

OPTIMA 400

Automated wire cutting
and identification system



komax

OPTIMA

Automation is the key to increase productivity and quality for high volume and serial production. Having a scalable solution that can also satisfy high-mix low-volume production is ideal for responding to the demands of the market.

The design of the Optima line revolves around this concept. This modular and flexible platform offers automated features while addressing a large variety of production for different materials, work volumes and industry applications.

Performance and quality

The Optima automated wire processing work station is the result of decades of wire processing machine design. Each function is developed and driven by innovation and enhancement from historical competence with laser wire/cable marking.

One of the major benefits of the Optima is the significant productivity gains achieved in wire processing.

With its ergonomic and intuitive design coupled with high production speed, the Optima is the most advanced and versatile solution for wire processing that is available today.

Flexibility

Multiple tasks are needed throughout the value chain. Many of these tasks will depend on the industry and customer application. The key to finding an automated industrial solution that is appropriate for a variety of demands is flexibility. Having at its core design the ability to upgrade, the Optima encompasses a segmented platform in which various essential functions can be added over time and as production requirements change.

Efficiency

Mindful of economical and environmental concerns, the Optima includes features to minimize wire waste while reducing its power consumption. It features a compact design and energy saving standby mode to start production only when needed.

Standards

The Optima complies with CE Standards and has “CE” label. The Optima machine also complies with European directives:

- Machinery directive 2006/42/CE
- Low voltage directive 2006/95/CE

And with the standards:

- Machine: NF EN 60204-1 – Machine Electrical Security



▲ Optima 400 configuration with 40-spool dereeler, cutting, laser wire marking modules and coiling pan.

CUTTING SYSTEM

Performance and quality

The wire cutting system can process wire from 6 to 26 gauge including single core and twisted wires. Supported by EasyProd software, it provides reliable automation for the processing of wire.

Multiple sensors have been integrated for special detection.

- End of the spool
- Cable cut
- Cable over tension

Cutting unit sensors can detect:

- Cable knots, splices and bare wire*
- Safety enclosure opening
- Pneumatic pressure fault

* Optical detector performance for cable diameter variation of 1/128" (0.2 mm) at 2 m/s (400 ft/min)

A tensioning system (see image 01)

integrated before the cutter, works with an electrical motor that applies constant force upon the wire, meeting international dereeling standards.

Economical and sustainable

The large diameter of the external encoder (see image 02) ensures a constant contact on the wire leading to precision dereeling accuracy. Through the tensioning device with force monitoring, the wire is held in place and speed is reduced by end of the spool detection. End of spool wire waste is considerably reduced. Production startup wire waste is addressed by the pneumatic gripper positioned by the cutter. This allows for reduced waste down to 50 mm (1.97 in).

Low maintenance

While in cutting mode, the reliable motorized double-belt drive pulls the cable in at high speed. EasyProd software controls cable traction for each cable type along with acceleration, deceleration and production speed for the best performance and accuracy. Length tolerances:

- 0 to +20 mm (0 to 0.79 in) for cables under 4 m (13 feet) length
- 0 to +0.5% for cables over 4 m (13 feet) length

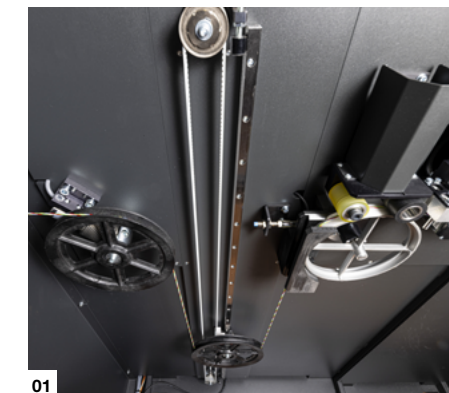
Belt lifetime can be doubled since the belts can be turned over due to the cable not being centered on them (see image 03).

Equipped with a powerful cutting system, Optima can process wire up to gauge 6.

