machine plan view, and electrical bill-of-material to the ordering engineer for written approval. Failure to do so may delay shipping.

7.3 PROJECT STATUS REPORTS

- 7.3.1 Project status must be reported via email to Aptiv Business Unit's Manufacturing Engineer responsible for the project on the first day of each month until project completion.
- 7.3.2 In the event that any milestone is not achieved, notification including the action required to put the project back on schedule must be communicated immediately.

7.4 BUILD REVIEW

- 7.4.1 Aptiv Business Unit's representatives may visit the supplier's facility during the build phase to evaluate status. At a minimum the Project Status Reports must keep Aptiv Business Unit's representatives informed of the build status.

7.5 MACHINE ACCEPTANCE

- 7.5.1 The machine acceptance will be conductive in three phases.
- 7.5.2 Pre-Buyoff
- 7.5.3 The supplier must perform a pre-buyoff and provide a written performance report to the Aptiv Business Unit's Manufacturing Engineer responsible for the project.
- 7.5.4 The supplier will follow the Aptiv Business Unit's Standard Equipment Acceptance Plan
- 7.5.5 Following the successful completion of the pre-buyoff, a Aptiv Business Unit representative will perform a machine buyoff at the supplier's facility.
- 7.5.6 The ordering engineer is responsible for completing the Aptiv Machinery EHS Checklist
- 7.5.7 The buyoff will be conducted in the same manner as the pre-buyoff.
- 7.5.8 The buyoff will review the conditions of this specification and identify any discrepancies especially concerning issues identified in the Risk Assessment.
- 7.5.9 Final Acceptance
- 7.5.10 Machine final acceptance will be performed at the Aptiv Business Unit Primary Manufacturing Location (PML) following installation.
- 7.5.11 The ordering engineer is responsible for completing the Aptiv Machinery EHS Checklist
- 7.5.12 Machine final acceptance will follow the Aptiv Business Unit's Standard Equipment Acceptance Plan for the specified process.
- 7.5.13 The machine final acceptance will verify that all conditions of the SOW have been satisfied.

8. DOCUMENTATION

It is important that prints for manufacturing machinery meet Aptiv Business Unit's standards for machinery drawings. Maintenance cannot effectively repair machinery without good documentation. EDR-01 specifies electrical documentation requirements. Sufficient mechanical drawings to allow technicians and engineering to make repairs or improvements including assemblies and tooling should be requested.

All drawings, diagrams generated in this project will be owned by Aptiv in its latest version and in an editable format.

A list of recommended spare parts with the Original Item Manufacturer (OIM) part name and part number cross referenced to the Original Equipment Manufacturer (OEM) part name and number should be requested. This applies to any chemical supplies as well as mechanical and electrical parts.

Software documentation needs may vary greatly depending on the nature of the software. The original documentation set should be included with third party software. If custom software is provided, source code should be requested, especially if any future software modification is possible.



Manuals for working on the machine, standard components and sub/systems must be available in English in all local languages from countries where Aptiv has plants.

Documentation must be provided in paper and electronic (PDF) version.

At minimum manual must include:

Operators manual:

- How to work with machine in a safety manner,
- What to do before/after work,
- Visual aids,

Maintenance manual:

- Safety checklist,
- Installation instructions,
- Calibration procedures if applicable,
- Operational troubleshooting of common machine problems and solutions,
- Preventive maintenance schedules, procedures with lubricants to be used,
- Clear and precise definition of tools needed for each maintenance routine,
- Safety data sheets of the lubricants to be used,
- Maintenance troubleshooting,
- Machinery consumption of Air and Power,
- Detailed electrical scheme,
- Detailed pneumatic scheme,
- Troubleshooting,
- Clear definition of tools needed for each routine with detailed instruction with pictures.

Note: No flammable lubricants are allowed

Spare parts list:

- Machine assembly views that reference vendor part numbers
- Exploded views of all machine parts (arrangement views with parts called out)
- Bill of material
- Spare parts list divided in 3 categories:
 - Category 1: in plant stock of spare parts that the workstation depends on to operate properly. Parts one cannot predict when it will fail/break.
 - Category 2: regional stock of spare parts that are subject to wear and has a predicted lifespan. Parts that has a predicted lifecycle.
 - Category 3: in supplier's stock of spare parts that the workstation does not depend on to perform its operations.

Process / EHS documentation:

- Risk assessment
- CE
- PFMEA
- EHS checklist

All deviations / exceptions must be agreed with ordering engineer from Aptiv.

9. PRODUCT(S) AND EXISTING EQUIPMENT

The product is all LV cable harnesses that require covering using adhesive tape, no specific product is selected for this development. APTIV filled 4 patent applications under the scope of the present development and are listed in the table below.

#	Title of patent:	Title of ROI:	Application Number:	ROI Number:	Note:
1.	TBD	Feeding System for One Piece Body Clips	TBD	TBD	TBD

10. SHIPPING INFORMATION /

The machine should be delivered to Aptiv's production facility in Żywiec.
64 Lesniana St., 34-300 Żywiec, Poland.

Packaging materials must be properly stored for future transfer activities.
Shipping must be included in the cost of the equipment.

