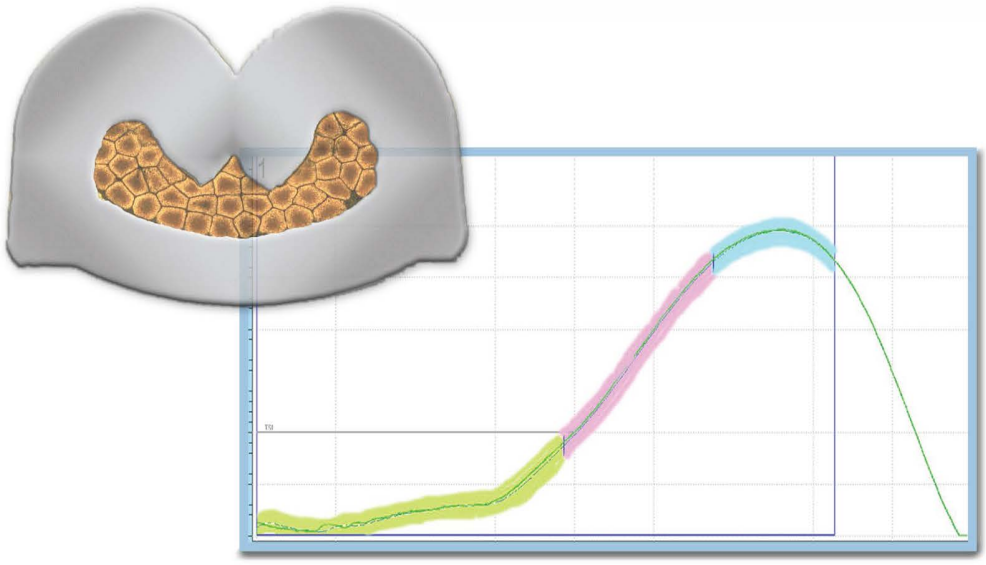
Wire Processing

QUALITY WITHOUT QUESTION



OES TECHNOLOGIES

Because one defective wire is one too many

Technology solutions for assurance of part quality in wire harness manufacturing

OES employees at OES corporate headquarters, London ON

Executive Team

Front (L-R):

Carl Thompson, VP, Engineering
Michael Reeve, VP, Sales and Marketing
Linda Russell, CEO
Kiet Ngo, VP Research and Development

Quick Facts

Ownership	Privately held corporation
Employees	90
Headquarters	London, ON Canada
OES locations	**OES-A, Inc.** El Paso, TX USA **OES Rep Office Shanghai** China **OES AG** Switzerland
Sales offices	19 offices, worldwide
Industries served	Automotive Aerospace Computer/Electronics Environmental Healthcare Defense

OES Technologies, a division of OES Inc., is renowned for solving the challenges associated with part quality assurance in the wire harness manufacturing industry. OES's dedication to innovation enables them to deliver a steady stream of cutting-edge technologies that meet the exacting demands of this ever-changing market.

Based in London, Ontario, Canada, OES Technologies designs, develops and manufactures their products, with world-wide distribution assisted by offices in the United States, China, Switzerland and a network of certified global representatives.

Whether installed on existing equipment or integrated into new production machines, OES's series of dynamic sensors, in-process monitors, and quality production management solutions inspect and analyze 100% of the parts being manufactured to isolate part defects.

The compelling advantage of in-process monitoring is that during production, each part is effectively examined for quality defects without a significant reduction in the production rate of the machine.

For 30 years, OES has developed, evolved, and expanded their products and technology solutions for the wire harness manufacturing industry. OES products are second to none for innovation, performance, reliability, and have been widely adopted by their global client base. OES solutions are the first and best line of defense for preventing defective parts from entering the supply chain.

