

Automatic bundling and closing

Reduce your production costs and integrate automatic bundling systems into your series production sequences.



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Summary

Automatic bundling tools are used in industrial production. Their ability to speed up the attachment and fastening of cable ties reduces manufacturing costs dramatically. The wide range of applications in which automatic bundling systems can be used ranges from cable assembly and packaging to automotive and truck engineering.

However, comprehensive clarification, planning and co-ordination are vital if an entire production process is to be switched over to these automatic tools, since the hidden potential for errors is significant. All factors affected either directly or indirectly by such a change must therefore be taken into account and included in the associated calculation.

To enable you to rise to this challenge, HellermannTyton is publishing this white paper to provide valuable support throughout all phases of the project.

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Introduction

Automatic bundling tools are used in industrial production to speed up the attachment and fastening of cable ties. Where large-scale series production is concerned, switching to automated processing tools opens up huge potential for cutting costs which needs to be both recognised and taken advantage of. By automating the processes of bundling, threading, tightening and cutting the cable tie and by attaching clips to cable harnesses, operational processes can be made more efficient and less expensive.

HellermannTyton leads the market for automated cable assembly. Working in close collaboration with industrial customers, the company developed and optimised the Autotool 2000 (AT2000) and Autotool System 3080 (ATS3080) automatic bundling systems which are used today in numerous sectors of industry.



The AT2000 and ATS3080 automatic bundling systems.

Its support of bindings with a maximum bundle diameter of 20 mm makes the AT2000 suitable for approximately 80% of harness applications. Even today, many of the devices used on the market are manually operated mobile or stationary solutions, although the use of the Autotool 2000 is becoming increasingly widespread in fully automated cable bundling systems in applications in the white goods sector in particular.

The ATS3080 meets the requirements of the remaining 20% of applications in the field of harness production. With a maximum bundle diameter of 80 mm, the areas of application in which this device can be used most effectively are in actual fact not to be found in harness production. The Autotool System 3080 is a popular choice in the packaging industry. The ATS3080 is just as suitable for bundling applications associated with the packaging of shower hoses, buckets and saucepans as it is for various applications in the automotive and truck industries. Integrated as a fixed component into fully automated systems, the ATS3080 represents a quick and easy bundling or sealing system.

Example application: FMC Corporation

The chemicals company FMC Corporation supplies customers all over the world working in the agricultural, industrial and consumer sectors with products for farming, specialty chemistry and industrial chemistry.

So that the high volumes of chemical powder can be made ready for shipment quickly and safely, FMC Corporation uses an automatic system for filling and sealing plastic bags at its production site in Wallingstown in Ireland. The system was developed and manufactured by Somex Automation.

Based in Ireland, Somex Automation (www.somexautomation.com) builds special purpose machinery and is dedicated to developing intelligent automation solutions.

Somex equipment provides the customer, whose core area of activity is the beverages industry, with a solution which combines efficient production with high product quality.



FMC uses a system developed by Somex Automation to fill and close its bags.



Horizontal application of the ATS3080.

The plastic bags are placed inside large containers and move from station to station along a conveyor belt. Once the bags have been filled, the container is forwarded to the closing station. At the sealing station, the plastic towards the top of the bag is gathered together by two V-shaped slide bars to a diameter of approximately 50 mm. The ATS3080 is a permanently integrated component of the fully automated system. Since the area in which the entire process is completed is potentially fire hazardous, the system has been encapsulated to provide protection against the high levels of fine dust prevailing in the atmosphere. Once binding is initiated by the equipment's start signal, the horizontal dispenser on which the ATS3080 is mounted moves towards the plastic bag. The operation to close the bag with a cable tie is fully automatic and takes approximately 1.3 seconds. Unlike its standard market equivalent, the cable tie is made from a continuous strap and separate closures - as a result, the binding process is entirely waste-free.

Following successful application at the premises in Ireland, the same system was purchased by the company's parent organisation FMC in the USA.

The challenge

Global economic activity in the production industry means that manufacturers are facing huge challenges which they need to meet proactively if they are to remain competitive in the long term. The high pressure on costs from consumers, increase of part quantities and intermittent orders being placed with ever shorter deadlines are forcing a change in production processes. Many companies have found themselves coerced into tackling this competitive pressure by relocating production to countries where wages are lower. However, lower wage costs alone do not guarantee a reduction in overall costs. Companies often underestimate the impact of the high cost of local support, long phase-in periods until production becomes reliable, a lack of flexibility abroad and high logistics costs. As such, rather than considering relocating production, it is often more sensible to fully exploit the potential of local sites by introducing technical measures such as a higher degree of automation.

