

The Instrumentation Cable Experts

Facilities

Head office & factory

1300 Industrial Boulevard
Mt Pleasant, Texas 75455, USA
www.dekoroncable.com

Stocking Centres

- USA – Mt Pleasant and Houston
- Singapore (sales office)
- Saudi Arabia
- Australia – Melbourne and Brisbane
- New Zealand

Topics for Discussion

- 1) Introduction
- 2) History & Innovation
- 3) Marmon Group
- 4) Products
- 5) Markets & application
- 6) Focused Operations
- 7) Quality
- 8) Project Optimization & Successes

Dekoron Product Mfg Range

- Instrument cables
- Thermocouple extension cables
- Control cables
- Field bus cables
- Fire resistance cables
- Direct burial cables

Market we serves

Dekoron develops and manufactures cables used in Signal Transmission, as well as Process and Control applications for these industries:

- Chemical processing
- Food processing
- Light Rail
- Mining and Metal Processing
- Offshore
- Oil exploration and production
- Power Generation
- Pulp & Paper
- Refining and petrochemical
- Waste water treatment

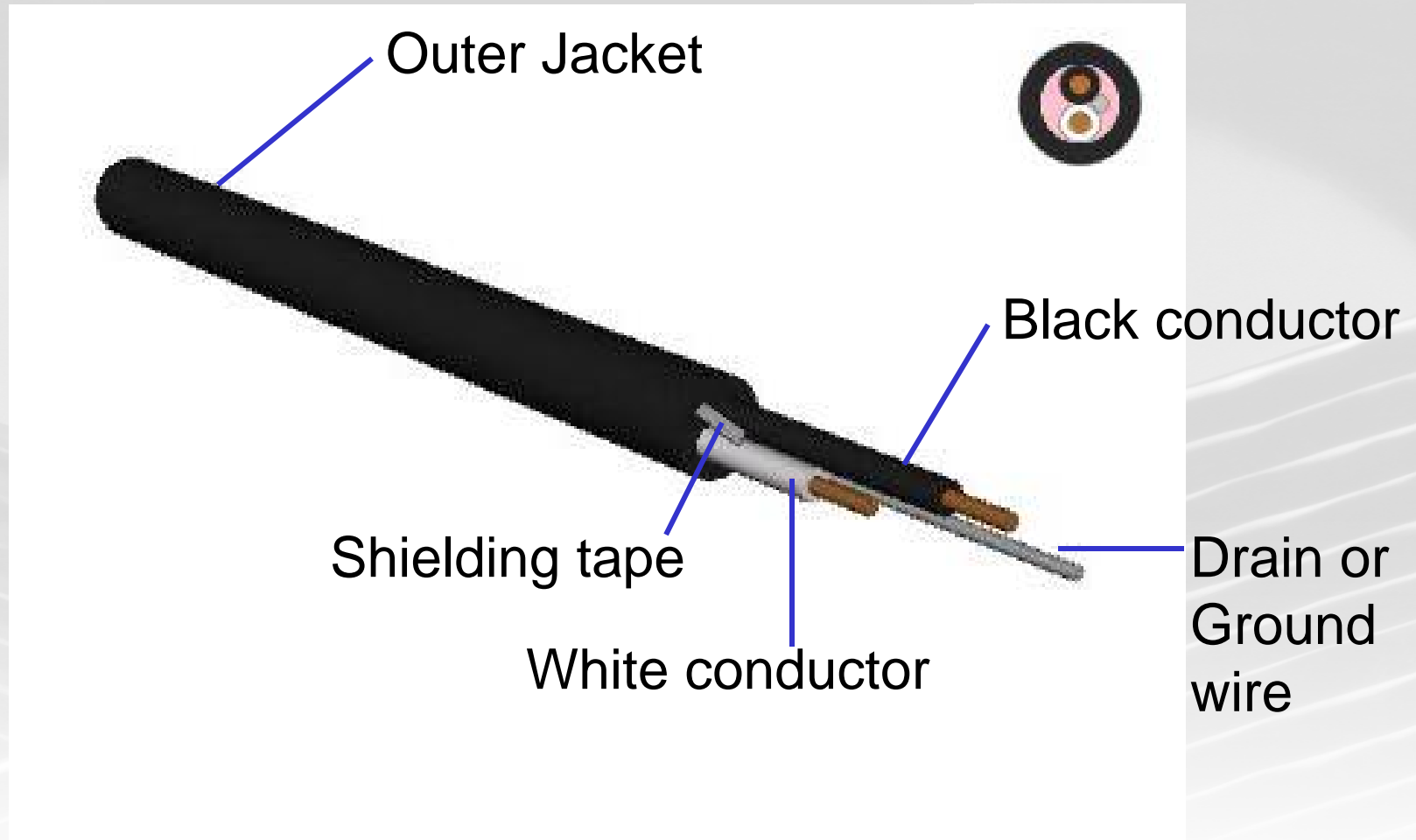
Dekoron – Introduction

- Instrumentation cables are a critical part of industrial control systems. Clean, reliable signals are essential.
- Dekoron has 45+ years experience in designing and manufacturing high quality instrumentation cables.
- Dekoron is the only US manufacturer and quite probably the only one in the world, dedicated to producing instrumentation cable.
- Part of the Marmon Corp. of Chicago, a privately held \$7 billion company.
- 75,000 sq.ft.(7,500 m²) plant in Mt. Pleasant Texas.
- Sales office in Singapore.
- Shortest most reliable lead-times in the industry.