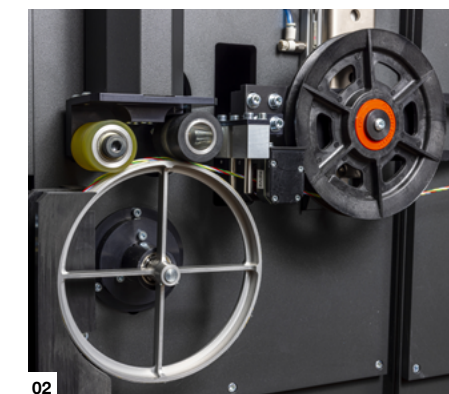
A precision clean cut is made by the cutter utilizing two "V" shaped rounded blades that are mounted head to tail. Blade replacement is made quick and easy with machine optimization and up-time in mind.

Ergonomic

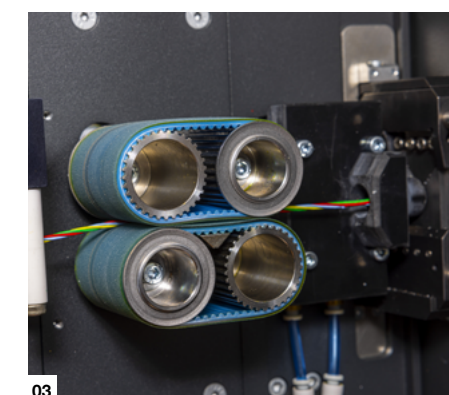
Experience, gathered over the years, has highlighted the need for a more user-friendly machine not just on the software side, but on the hardware side as well. Optima boasts several new features to ease the use and the support of the machine: Human-Machine interfacing options, intuitive LED indicators, wire feeding assistance, adjustable mounted touch screen, and sliding doors for better maintenance access.



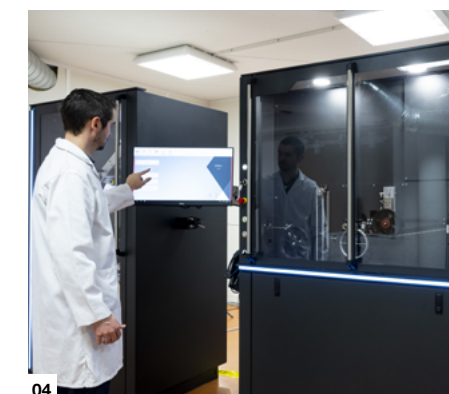
01



02



03



04

01 Innovative tensioning device with controlled applied force.

02 External coder with large diameter ensuring great accuracy.

03 Integrating Komax Kappa driving and cutting unit.

04 Intuitive (and visually appealing) LED display along the machine and the dereeler.

UV LASER MARKING

The Optima 400 range combines scalability, modularity and performance at a very competitive price.

UV laser marking has long been the standard in terms of wire/cable identification in the aerospace industry.

Clear, unalterable and permanent marking

UV laser marking provides a safe, permanent, high contrast identification on all cables guaranteed “UV-markable” by cable manufacturers, such as single or multi-wire twisted and jacketed cables with PTFE (Teflon®), FEP (Teflon®), ETFE (Tefzel®), XL-ETFE (Tefzel®).

Non-aggressive marking

Unlike hot stamping and ink-jet methods, the Optima UV laser wire/cable marking process causes a reaction within the wire insulation which results in a safe, permanent and unalterable mark.

Low operating costs

UV laser marking provides fast and efficient identification for UV markable wire/cable without post marking treatment.

The Optima meets the requirements from manufacturers, subcontractors and maintenance centers in the Aeronautics, Space and Ground Vehicle sectors.

Complies with the following standards:

- CE
- FDA “Radiation Control for Health and Safety Act”
- Underwriters Laboratories (UL)

Aeronautics:

- AIRBUS: AIPS / AIPI
- BOEING: BAC 5152
- SAE ARP 5607
- SAE AIR 5468
- SAE AS 5649
- SAE AS 50881 (MIL 5088 L)
- ASD EN 4650
- ASD EN 3475-100
- ASD EN 3475-705
- ASD EN 3475-706
- ASD EN 3838

Machine:

- EN 60204-1

Laser:

- EN 60825-1
- EN 60825-4
- EN ISO 11553-1

Stand-alone machine with low maintenance requirements

The machines in the Optima range are designed to operate without external adjustment nor daily maintenance. The operator’s tasks are limited to changing the spools, selecting the production file and collecting the marked cables. Multiple options and accessories can increase productivity by raising the level of automation and therefore reducing the number of operations to be performed by the operator.