The use of automatic bundling systems is an effective step towards reducing production costs whilst retaining high production quality. This is because as well as reducing costs in terms of time, personnel and materials, automatic binding also minimises the potential for human error. The Autotools represent a solution providing constant traction and high

process accuracy which is able to supersede manual binding and taping. In so doing, it brings the binding process under control and production systems can be adapted more quickly to prevailing order conditions.

However, comprehensive clarification, planning and co-ordination are vital if an entire production process is to be switched to these automatic tools, since the hidden potential for errors is significant. All factors affected either directly or indirectly by such a change must therefore be taken into account and included in the associated calculation. To enable you to rise to this challenge, HellermannTyton can offer valuable support throughout all phases of the project, with our proven track record of expertise gained from our role as a reliable partner in numerous successful projects.

The 5 phases of automated bundling or closing

Phase 1: Define your requirement.

Before you are able to decide whether you should be using an automatic bundling system, you must formulate concrete requirements describing what the equipment needs to do for you.

- How many bindings are produced per year?
- What are the target production cycle rates?
- What bundle diameters are required in processing?
- Will the Autotool be mobile or stationary, or is it to be integrated into a fully automatic production installation?
- What requirements do the cable ties have to meet?
- How high is the required binding strength?
- Do additional elements (e.g. clips) have to be fastened to the cable harness?
- How can the material be fed in and taken out?

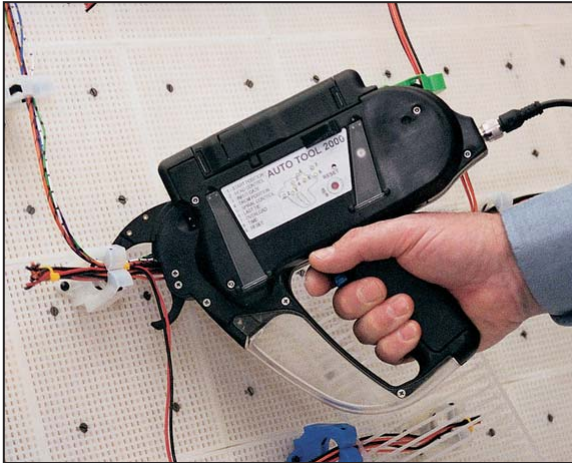


AT2000 with overhead dispenser for mobile application.



Cable ties can be attached and fastened in just seconds.

With the Autotool 2000 cable ties can be bundled, tightened and cut flush in a cycle lasting just 0.8 seconds. The maximum bundle diameter is 20 mm. Since the binding of the AT2000 can be adjusted to meet individual requirements, the tool is able to process both bands of 50 cable ties and reels with a capacity of 3500 ties.



Manual production of a cable harness with the AT2000.

Fastening elements known as “bundling clips” can also be attached fully automatically. With a cable tie on the left and right the clips can be mounted quickly and will not move once attached to the item being tied.

The AT2000 is electrically driven, with a power supply unit or battery being used depending upon the application. For stationary or mobile applications the device is fitted inside the bench mount kit or overhead dispenser respectively. The Autotool 2000 can of course also be attached to a robot or integrated into an

automatic production line equally easily. Integrated into a production line the consistent process of binding can be repeated fast, precisely and with very good quality.

Should the device malfunction, production is stopped automatically. In the case of such an event, the LED indicators on the external display enable the error to be identified and rectified quickly so that production can be resumed.

The AT3080 is the ideal choice for maximum application flexibility. There is no alternative to this system available on the market. The device can be supplied with quick-replace binding jaws measuring 30, 50 and 80 mm, facilitating the fully automatic bundling of diameters from 1 mm to 80 mm. Bundling speeds range from 0.8 to 1.6 seconds per cycle dependent upon bundle diameter. A two-part closing system comprising an outside serrated strap on a continuous reel and separate closures means that absolutely no waste is produced by the binding process. Furthermore, the AT3080 is able to bind a large number of clips fully automatically.



The Autotool 3080 system.

Final assembly of the cable harnesses is much easier since the preassembled cable harness can be fixed to a panel edge or fixing hole. The tension of the tie is set individually as appropriate for prevailing application requirements.



Three jaw sizes optimise the binding cycle for the different binding diameters.