Dekoron Innovations & Firsts

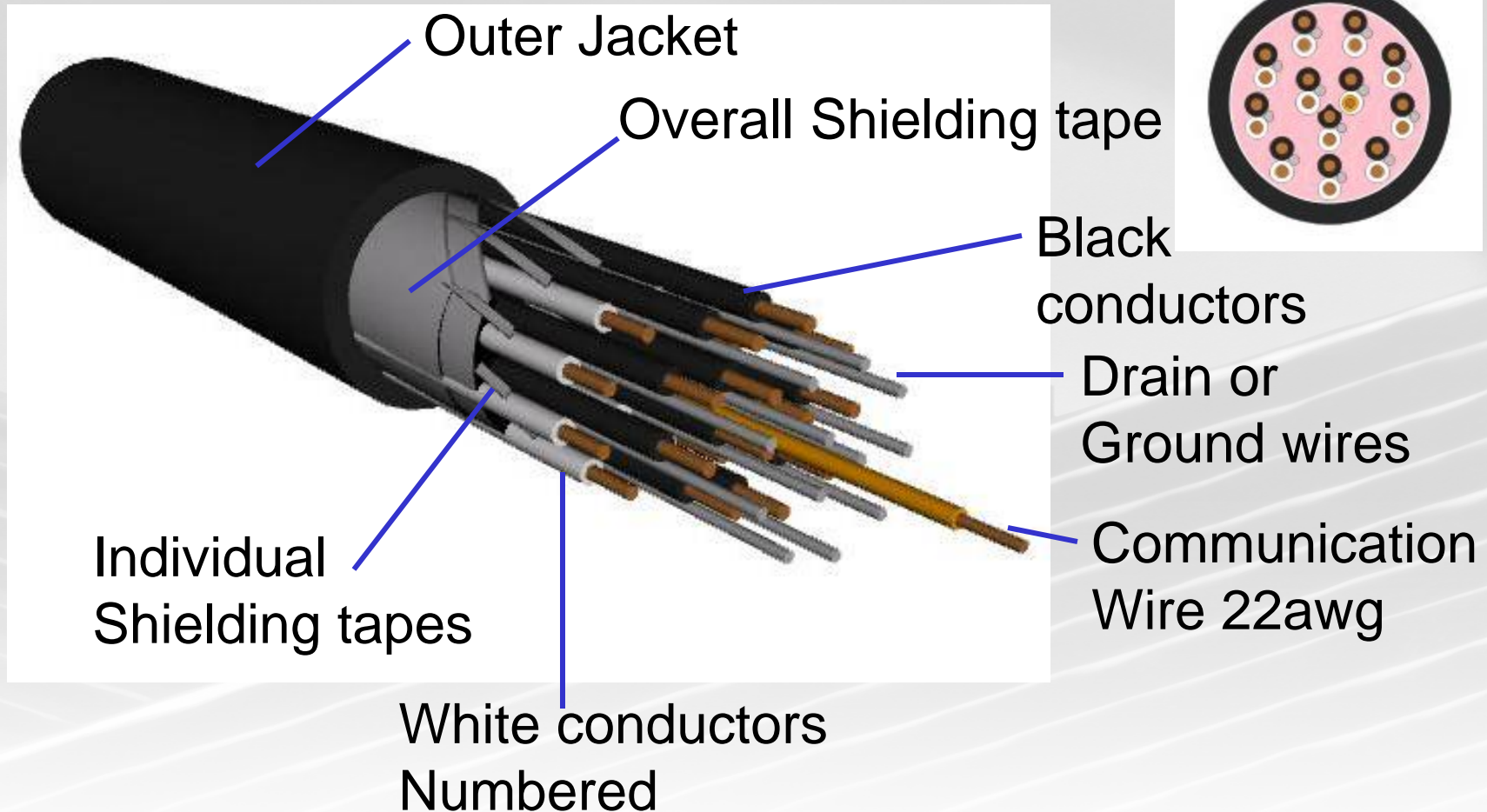
- 1962 Electrical signaling transmission technology (low voltage)
- 1968 Isolated shields for electrical wire
- 1969 Dekabon[®] Direct Burial Cable
- 1972 Nuclear rated instrument cable
- 1983 Plenum Cables non-fluoropolymer
- 1989 Fire resistant Circuit Integrity Cable
- 1992 Fieldbus digital instrument cable