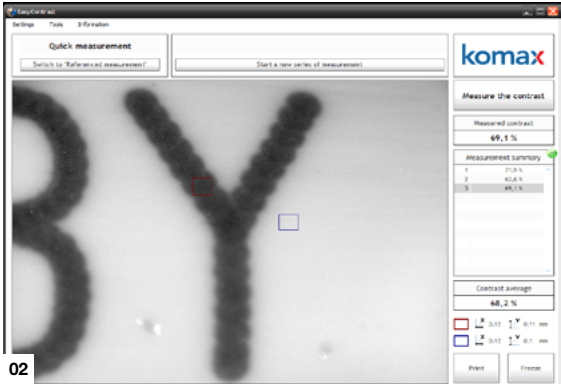
PRODUCTIVITY GAINS THROUGHOUT THE PRODUCTION PROCESS

The productivity gains achieved by the Optima are not only related to high marking speeds but also to production optimization of both hardware and software. Examples:

- Easy, quick spool change and cable set-up

- Identification and font parameters automatically changed during production
- Special features including label printing, traceability, waste reduction, etc.
- The EasyProd software offers flexibility in sorting production data

01
UV laser marked wire
02
Contrast measured by the EasyContrast system provided by Komax



OPTIMA 400

Vector marking range

Optima 444
Optima 464
Optima 484

Bringing a new level of scalability for aerospace harness manufacturing, the Optima 400 platform presents 3 models.

Each model is equipped with a diode pumped UV laser which utilizes vector marking technology. Marking occurs by scanning the laser beam directly on the wire. Each machine can be upgraded to one of the higher models in the range according to the client’s requirements.

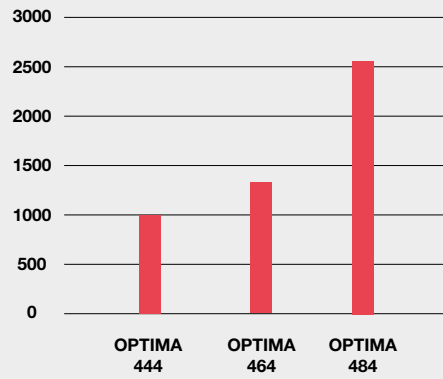
Additionally, for non-jacketed cables, which are not UV markable, all Optima models can be utilized for measure and cut-to-length.

Marking specifications

- ASCII Universal Characters 32 to 126
- Barcode (code 39)
- 3 fonts (other fonts on request):
 - Vertical: 0.7 x 1.4 mm
 - Vertical: 0.6 x 1.4 mm
 - Horizontal: 1.1 x 1.2 mm

PRODUCTIVITY COMPARISON OF THE OPTIMA RANGE

Average number of cables in meters per hour



NOTE: Wire marking speed represents only 30 to 40% of total production time. Numerous other factors determine overall productivity such as:

- spool change
- wire feed and configuration
- production data handling
- software familiarity
- production organization skills

THE BENEFITS OF VECTOR MARKING

The marking process is no longer limited by the hardware. Scanning the laser directly onto the wire provides high flexibility in the creation and choice of font size.

Diode technology requires no consumables for the laser, reducing the maintenance on the machine and lowering the operating costs.

The air-cooled laser reduces noise level and energy consumption.

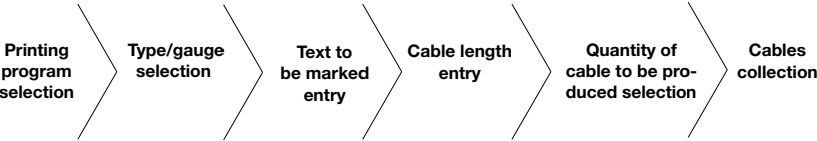
▶ Laser marking in progress



QUALITY CONTROL

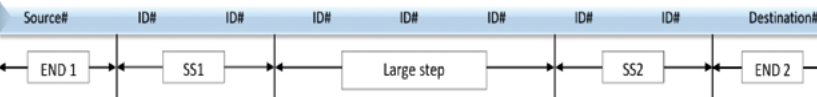
- **Fault Detection**
Sensors on the Optima machine interrupt production and display an error message for the operator as soon as a fault occurs. The intuitive LED indicator locates the default.
- **Wire waste**
The machine is equipped with new devices that significantly reduce the wire waste from the beginning of the production to the end of the spool.
- **Laser Auto Calibration**
The machine automatically adjusts the laser energy density depending on the cable parameters defined on the Easy-Prod software. This exclusive feature increases the energy for cables that are difficult to mark and reduces energy on cables that are easily marked. This minimizes consumables, wear, and operating costs while increasing marking quality.