The AT3080 is always used with two material reels comprising a 500 m strap and a reel of 5000 closures. Dependent upon how the tool is being used, the overhead dispenser (which is attached to a rail) is used for mobile applications. In this application the bundling tool is guided and operated manually. For stationary applications the AT3080 is fitted inside a bench mount kit, which has a dedicated controller with an input signal for „start“ and an output signal for „ready“.

Accordingly this system can be operated manually, via a foot pedal or using sensor detection. This mounting kit can be integrated into automatic production lines in a vertical position and, subject to modifications, in a horizontal position.

Phase 2: Ascertain the cost-effectiveness of the systems.

When converting to automatic bundling systems the primary aim is of course to reduce overall process costs whilst retaining or increasing production quality. When making the associated calculation it is important that all cost factors affected by the conversion are taken into account.

Cost factor: Tool

The one-off investment costs incurred by the purchase of the systems can be offset very quickly by the associated savings made.

Cost factor: Wages

Automating production processes cuts personnel costs significantly, since fewer personnel are required in production. The use of the CE-tested tools also increases safety at work and reduces the risk of accidents and injuries to which operators are exposed.

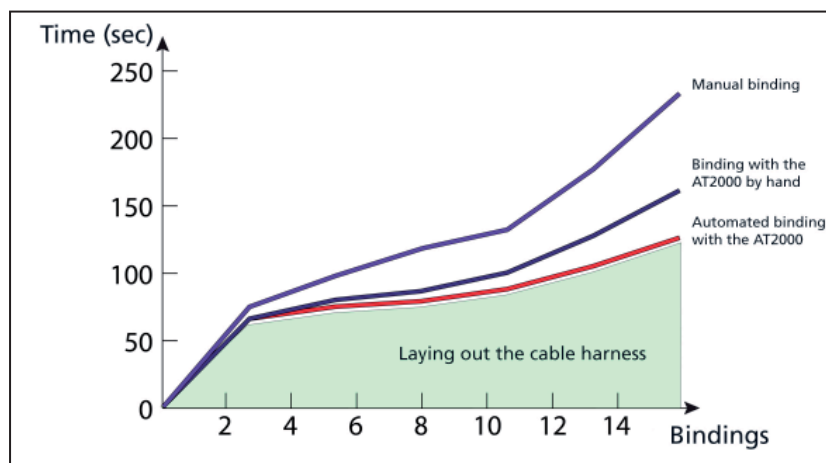
Cost factor: Material

Using automatic bundling systems to attach and fasten cable ties provides a means of reducing materials overheads and the volume of waste. In fact, the AT3080 does not produce any waste at all in operation, so no cable tie material is lost. Furthermore, materials overheads can be better controlled with automation, and calculated more precisely.

Cost factor: Time

The time cost factor benefits in particular from the conversion to automatic bundling systems, as significant savings can be made. Faster bindings mean faster production throughput. Empirical values show that the time for an application can be reduced by up to 75%. Expensive waiting times can also be prevented as the system is under better control. As production can be adapted flexibly and promptly to prevailing order conditions, intermittent incoming orders can be processed quickly.

The automated binding process supported by the AT2000 means that binding is completed in parallel with the laying out of the cable harness, enabling valuable production time to be saved. The only other time factor in addition to the assembly time is the time required to change over the table (see graph).



Cost factor: Energy

Although lower energy consumption is not normally the reason for automating facilities in the first place, factors such as the reduction in personnel and materials overheads, combined with reduced throughput times, can certainly lead to a fall in electricity consumption, thereby bringing about valuable savings.

Phase 3: Plan the technical integration.

If you wish to integrate an automated bundling system into your installation, in addition to technical expertise, you will also need a great deal of experience. To ensure that all prerequisites for seamless operation are in place after installation, you will get valuable support from HellermannTyton. At the headquarters of HellermannTyton GmbH in Tornesch, Germany, house design and development, production and sales of the Autotools are placed under one roof. This advantageous location means that you will always have the right contact nearby to provide a fast and flexible response to your questions. With 34 sister companies, HellermannTyton is able to provide an assurance of expert support and advice all over the world.

Once plans are in place to use an automated bundling system, the first thing you will receive is CAD data for integration into your installation. For good compatibility with your design software HellermannTyton is able to provide the data in various formats. When integrating the systems into your installation, please bear in mind that the Autotool has to move to the item being tied every binding cycle. During binding it is essential that the item being tied does not tear and the tool is not hindered or obstructed in any way. The installation is programmed either in advance (as an offline program) or subsequently (directly and online). Minor adjustments to match the program to the actual conditions prevailing in the application environment can be made once the installation has been commissioned.