Dekoron Single Pair Instrumentation



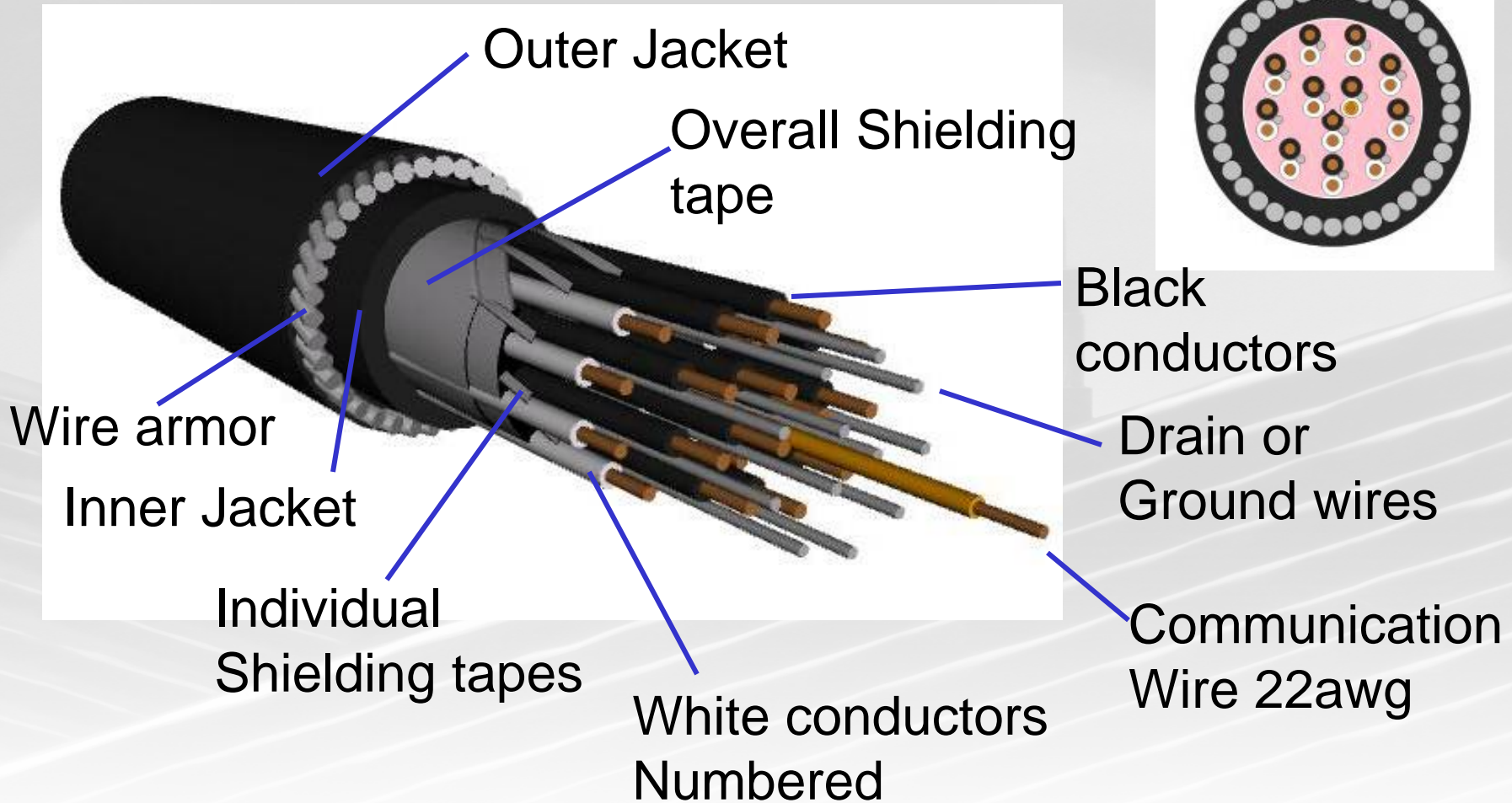
Dekoron Multi Pair Instrumentation

12 pair 300V # 1874-01280



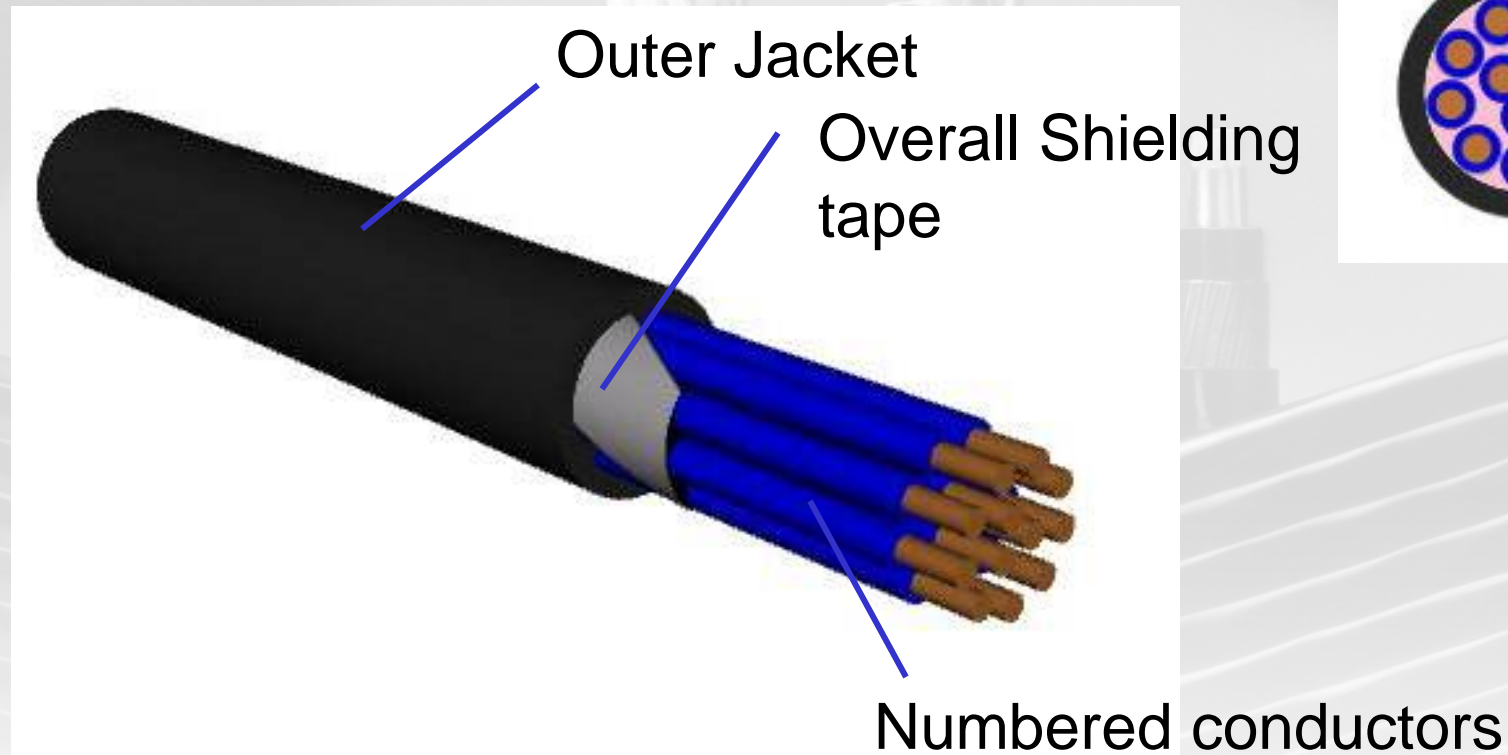
Dekoron Multi Pair Instrumentation – Wire Armored

12 pair 300V wire armored # 1872-01280



Dekoron Multi Conductor Control Cable

12 conductor 300V # 1835-6128L200S1



Products & Insulation

Instrumentation Cables

300 Volt

Thermoplastic – PVC, TPE, HDPE

Thermoset – XLPE, silicone

600 Volt

Thermoplastic – PVC/Nylon, HDPE, PVC

Thermoset – XLPE, silicone

Thermocouple Extension Cables

300 Volt

Thermoplastic – PVC

Thermoset – XLPE

600 Volt

Thermoplastic – PVC/Nylon, HDPE, PVC

Thermoset – XLPE

Control Cables

600 Volt

Thermoplastic – PVC/Nylon, HDPE

Thermoset – XLPE, silicone

Conductors

- Copper
 - 10-20 AWG / 4.0 - 0.5 mm² (4 mm² is highest)
 - bare or tinned copper
 - 7 strand as standard
 - 19 strand flexible and solid to special order only
- Thermocouple Extension
 - 16-20 AWG/1.5-0.5 mm²
 - EX, JX, KX, TX, SX Extension alloys
 - Solid as standard
 - Stocked raw wire mainly 16 & 20 AWG KX, JX, EX & TX
 - Some 18 AWG KX and JX
 - Metric sizes to special order
 - Stranded thermocouple to special order

Cable Assembly

- 2 to 100 pair/triad/conductors, all numbered
- Individual shields/overall shields
- Aluminum and copper mylar shielding tape
- Isolated pair shields
- Maximum core diameter 2.4"/ 60mm
 - Increasing to 2.8"/ 70mm mid 2008
- Very long lengths available (3000M +)
- Communication wire standard in 300V cables, 22 AWG solid copper with PVC.