CONTROL SYSTEM

- **Hardware:** computer running under W11 IOT Enterprise LTSC 2024 adapted for machine control.
- **EasyProd software**
Automatic or manual entry of marking data (ID, space between markers and cable length, etc.):
 - Manual production mode:
 - Automatic production mode:

The automatic production mode is used to mark and cut large amounts of cable through the use of the production file. The software offers different production modes for cables, particularly by type/gauge (to reduce the number of spool changes).

The cable is divided into 5 marking areas that can be easily customized using the EasyProd software.



Technical characteristics

Laser	YAG
Marking technology	Vector marking
Laser security	Class I laser compliant with European (CE) and American standards: suitable for work in covered workshops
Operating temperature range	+ 15 °C to + 30 °C
	For optimal laser operation it is recommended to avoid large temperature variations
Storage temperature	+ 1 °C à + 45 °C
Relative air humidity	80 % (non-condensing)
Input requirements	1 more line if WCT: 208-230 Volts - 50-60 Hz - 20 A
Compressed air	6 bar
Compulsory smoke extraction	The machines in the Optima range are equipped with a smoke extraction system
Cooling unit	The laser head is cooled by means of an integrated autonomous air-cooling unit



01



02

DEREELERS

Adaptable

With flexibility in mind, Optima is designed to adjust and conform to the production environment. One can choose from a single spool up to a 40 spools motorized dereeler with automatic feeding system.

2-spool dereeler

Set on configurable rollers, each station can process spools from a small standard 250 mm (9.84 in) / 25 kg (55 lb) up to a massive 600 mm (23.62 in) diameter / 75 kg (165 lb). Small spools must be positioned exclusively in the upper part of the dereeler. Wire extremities are clamped at the output of the dereeler for manual feeding and optimized for loading/unloading. This dereeler is only compatible with Optima 444 and 464.

Multispool motorized dereeler and automatic feeding system (AFS)

For best production flexibility, the multispool dereeler with AFS eliminates most wire spool loading operations and minimizes wire changeover through complete automation. From a single production file, an entire harness can be produced without manual spool loading.

The dereeling station is automatically selected by the machine software according to the cable to be loaded or unloaded. The multispool is configurable in cabinets of 8 spools (4 on each side). There can be up to 5 cabinets for a total of 40 spools. At any time, the system may be upgraded by adding additional cabinets.

WASTE REDUCTION

A key feature of the AFS is the waste management offered by the gripper. By stopping in optimized positions for each step, the waste at the beginning of the production is limited to few centimeters.

Coupled with the external coder of the Optima that handles the end of the spool, savings on waste are guaranteed.

Spool characteristics

	2-spool dereeler	Multispool
	Maximum weight: 75 kg (165 lb)	Maximum weight: 25 kg (55 lbs)
	A: 150 to 350 mm (5.90 to 13.78 in) D: 250 to 600 mm (9.84 to 23.62 in) *	A: 150 to 250 mm (5.90 to 9.84 in) D: 250 to 400 mm (9.84 to 15.75 in) B: Inner axis: 20 mm (0.79 in), 25.4 mm (1 in) or 38 mm (1.5 in)

* Lower position of the dereeler

- 01 Reliable traceability via spool barcode scanning
- 02 Multispool dereeler (up to 40 spools)
- 03 Wire dereeling system



03

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Komax – leading the field now and in the future

As a pioneer and market leader in automated wire processing, Komax provides its customers with innovative solutions. Komax manufactures series and customer-specific machinery, catering to every degree of automation and customization. Its range of quality tools, test systems, and intelligent software and networking solutions complete the portfolio, and ensure safe, flexible, and efficient production.

Komax is a globally active Swiss company with highly qualified employees and development and production facilities on several continents. It provides local support to customers worldwide through its unique sales and service network and offers services that help them get the most out of their investments.

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