Get to know OES Technologies

The OES Technologies team works closely and collaboratively with their clients to provide leading product and technology solutions for:

- Manufacturers
- Machine suppliers
- Partners, representatives, and distributors

Three key attributes distinguish OES Technologies as the market leader for in-process monitoring technologies for product quality assurance:

Innovation

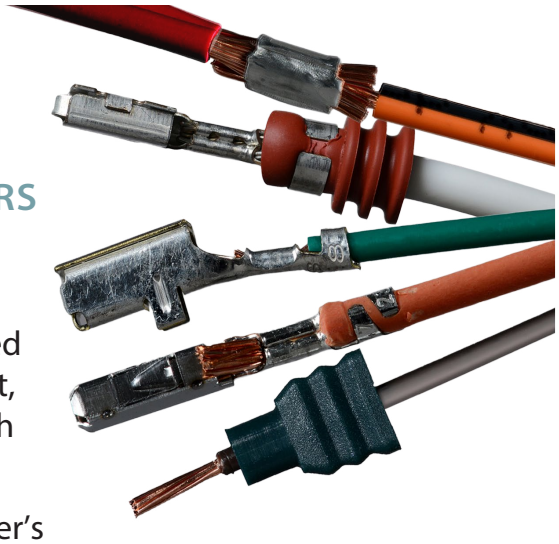
OES invests significantly in research & development , with 25% of its staff act13ively engaged in converting new technologies into viable products for the wire processing industry. OES has accrued 13 patents on these proprietary technologies, with one more currently pending.

Industry Experience

OES Technologies has over 25 years' experience in the wire processing industry. The steady accumulation of knowledge enables OES to conceptualize, build and deliver new, advanced in-process monitoring and inspection technologies. These technologies have been widely approved and adopted by their growing global clients base.

Independence

OES is 100% independent, enabling it to develop and deploy solutions specific to any client's needs without obligation to any one party. This makes OES Technologies solutions better aligned with overall market needs and trends.



Collaboration with Industry Partners

Manufacturers

- OES' quality assurance products, which are designed for installation onto existing production equipment, are supplied to wire harness manufacturers through a network of global representatives.
- OES Technologies works closely with a manufacturer's central engineering department to accelerate corporate approval of new and innovative technologies by facilitating the benchmarking and validation processes.

Machine Suppliers

- OES works closely with many leading machine suppliers to integrate OES sensors and technologies for part quality assurance.

Special projects

- OES engages in special projects, and solves unique challenges, such as those found in high ton crimping, splice crimping, and sequential crimping.

OES Technologies' breakthrough innovations for the Wire Processing Industry

Sensors

Piezo Strain Sensor senses the micro defle tion of the press frame correlating to the crimping force.

2007 US Patent No. 7,216,519

Polymer Base Technology (PBT) is integrated into a mechanical component of the press, optimizing the crimp force monitor performance.

2009 US Patent No. 7,603,909

Crimp Force Monitors

Continuous evolution of CFM products combine the advanced performance, features, and functions, with operator simplicity.

1998 US Patent No. 5,841,675
2008 US Patent No. 7,333,906 B2
2014 US Patent Pending

Wire Strip & Seal Load Inspection

Non-contact wire end inspection applying laser profile anal sis (LPA) methodology for detection of wire strip and seal load defects on automatic wire processing machines.

2002 US Patent No. 6,496,271 B1
2005 US Patent No. 6,885,463 B2
2007 US Patent No. 7,719,695

Conductor Quality Sensor (CQS)

Conductor touch technology monitors wire strip blade contact with the conductor for control of nicked, scraped and cut strand defects on automated wire processing machines.

2014 patent pending

Wire Chop

Chops defective crimps, eliminating any possibility of mixing crimp defects with good parts

Quality Production Management (QPM)

Automates and error proofs the machine setup process with detailed production and productivity reporting. Adaptable to new and existing wire processing equipment (bench presses and automatic machines).

Calibration (CAL5000)

A crimp force monitor calibration tool , optionally available as a crimp press analyzer.