Jacket Options

- **PVC** **P**oly**V**inyl**C**hloride
- **CPE** **C**hlorinated **P**oly**E**thylene
- **LDPE** **L**ow **D**ensity **P**oly**E**thylene
- **TPE** **T**hermo**P**lastic **E**lastomer
- **TPN** **T**hermo**P**lastic **N**on-Halogen
- **HYPALON (CSPE) synthetic rubber**
- **NYLON**

Armoring Options

- Interlock armor, galvanized steel or aluminum
- Continuous Corrugated Welded Armour
- Served Wire armor, galvanized steel wires, 16-24 AWG
- Dekabon® aluminum moisture & chemical barrier, environmentally safe (replacement for lead sheathing)
- Double armored Dekabon® plus served wire armor or interlock armor. Excellent for buried service in hydrocarbon & chemical environments.

Specialty Products

– Fieldbus Digital Cable

- Effectively transmits digital signals in Fieldbus and protocols.
- Digital systems allow two way communication and can provide lots of information, but sacrifices transmission distances and redundancy.
- Available in 16 & 18 AWG
- Often used with SWA armoring

Specialty Products

- CIC Circuit Integrity Cable
 - Fire resistant cable that continues to function in the event of a fire.
 - Meets UL1709, IEC 60331, BS 6387 C S W & Z
 - Uses ceramifiable silicone insulation that prevents the conductors from shorting out. (replacement for Mica tape)
 - Applications include
 - Emergency Communications
 - Motor Control
 - Flame Sensors
 - Sprinkler Activation
 - Temperature monitoring thermocouples

**Throw some cable
on the barbie !**



Cable Standards


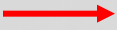

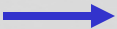
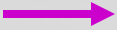
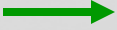
- 300 Volt UL 13 PLTC / ITC
- 600 Volt UL 1277 TC
- International Standards
 - CSA # 239 Control and Instrumentation
 - 300 & 600 Volt PVC insulation & jackets with steel and aluminum interlocked armor optional
 - IEC 502 600/1000 Volt for PVC & XLPE insulations
 - IEC 227 450/750 Volt for PVC insulation
 - BS 5308 300/500 Volt for PVC & HDPE insulations
 - BS 6346 & 5467 600/1000 Volt for PVC & XLPE insulations

Main Markets

Dekoron products are used in large scale industrial control systems in industries including:

- Oil refining
- Petrochemicals
- Oil & gas production and processing
- Power generation
- Chemicals
- Paper
- Steel and metals processing
- Bio Fuels (ethanol, bio diesel)

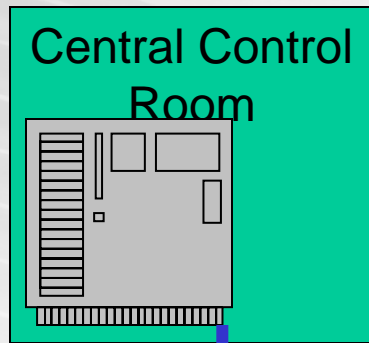
Cable in a Refinery

-  Instruments
-  Instrument cable 300-600V
-  Control elements
-  Control cables 600V
-  Low Voltage power 600V
-  Medium Voltage power 2-35KV
- High Voltage Supply 69-138KV



Sub Station

Onsite power generation (co-gen plants) common.



Power Panel

Pump

Valve

Flow Meter

Reactor

Level Gauge

Pressure Transducer

Viscosity sensor

Heater

Flow Meter



Also use some electronic, network and fibre-optics in the control room and for low criticality control, monitoring & communication.

Key Customers

- Conoco Phillips
- Valero
- ExxonMobil
- Marathon
- Chevron
- Shell/Motiva
- Dupont
- Florida Power
- Kentucky Utilities
- Cinergy
- Weyerhaeuser
- Pemex, Mexico
- PDVSA, Venezuela
- Sincor, Venezuela
- Taiwan Power
- PTT Thailand
- Star Petroleum, Thailand
- Pec-Tech, Indonesia
- Petronas, Malaysia
- Saudi Aramco
- Qatar Petroleum
- Kuwait Oil Company

Focused Operations

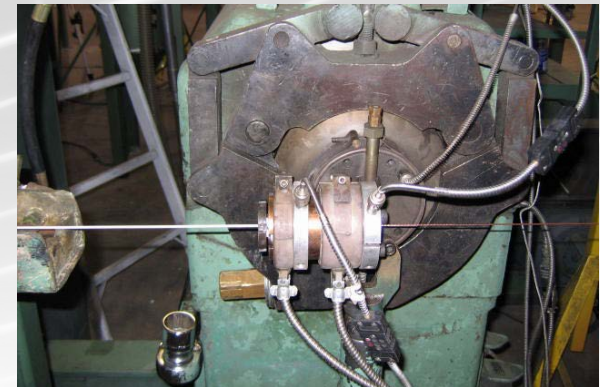
- By focusing on instrumentation cable Dekoron achieves the following:
 - Employees make instrumentation cable every day not once or twice a month - **improves quality.**
 - Equipment is optimized for running instrument cables, for size, speed, controls, material handling & in-process inspection - **better deliveries**
 - Raw material range & variations are minimized – **less wastage, optimal pricing**
 - Processes and inspection are optimized with regular production of the same items – **less faults**

Singles Extrusion



Many different types and colors of primary insulation are available.

Bare wire is coated with plastic as it passes through the extruder. The coated wire is cooled & run onto reels holding up to 15,000 ft.



Twisting



As the pairs of wires are twisted together they are marked, drain wire is added and shielding tape is applied over the wires

All the pairs needed for a cable are normally run at one time, changing the numbering as each reel is started.



