



CREATIVITY, ENERGY, ENTHUSIASM, COMMITMENT, ORGANIZATION

CEECO A PREMIER MACHINERY SUPPLIER

Since its formation in the late 1960s, customers around the world have recognized Ceeco as a premier supplier of rotating equipment. When it became part of Nextrom in 1996, Ceeco developed synergies with its sister companies to help Nextrom become a leading supplier of the 'complete solution' to the cable industry throughout the world. Now, with its re-emergence as an autonomous division within the Nextrom group, Ceeco intends to continue to focus on its four main product ranges:

- Data and Telephone communication
- Optical Fibre, as a sub-contractor to Nextrom Fibre
- Energy
- Flexible Pipe

A cornerstone of the company's success has always been understanding the current challenges related to the construction of various forms of cable and flexible pipe, and then overcoming them through innovative machine design.

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ROTATING EQUIPMENT FOR LAN CABLE

There are many challenges facing today's manufacturer of Local Area Network (LAN) Cable. Over the past decade the cabling market has had to undergo significant changes, due to the growth of the communications market and the dramatic expansion in the amount of information requiring transmission. The driving force behind many improvements in the process of data cable is that the markets for these types of cables are continually demanding higher standards of communication cable.

Data communication cable is a unique product in that the whole process cycle is controlled by the finished electrical parameters. The implication of this is that all participants in the process cycle, machine or material supplier and cable maker, must now understand the multitude of variances that could affect these parameters, including a variety of electrical parameters.

In recent years Ceeco has been synonymous with the production of high quality data cable using tandem group twinners. With the expanding markets for 'Cat 6' and 'Cat 7' data cables, there has been a greater emphasis on the quality requirements for the production of core. The challenge has been to design and manufacture machines dedicated to the production of high quality cable, without necessarily reducing the process window in the insulation department. The objective is to give cable producers a wider and more effective choice of twinning and laying up equipment for data communication cable.

Since presenting the Back Twist Module to cable manufacturer (Wire Show 98), over 40 of these lines have been delivered to major LAN Cable producers around the world. All types of Category Cables and materials were tested over an extended period and the results were satisfactory. Impedance curves of ± 2 ohms were typical and crosstalk showed about 4-dB gain over non-back twist lines. Product yield rates in excess of 95% were being realised on ISO 11801 Cat. 6 Cables.



Fig 1 High Speed Back Twist Module

However the need for higher production speeds has led Ceeco to further develop its novel back twist design, whilst keeping the proven advantages of the existing unit:

- Front-loading from one side, with integral loader.
- Ease of threading up.
- Good tension control.
- Balanced wire path.
- Production of high quality cable.

An improved bow design and an innovative re-design of the cradle has allowed an increase in operating speeds of up to 4500 tpm, Fig 1.

We believe that the introduction of the high-speed back twist module will help to ensure that whilst cable specifications continue to be increased, these high quality cables can still be produced in a cost-effective manner.

STRIP ARMOURING

The protection of sensitive cable is a problem found throughout the world, whether it be optical fibre or control cable. Strip armouring is a commonly used process for the protection of various types of cable throughout North America. Its low cost capability to provide tensile crush and impact resistance to a wide range of wire and cable applications has enormous potential within the global market.

This process takes a flat metallic strip and forms it into an 'S' shape which is then interlocked on itself to create a physical protection for what it encloses (Fig 2). This protective layer can take the form of a flat, triangular or round shape.

The recent interest in this process is fuelled by a number of market changes. These include, among others:

- 1) Electrical code changes, which allow for pre-assembled, strip armoured conductors. These are easier to install compared to the traditional process of pulling wires into metallic conduit.
- 2) A growing trend towards composite cables and pre-assembled cables.
- 3) A growing demand in the fibre optic and data markets (riser and plenum cables) where additional physical protection is a requirement.
- 4) Expanded use of this speciality layer in the coaxial cable, instrumentation cable and control cable markets.
- 5) A market desire to identify the function of armoured cable with a colour coded stripe or other such markings that would enhance the serviceability of the cable.



Fig 2

Toronto's machine program includes the capability of armouring products as small as 6mm or 0.25in up to armour diameters of close to 125mm or 5in. Speeds range up to 1200rpm with widths typically between 9.5mm and 25mm. Materials vary depending on the application and can include the sophistication of nickel-based alloys (Monel) to Stainless steel galvanised steel and a wide range of aluminum alloys. The capacity of a line is typically 2 million meters or 6 million feet per year, giving an extremely low capital cost solution.

STRANDING

Every cable manufacturer aims to make a quality product using the least amount of resources. To do this, that manufacturer must understand the critical parameters that affect the strand it wishes to make. Once this is accomplished, finding the hardware to provide them with the most flexible and effective process is simplified.

Recent revisions to the ASTM standards for Compressed Copper (ASTM B8), Compressed Aluminum (ASTM B231), and Compressed 8000 series Aluminum alloy (B801) have meant the introduction of a number of changes, including:

- Smaller strand diameters
- Acceptance of Single Input Wire Unilay stranding

The traditional strand designs have been available for decades and have served the industry satisfactorily; the motivation for the changes is to reduce the conversion cost from rod to strand significantly, without compromising conductor performance. The challenge for today's manufacturers is to determine what target is to be chosen within the scope of the specifications.

A gauge of the economics involved, using alternative machine processes, is capital cost-per-twist. If we arbitrarily use the Double Twist Strander as a reference, the capital cost per twist of a Tubular Strander is between 3 to 5 times greater, and of a Rigid Strander 12 to 15 times greater.

If the criteria for determining the construction were based solely on the economics, the industry would gravitate to the unilay conductor schedule, and the smallest diameter that is allowed within that schedule. This program provides the greatest potential as it has the smallest strand diameter schedule for a specific strand size. Consequently this represents the greatest potential for insulation savings for a given insulation thickness. It further allows the use of the Double Twist machine, which has the lowest capital cost per twist of the available processes used for stranding.



Fig 3

The demonstrated performance of the Double Twist machine (Fig 3) with the patented technology, allows the manufacture - in one pass- of strand containing three layers. The roll form process coupled to the productivity of using a single input wire (SIW) makes the Double Twist production method the most efficient and cost effective in the market.

Customized and innovative design has always been a key feature in continually extending the product range of rotating equipment, spanning from the delicate fibre optic filaments to 300mm (12 inch) diameter submersible oil pipe. Ceeco is committed to the process of continually improving the quality of its range of equipment through collaboration with cable producers around the world in order to meet the challenges that the industry will have to face in the future.