OES TECHNOLOGIES

STRAIN SENSOR

PBT-R15B | PBT-R31B | PBT-R04B | PBT-R17B | PBT-R16B





CFM1000

CFM2103/2203

CFM4103/4203

CPM5100/5200

LPA56B

LPA58

CQS

WireChop

QPM:

Verify | Validate | Inspect | Monitor | Print | Report






CAL5000

SENSE...THE CRIMP FORCE

PBT Sensor Technology

Polymer Base Technology (PBT) force sensors deliver exceptional sensing performance for crimp force monitoring applications. The key differentiating features of PBT sensors compared with traditional crimp force sensor options are:

- **Performance**

  The PBT sensor combines high sensitivity and signal to noise ratio which together contribute to exceptional crimp force monitor performance particularly for small cross section crimping applications. The PBT sensing element is mounted directly over the crimping tool for optimum sensor performance and eliminating possibility of "shunting" of the force signal.

- **Reliability**

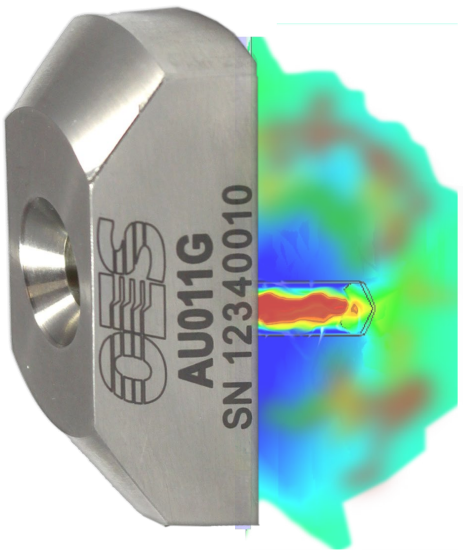
  The PBT sensor life expectancy exceeds 10 million cycles under normal use. Furthermore the PBT sensor has a 4X over-range capacity of the calibrated force range. This ensures sensor survivability and reliability for varying operational conditions.

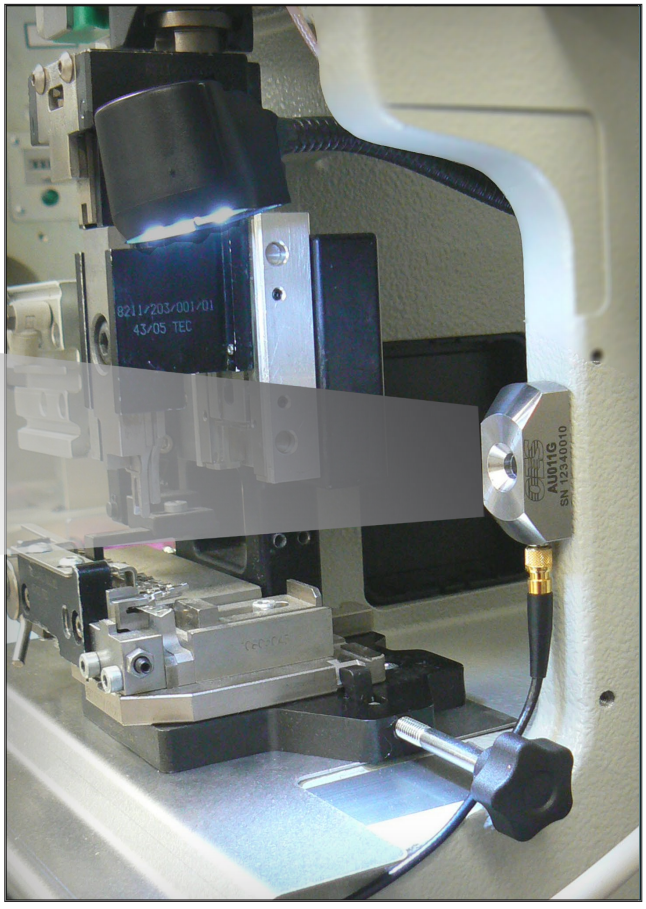
Dynamic sensors developed by OES for crimp force monitoring

Piezo Strain Sensors

The **OES Piezo Strain Sensor** is the sensor of choice for a wide range of crimp monitoring applications and ideally suited for high ton crimping applications. Crimp presses exert force during the crimp forming process resulting in strain on the frame of the press. This strain causes micro deflection of the press frame proportional to the force exerted during the crimping process which is sensed by the Piezo Strain Sensor.