Bunching



The pairs are pulled through the die plate and twisted together to produce the cable. Protective tapes and binders are applied.

The shielded pairs are laid out on the payoff stands in a specific order to produce the optimum cable.



Bunching



The new buncher can produce the longest instrument cable lengths in the USA.

Lengths of 16 AWG 50 pair over 5,280ft (1 mile or 1.6km) have been produced.

Longer lengths reduce the need for junction boxes on long runs & provide customers more flexibility in their plant design

Jacketing



Jacket extrusion applies a protective chemical & moisture repellent plastic coating over the cable.

Jackets are marked by in line ink jet printers with part #, date and sequential length in feet or meters.



Quality Assurance



Dekoron is an ISO 9001-2000 certified company. UL audits Dekoron on a regular basis with unannounced visits.

Electrical testing is performed during manufacturing and on the finished cable.

Modern control systems are used to control critical processes such as extrusion.



Armoring Options

The Dekabon® process uses a bonded aluminum polymer tape to prevent moisture ingress



Served wire armor wraps multiple galvanized wires around the cable to protect it from mechanical damage.

Finished Inventory & Shipment

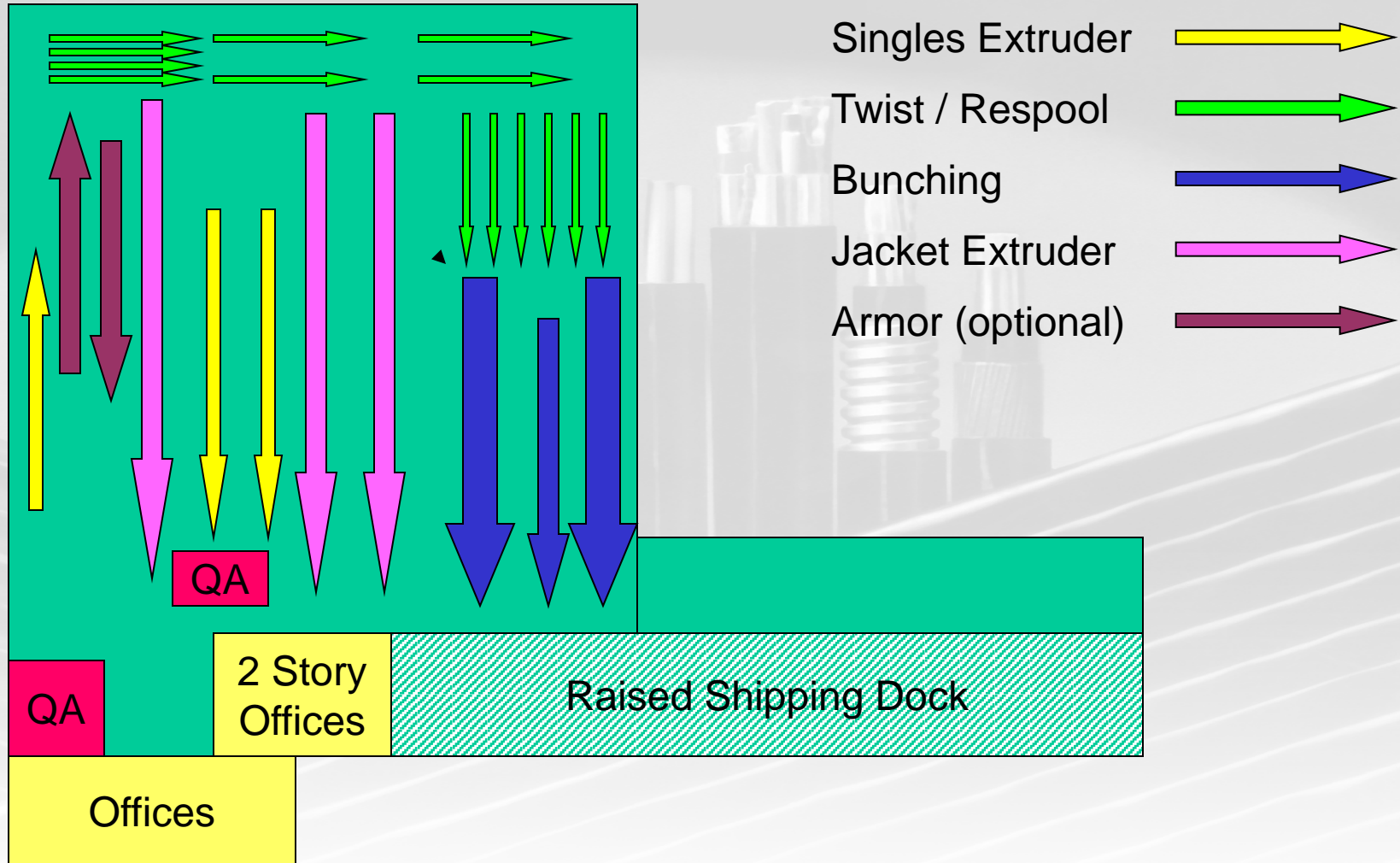


Dekoron keeps approx. 50 items in finished inventory.
1-50 pair 300V PVC
1-36 pair 600V PVC/nylon,
1-24 pair KX thermocouple