11. INSTALLATION / INTEGRATION

First machine shall be implemented to APTIV Plant Żywiec

12. START-UP ASSISTANCE / SUPPORT / WARRANTY

The supplier needs to provide a written training plan for the machinery being supplied. It is in the supplier's own interest to make a good plan to ensure success of their machinery in all Aptiv facilities.

Some of the critical items in a good training plan ranked by level are shown below. The SOW should require the "Best in Class" but use the table to assist in ranking suppliers responses.

Lowest Level of Training provided	Mid Range Acceptable Level of Training	Best in Class Level of Training
Training self taught with video/manual provided.	Training "classes" provided at time of installation by supplier's technical representative.	Training classes provided at installation and refresher course offered at site

- 12.1. A start-up PLAN should consider that;
 - 12.1.1. The supplier should provide start-up classes on site at the time of installation and refresher courses offered periodically on site. These training courses should be geared for Manufacturing Engineering, Maintenance and Operations. Training must be comprehensive enough to allow personnel to maintain and operate machinery safely and effectively.
 - 12.1.2. The supplier will specify maintenance training outlined by electrical, mechanical, and pneumatic systems.
 - 12.1.3. The supplier should provide training manuals as well as any additional training materials available such as videos, performance checklist or training aids. When training materials are not available, a request should be made to allow any Aptiv Business Unit facility to work with supplier to develop such material
 - 12.1.4. The option to bring additional equipment on-site specified for training should be researched for any Aptiv Business Unit facility with a training center or for floor space that can be designated for training.



12.1.5. Training should cover general operations of the system as well as adjusting the machinery (through software or discrete controls) for application-specific processes. If applicable, the training should include "understanding the software", and methods to apply the software to new situations. Training courses should cover:

- 12.1.5.1. Operator training
- 12.1.5.2. Maintenance training (repair & preventative)
- 12.1.5.3. Engineering training

12.2. Support

The supplier needs to provide a written support plan for the machinery being supplied. It is in the supplier's best interest to make a good plan to ensure success of their machinery in all Aptiv facilities. The supplier is responsible to support the whole system and is the single point of contact for all issues. If the question is beyond the supplier's knowledge about a component, they are responsible for contacting the component maker for help.

Some of the critical items in a good support plan are shown below ranked by level. The SOW should require the "Best in Class" but the responsible engineer may use this table to assist in ranking suppliers responses.

<i>Item</i>	<i>Lowest Level of Support provided</i>	<i>Mid Range Acceptable Level of Support</i>	<i>Best in Class Level of Support</i>
<i>spare part availability of items listed on recommended spare parts list</i>	<i>Available in >48 hours</i>	<i>Available in 9-24 hours</i>	<i>spares available in 1-4 hours</i>
<i>spare part availability of any purchased or manufactured part from the BOM</i>	<i>1+ week</i>	<i>49-72 hours</i>	<i>available in less than 24 hours</i>
<i>Availability of on site support</i>	<i>25-48 hours wait for on-site support</i>	<i>5-8 hours wait for on-site support</i>	<i>within 2 - 4 hours for on site support by a technical person</i>
<i>Quality of support by telephone</i>	<i>Calls taken only during normal business hours</i>	<i>Within 3-4 hours response to 24 hour monitored pager</i>	<i>Immediate telephone response available 24 hours/day by a knowledgeable person</i>
<i>Type of Engineering / Design documentation provided</i>	<i>Limited prints and limited manuals</i>	<i>Complete manuals plus complete prints</i>	<i>Complete manuals and complete prints (electronic and paper) in multiple languages</i>
<i>Type of Maintenance and Troubleshooting documentation</i>	<i>No documentation per se.</i>	<i>Materials in paper, electronic <u>or</u> on-line format in English.</i>	<i>Documentation and Guides in paper, electronic and on-line in multiple languages</i>

12.2.1. The level of support should be outlined by global area and should include:

- 12.2.1.1. spare part availability of items listed on recommended spare parts list (best in class is "spares available in 1-4 hours")
- 12.2.1.2. spare part availability of any purchased or manufactured part from the BOM (best in class is "available in less than 24 hours")
- 12.2.1.3. Availability of on-site support (best in class is "within 2 - 4 hours for on-site support by a technical person")
- 12.2.1.4. Quality of support by telephone (best in class is "Immediate telephone response available 24



hours/day by a knowledgeable person")

- 12.2.1.5. Type of Engineering / Design documentation provided (best in class is "Complete manuals and complete prints (electronic and paper) in multiple languages")
- 12.2.1.6. Type of Maintenance and Troubleshooting documentation (best in class is "Documentation and Guides in paper, electronic and on-line in multiple languages")
- 12.2.1.7. Who to contact for phone support (phone number etc.).
- 12.2.1.8. Location of nearest support personnel.
- 12.2.1.9. Time line of the initial installation support and follow-up check visits.
- 12.2.1.10. Policy for determining if a support engineer needs to come on-site ("911" call). A regional support staff is a big plus!
- 12.2.1.11. Optional on-site engineer for 30,60, or 90 days.
- 12.2.1.12. Internet email address of support service.

12.3. WARRANTY

The supplier shall warrant the machinery for a minimum of one years, considering 24 hours working time per day. The warranty period will start on the date the machinery is placed into service unless otherwise negotiated by the purchasing department.