The OES Piezo Strain Sensor's internal charge amplifier provides high noise immunity over varying lengths of standard coax cable and very reliable performance in the production environment.





ANALYZE...THE CRIMP SIGNATURE

OES Crimp Force Monitors assure crimp quality for a diverse range of wire and terminal combinations, and adapt well onto a wide series of wire processing machines and bench top crimping presses. Advanced crimp force algorithms incorporated into every CFM model deliver the highest level crimp defect detection with minimum false rejects.

The use of standardized CFM settings for most crimping combinations results in efficient and error free machine setup with effective quality control. OES CFM products are configurable for specialized crimping applications such as sequence crimping, splice crimping, hydraulic and pneumatic crimping presses, split tool and double crimps, crimping of terminals and wire of various hardness, material density, and headroom.

CFM1000
Bench Press

CFM2103/2203
Module for automatic machine

CFM4103/4203

CPM5100/5200
Bench press and automatic machine

FORCEVIEW 3

User interface software supplied with CFM models combines operational simplicity with high visual representation of the crimp process – crimp force signature, analysis detail, and the process trend.

Capabilities include a crimp data manager for logging importing and exporting, and managing security levels and access.

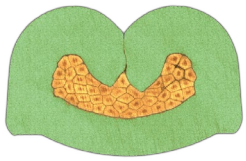
Crimp force monitor performance for new and existing applications

Crimp defect examples

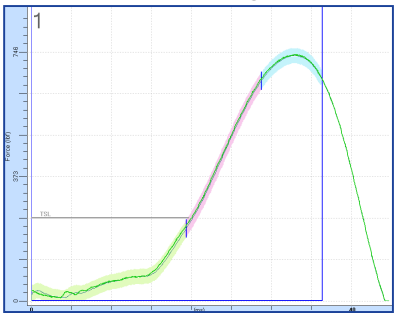
Good

Crimp

Cross Section



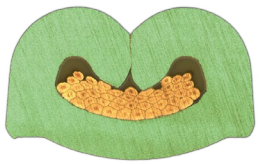
Crimp Force Signature



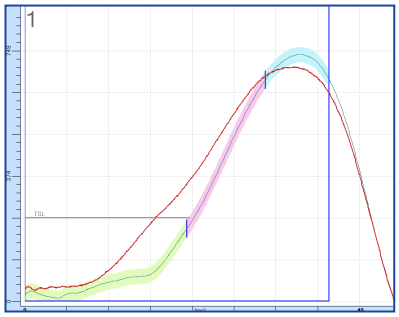
Insulation inside the conductor crimp

Crimp

Cross Section



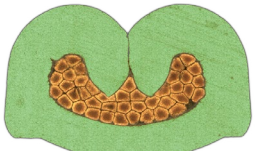
Crimp Force Signature



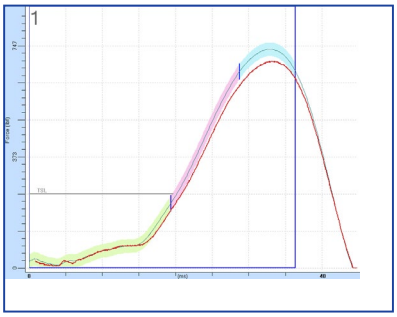
Missing strands inside the conductor crimp

Crimp

Cross Section



Crimp Force Signature



CFM FEATURE COMPARISON

	OES CFM1000	OES CFM2103/2203	OES CFM4103/4203	OES CPM5100/5200
APPLICATIONS				
Bench Press Application (1 Channel)	✓	✓	✓	✓
High Ton Crimping Press	✓	✓	✓	✓
Sequence Crimping	✘	✓	✓	✓
Automatic Machine (2 Channel)	✘	✓ (CFM2203)	✓ (CFM4203)	✓ (CPM5200)
FEATURE				
Operator Interface	3 Color LCD	PC (ForceView 3)	1 color LCD	Color Touch Screen
Force Curve Display	✓	✓	✓	✓
Process Trend	✘	✓	✓	✓
Language Configurable	✓	✓	✓	✓
Password Control / levels	✓	✓	✓	✓
Crimp Data Logging & Traceability	✓ (Ext. PC)	✓ (Ext. PC)	✓ (Ext. PC)	✓
Wire Chopper Control	✓	✓	✓	✓
PERFORMANCE				
Crimp Analysis Software	ForceView	ForceView 3	ForceView 3	ForcePak 3
OPTIONS				
Sensor - Strain, Force Ring, PBT Ram	✓	✓	✓	✓
Crimp Parameter Recall by Part Number	✓	✓	✓	✓