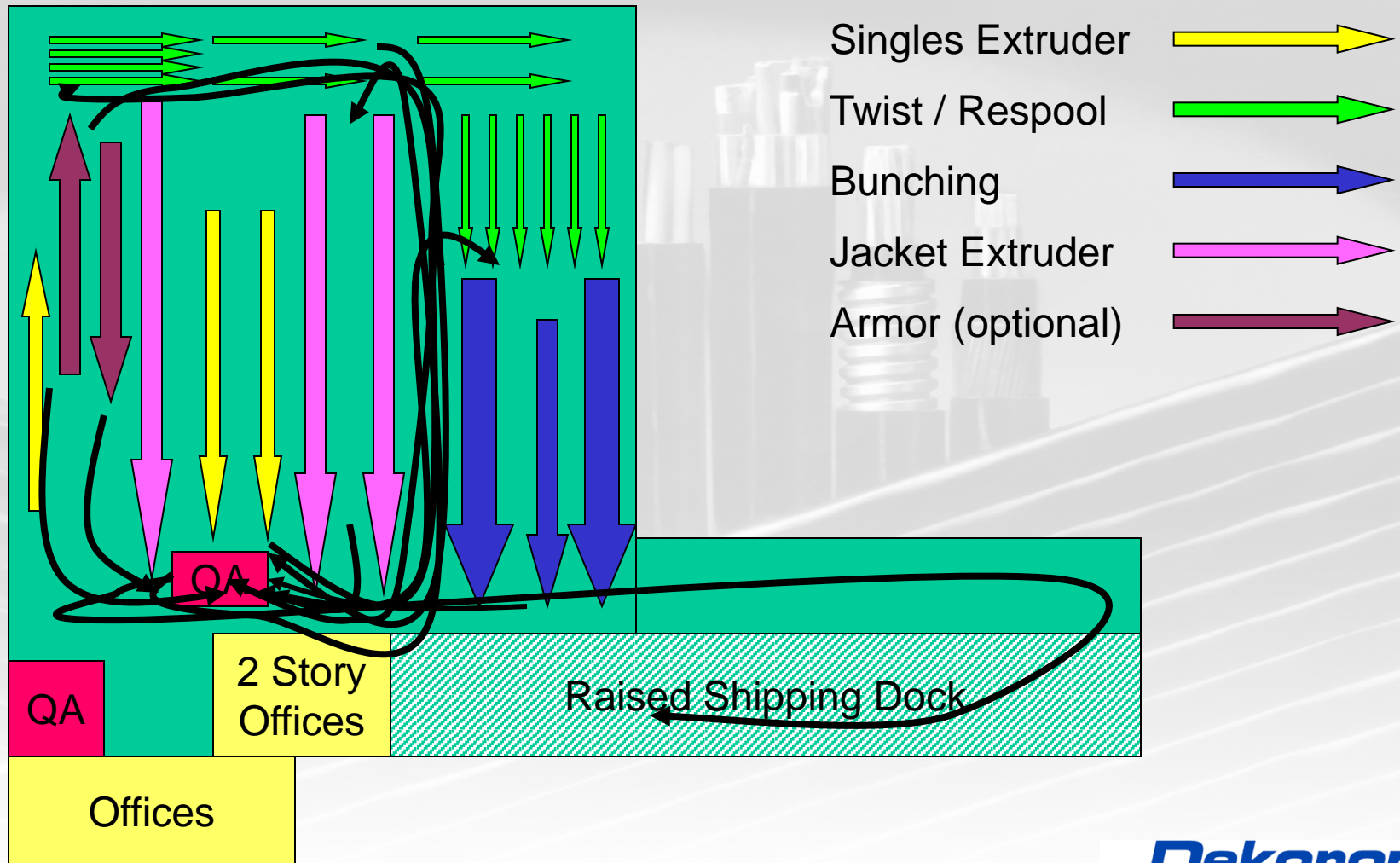


All reels are heat treated.
Cable is wrapped to keep out dirt and handling labels applied.

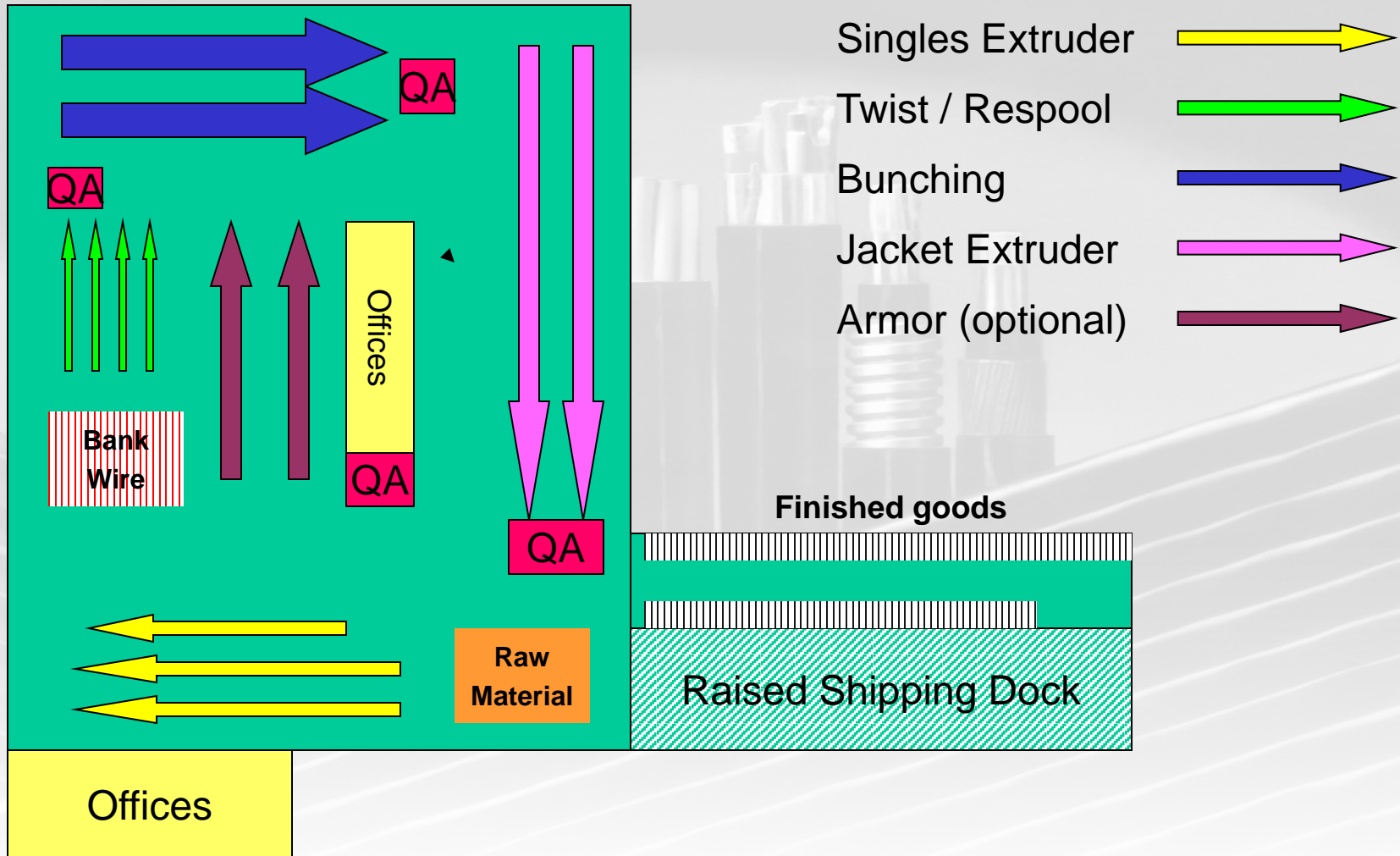
2004 Layout



Extensive Material Movement



2006 Layout



Key Metrics

- On time delivery to customer request date 2006 - **97%**.
- Customer returns due to poor quality of in 2006 - **zero**
- These two key metrics are improving while Dekoron enjoys a high growth rate.