To prevent mechanical or electrical interface problems affecting your installation, HellermannTyton will accompany you throughout the design phase and discuss the feasibility of the overall system with you.

Phase 4: Start the installation and commissioning processes.

Once planning of the overall system is complete, installation of the automatic bundling system in the robot cell or on the production line can start. HellermannTyton will be at your side to provide expert support and advice throughout production or assembly, commissioning and familiarisation. Your employees will be given training to ensure that they have the necessary specialist knowledge to operate the tools, carry out troubleshooting, replace worn parts, and clean and maintain the equipment.

Phase 5: Rely on good service.

Even after commissioning is complete HellermannTyton will ensure that production can run seamlessly at all times by providing tailor-made customer support delivered by qualified and skilled employees. So that the Autotools can enjoy a long service life, HellermannTyton offers customers the opportunity to have them modified to reflect the latest developments in technology free of charge at any time. An in-house 24 hour tool repair service also means that rapid assistance can be provided in the event of a problem.

Example application: Fresenius Medical Care

Fresenius Medical Care has been developing and producing medical equipment since 1979. From its centre of competence and production site in Schweinfurt, Germany, the company delivers dialysis machines for treating patients with chronic kidney failure to locations all over the world. "Excellency in quality and profitability" is the motto of the mission statement to which all employees from production, development and administration at Fresenius Medical Care have committed themselves. So that it could remain true to this motto in the field of cable assembly also, Fresenius Medical Care overhauled its production process for cable harness assembly in 2008.

Fresenius had already been using manually operated Autotools in production since 1999. Up until the changeover in 2008, the manufacture of a cable harness had involved the following stages: During the first stage of the process, which was fully automated, the cable was cut to length from the reel, stripped, crimped and fitted with some connectors. Next, further connectors would be added by hand as necessary and markers for heat shrinkable tubing would be placed on the cable. Although the Autotool 2000 was used in the subsequent binding process, it was operated manually. The cables were bundled as illustrated in a drawing and the cable ties were attached in the correct positions with AT2000 by hand.

Fresenius Medical Care saw the potential for rationalising this process and responded by drafting a plan for optimising manufacturing costs in the production process. The qualitative aims were defined as follows:

- To reduce manufacturing costs by speeding up throughput
- To assure quality
- To make the binding process easier by converting to a handling system
- To improve workplace ergonomics

Fresenius Medical Care chose a system by an Italian manufacturer of special purpose machinery which had been building what are known as changeover tables for Italian companies working in the assembly sector for a number of years. The changeover tables for cable assembly consist of a table structure with a freely programmable automatic binding system. The harness boards are located one above the other. A cable harness is laid out on alternate boards whilst a second board is tied automatically. Then the tied cable harness is removed and the one just laid out is inserted. There is no longer any additional time required for bundling.



Changeover table consisting of a table structure and the automatic binding system.



The AT2000 as a fixed integral component of the robot cell.

Calculated for the complete cable harness, binding takes an average of 2 seconds, including the distance travelled. Fresenius manufactures many different products, although the majority are small types of cable harnesses. To make the most efficient use of the boards for laying out the cables, two harnesses are often laid out one next to the other on a single board.



Harness board with a Fresenius cable harness.



A user-friendly system.

It was possible to meet all of the aims listed above by converting the manual production process to this handling system. Throughput times were reduced with the error quota of 0.7 min/cable harness remaining constant. As a result, Fresenius was able to achieve a significant reduction in manufacturing costs of approximately 20%. Furthermore, automation provided Fresenius Medical Care with a means of considerably increasing safety and user-friendliness for its operators. The height-adjustable nature of the tables, the inclined position of the boards for laying out the harnesses and minimum noise emissions mean that the workplace is now much more ergonomic than before.

HellermannTyton GmbH

HellermannTyton is your first port of call for products for bundling, fastening, protecting, labelling and processing cables, lines and their connection components. We also develop advanced systems for our customers in the fields of data and network technology.

With 34 sister companies, HellermannTyton has operations all over the world and is a leading provider in the market segment. Eleven of these sites are facilities producing the more than 20,000 products featured in HellermannTyton's portfolio. Both standard products and complex parts for very specific applications are produced at the company's site in Tornesch, Germany, where very stringent quality requirements are complied with. In order to develop tailor-made products HellermannTyton relies on direct dialogue with its customers. It is this which provides the basis for the development of innovative solutions meeting specific requirements profiles. As well as investing in research and development the company also reviews its entire product portfolio continuously.

Contact person

If you would like to find out more about automatic bundling systems we would be delighted to hear from you:

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