CFM FEATURE COMPARISON

	OES CFM1000	OES CFM2103/2203	OES CFM4103/4203	OES CPM5100/5200
ADVANCED OPTIONS				
QPM (Quality Production Management)	✘	✘	✓ (QPM-Link)	✓
Material Validation	✘	✘	✓ (QPM-Link)	✓
Production Reporting	✘	✘	✓ (QPM-Link)	✓
Productivity Reporting	✘	✘	✓ (QPM-Link)	✓
Part Number Learned Curve Recall	✘	✘	✓ (QPM-Link)	✓
HARDWARE				
Supply Power	24VDC (ext. adapter)	24VDC	90-230VAC	24VDC (ext. adapter)
USB port	✓	✓	✓	✓
Ethernet	✘	✓	✓	✓
Inputs	2	2/4	2/6	4
Outputs	2	4	4/8	6
PRODUCT SUPPORT				
Warranty: 2 years	✓	✓	✓	✓
Lifespan: 20+ years	✓	✓	✓	✓
Product Support: Lifespan +5 years	✓	✓	✓	✓

ERROR-PROOF & AUTOMATE...
THE MACHINE SET-UP AND PRODUCTION PROCESS

QPM Quality Production Management

QPM is a process monitoring, management, and reporting system adaptable to existing and new wire processing equipment (bench presses and automatic machines).

Connectivity between the crimp force monitors and the Client Data Manager which resides on the server, facilitates efficient machine setup and change over, production, and productivity reporting. QPM is designed for interface with the clients ERP system.

QPM
CPM5100/5200

QPM Link
CFM4103/4203

Eliminate errors, reduce scrap material, improves quality and plant floor efficiency

QPM STEP-BY-STEP

- **Work order entry**
  Bar scan entry or from central production control system.

- **Material validation**
  Scan/verify correct materials on the machine.

- **Crimp validation**
  Validate the crimp dimensions are within specification, with optional pull test.

- **Production**
  CFM parameters loaded automatically, production start.

- **Crimp dimension re-validation**
  Production interrupted for re-inspect of crimp dimension.

- **Crimp data logging**
  Log production crimp data.

- **Productivity monitoring/reporting, traceability**
  Monitoring machine and operator productivity uptime and downtime by cause.

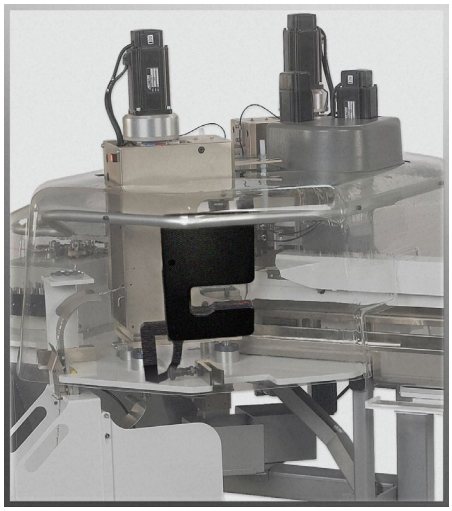
- **Operator call**
  Entry of machine operational condition on the plant floor with tower light interface option. Uptime and downtime data integration with productivity monitoring and reporting.