Project Optimization

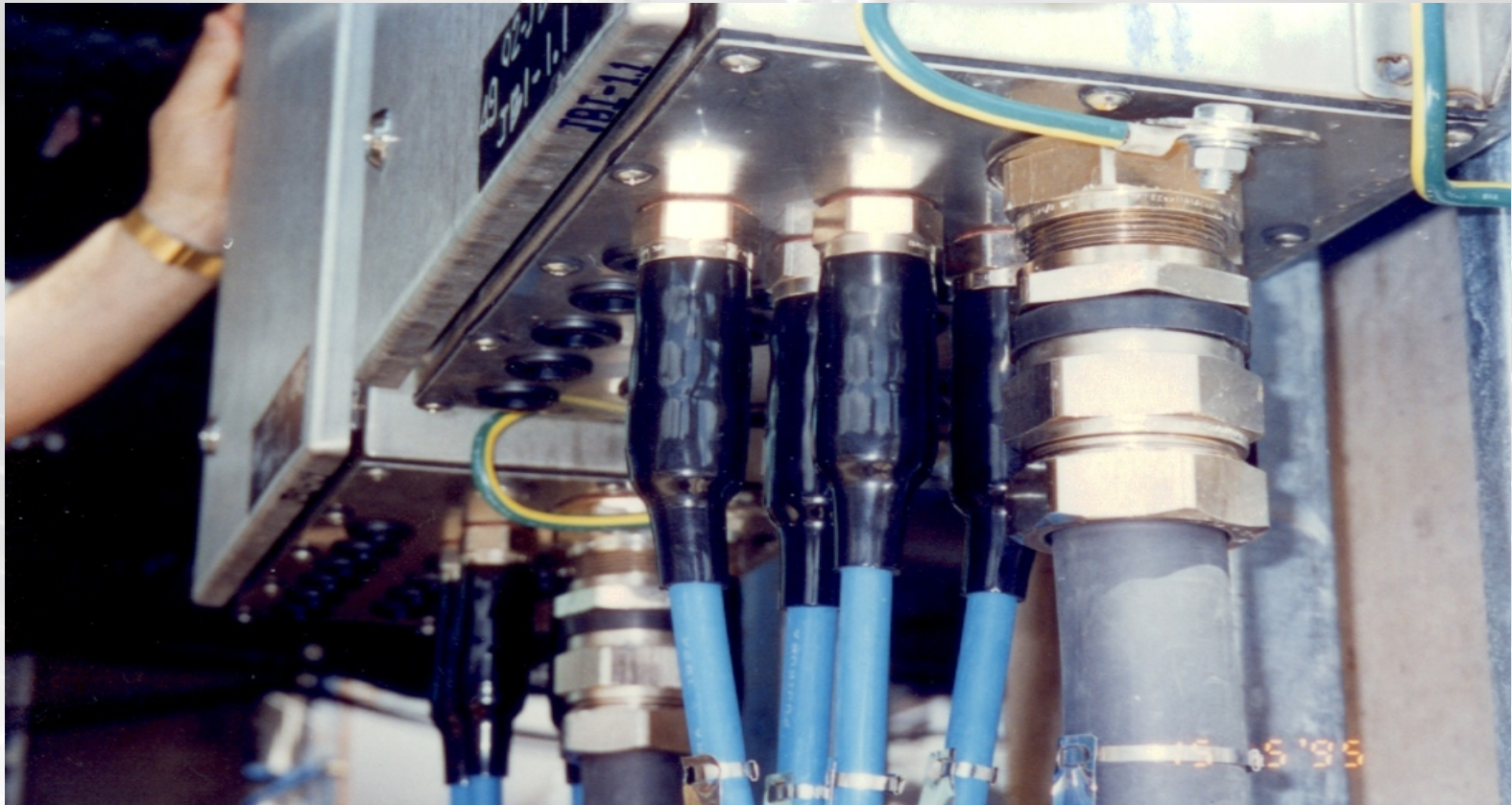
- Dekoron is pleased to work with customers to optimize their instrumentation projects.
- FEED stage
 - Provide technical advice on instrument cable construction, estimated costs and deliveries.
- Bidding stage
 - Provide timely and accurate bids with comprehensive data sheets etc.
 - Quote alternatives as appropriate
 - Promptly address any questions
- Manufacturing stage
 - Due to short reliable lead-times Dekoron prefers not to make the cable until the customer is sure of the lengths required.
 - Raw materials and capacity can be reserved with a P.O. and detailed lengths provided later.
 - Priority items are identified and shipped first.
 - Expediting and inspection visits readily accommodated.

Project Optimization

- Shipment stage
 - Provide timely and accurate certification, shipping documents.
 - Arrange reliable transportation with companies that can follow jobsite requirements.
 - Stage shipments for complete truck or container loads.
- Commissioning
 - Provide training on installation techniques as needed.
 - Provide training on field testing as needed.
- Clean Up Stage
 - Dekoron will take back good condition reels from domestic USA job sites, subject to cost effectiveness.
 - Dekoron will consider the return of un-used standard cables provided lengths are saleable.
 - Dekoron can assist in finding good scrap rates for left over cables and short cuts.

Field Junction Box

- Multi pair cable in, many single pair cable out



Laying of multi pair cable

- “DEKABON” direct burial instrument cable under pipe rack



Laying of multi pair cable

- “DEKABON” direct burial multi pair cable in cable trench



Laying of multi pair cable

- “DEKABON” direct burial cable from control room



“Dekabon” Direct Burial cable going into control room through MCT

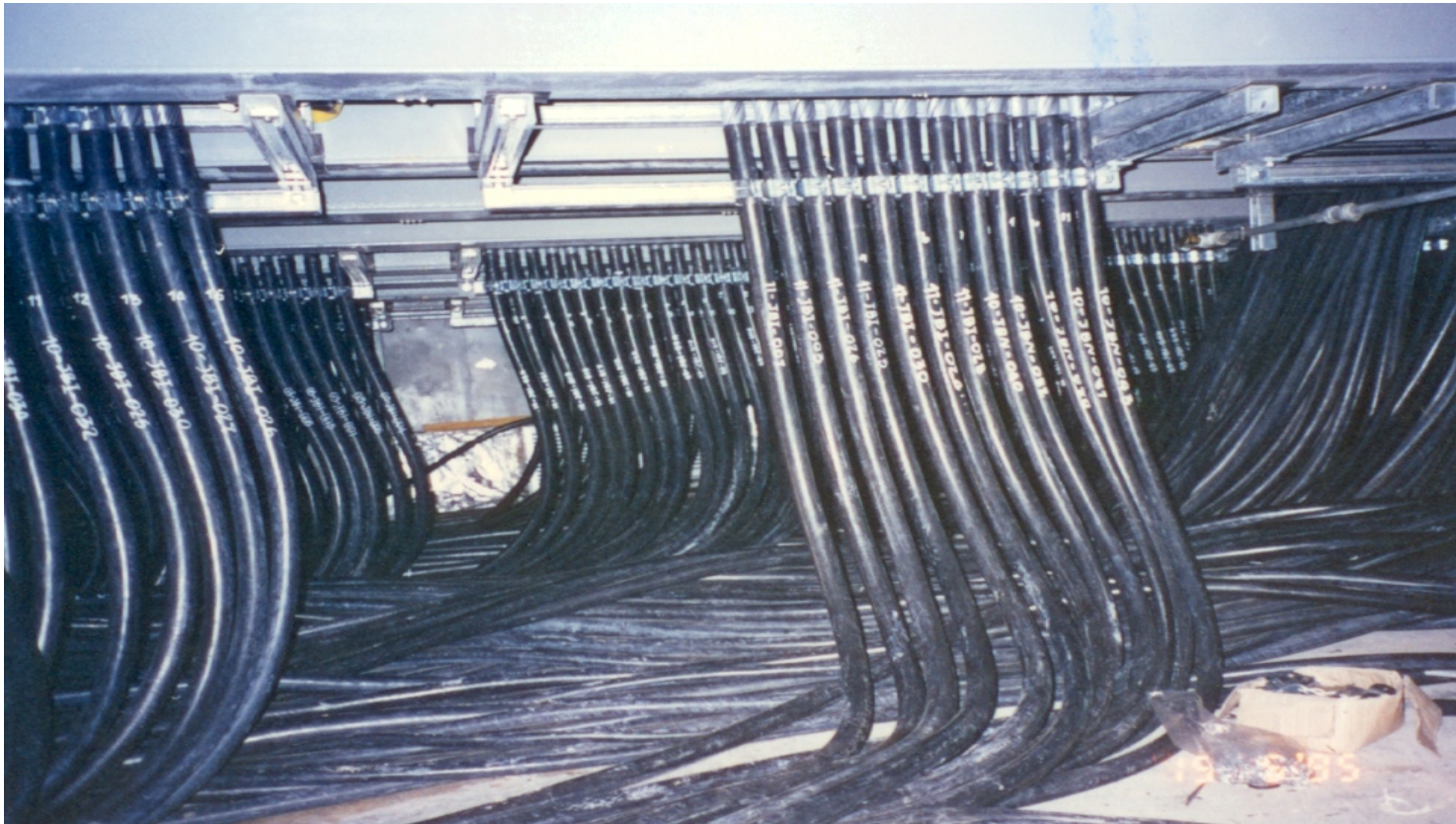


Details of MCT (water and gases barrier) and Dekabon™ direct burial cable at control room



Laying of multi pair cable

- Securing method of multi pair cable under control room flooring



Laying of multi pair cable

- Multi pair cable going into cabinet and terminal block



Comparison of Standards

Color code for ANSI, IEC and BS

Extension Wire Alloy Combination			Maximum Temperature Range	ANSI	International IEC 584-3	BRITISH to BS 1843	T/C
Code	+ Lead	- Lead					
Jx	IRON Fe (magnetic)	CONSTANTAN® COPPER-NICKEL Cu-Ni	-210 to 1200°C -346 to 2193°F Thermocouple Grade 0 to 200°C, 32 to 392°F Extension Grade				J
Kx	CHROMEL® NICKEL-CHROMIUM Ni-Cr	ALUMEL® NICKEL-ALUMINUM Ni-Al (magnetic)	-270 to 1372°C -454 to 2501°F Thermocouple Grade 0 to 200°C, 32 to 392°F Extension Grade				K
Vx	COPPER Cu	CONSTANTAN COPPER-NICKEL Cu-Ni	0 to 80°C 32 to 176°F Extension Grade	NONE ESTABLISHED			K
Tx	COPPER Cu	CONSTANTAN COPPER-NICKEL Cu-Ni	-270 to 400°C -454 to 752°F Thermocouple Grade -60 to 100°C, -76 to 212°F Extension Grade				T
Ex	CHROMEL NICKEL-CHROMIUM Ni-Cr	CONSTANTAN COPPER-NICKEL Cu-Ni	-270 to 1000°C -454 to 1832°F Thermocouple Grade 0 to 200°C, 32 to 392°F Extension Grade				E
Sx	COPPER Cu	COPPER ALLOY II	-50 to 1768°C -58 to 3214°F Thermocouple Grade 0 to 150°C, 32 to 300°F Extension Grade				S



IMPORTANT NOTICE
READ BEFORE UNLOADING CABLE
DO NOT REEL WITH THE REEL FLANGE
AND NEVER EXCEED THE MAXIMUM
WEIGHT OF THE REEL AND CABLE



Daktronics

IMPORTANT NOTICE
READ BEFORE UNLOADING CABLE
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Daktronics



Dekoron
Wire & Cable, Inc.

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Questions?