INSPECT...THE WIRE STRIP AND SEAL

WireScan

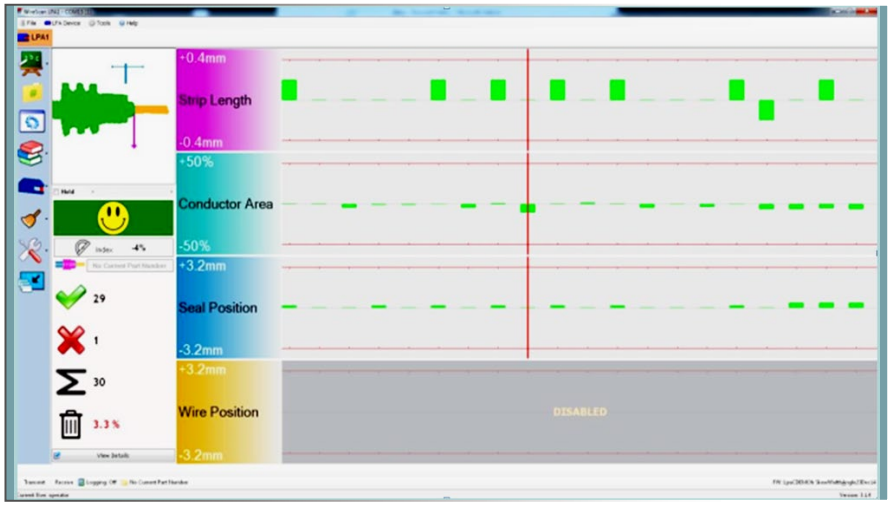
Laser profile analysis (LPA) sensors are installed on automatic wire processing machines to optically scan and analyze the profile image of every wire produced for assurance of wire strip quality, and correct seal loading.

The LPA captures the image profile of the wire end during the wire transfer process, and inspects the selected attributes of the wire strip and/or seal for controlling defects at the source. LPA's are compatible for installation onto many wire processing machines for in-process inspection of every part produced.



WireScan 3

WireScan 3 software provides viewing of the wire image profile in real time. The analysis regions, tolerance limits and pass/fail decision are displayed following each wire end inspection. The data manager feature provides data logging, importing and exporting with management security access controls.



Wire strip defects detected:

Pass!

High insulation or short strip

Low insulation or long strip

Pulled strand

Cut strand

Conductor Mass

In Process inspection for wire strip and seal insertion defects

INSPECT...THE SEAL INSERTION

Seal insertion defects detected:

Pass!

Low seal position

High seal position

Missing seal

Conductor error

DETECT...STRIP BLADES TOUCHING THE CONDUCTOR

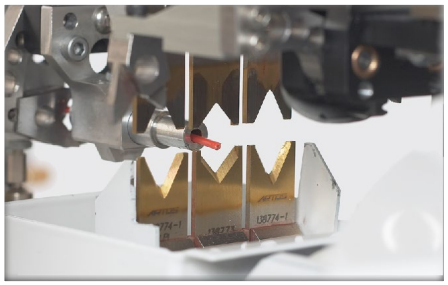
Conductor Quality Sensor (CQS)

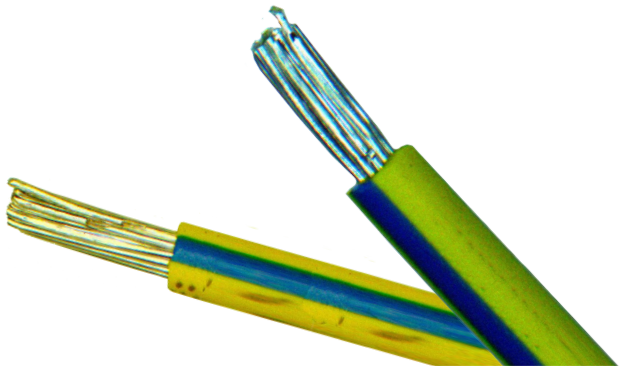
Wire conductor strands can be nicked, torn, pulled, or scraped during the wire stripping process resulting in crimp quality defects. The CQS detects "conductor touch" condition during the processing of wire on automatic wire processing machines.

Capability

- In-process monitoring every wire produced for conductor touch condition.
- Detection of conductor touch for all wire sizes and materials (copper and aluminum).
- Adaptable to a wire range of wire processing machines.

CQS detects cut, nicked or scratched wires during the stripping process.





Eliminate wire processing conditions at the source that can contribute to crimp defects

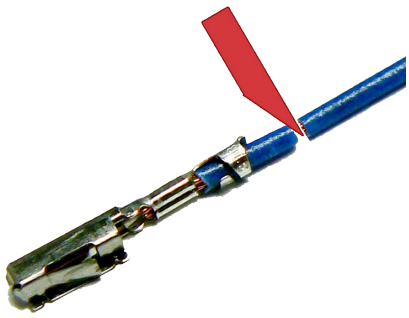
ELIMINATE...CRIMP DEFECTS

WireChop

WireChop eliminates defective terminal crimps that might otherwise mix with good production parts. WireChop is controlled by the crimp force monitor and activated by the CFM following detection of a crimp defect which chops the terminal from the wire.

WireChop can be mechanically configured to hold the wire for secondary inspection, or to chop the circuit automatically. WireChop is adaptable for bench press and automatic machine applications.

- 100% control of crimp defects
- Eliminates the risk of human error for mixing good and bad crimp circuits
- Collapsible mounting bracket allows for quick die changeover
- Adaptable to a wide range of presses.
- Controlled by the CFM chopper control interface
- Minimal Maintenance - designed for a long production life

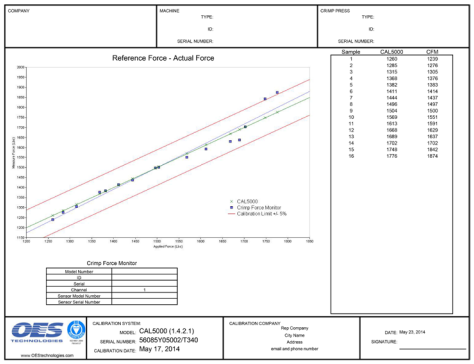


EXAMINE...CRIMP PRESS CAPABILITY

CAL5000

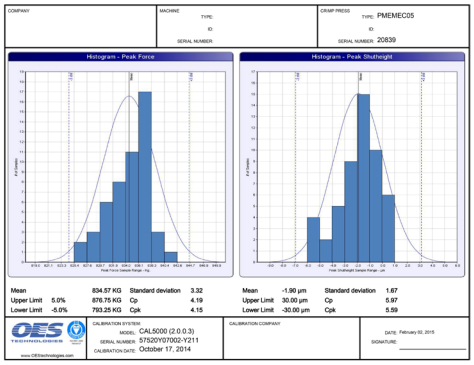
The Press Analysis Tool Kit is a test and measurement device that is offered in two configurations:

- **CFM Calibration:**
  The CAL5000 is used as a tool to calibrate OES crimp force monitors to absolute force. The CAL5000 is connected with the Press Load Simulator and the Crimp Force Monitor for a precise calibration of the crimp force monitor. The CAL5000 operator interface prompts the user through a step by step process of cycling the crimping press on the Press Load Simulator while the CAL5000 automatically calibrates the crimp force monitor to absolute force.



- **Press Analysis:**
  The CAL5000 analyzes the press capability to produce quality crimps. The load block simulates the crimp force conditions while monitoring the repeatability of the press shut height and and peak force.

- **Press Shut height Adjustment:**
  The CAL5000 is an effective tool to set the press shut height precisely to 135.78mm or 119.20mm. The CAL5000 supports precise adjustment of crimp press shut height by montoring and reporting the press shut height when the crimping press is cycled automatically and under simulated load.



Crimping press capability is a precondition for assurance of crimp quality

DEPEND...ON OES's 35 YEARS' EXPERIENCE

SENSE... The crimp force
- PBT Sensor
- Piezo Strain Sensor

ANALYZE... The force signature
- CFM1000, CFM2103/2203, CFM4103/4203, CFM5100/5200

INSPECT... Wire strips and seals
- LPA56B, LPA58

DETECT... Strip blades touching the conductor (conductor touch)
- CQS

ELIMINATE... Crimp defects
- WIRECHOP

ERROR PROOF & AUTOMATE... Machine setup and production process
- QPM

EXAMINE... Crimp press capability
- CAL5000

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