

# AFC FIELD REPORT: MOF®



## TEXAS SCHOOL DISTRICT WIRES FOR THE FUTURE WITH MOF®

When the Humble, Texas, Independent School District (ISD) decided to invest \$20 million to upgrade the technology used by its 29 school campuses and 24,000 students, it chose a future-proof network design that included Category 5 copper for today's needs and Metal-clad Optical Fiber (MOF®) from AFC Cable Systems for future growth.

The Humble ISD, located just north of Houston, between Lake Houston and Highway 59, encompasses 90 square miles and includes the communities of Atascocita, Humble, and Kingwood. What began 100 years ago with a one-room schoolhouse and 12 students now includes two large traditional high schools, two small nontraditional high schools, two ninth grade campuses, six middle schools, and 18 elementary schools. The district approved an \$85 million bond referendum in the fall of 1996, which included funding for two new schools and the technology upgrade.

Meeks Technology, of Austin, Texas, specified a network for the Humble

ISD that would provide students and teachers with communication capabilities among schools and a high speed link to the Internet. The network upgrade began in May 1998 and took about a year to complete. The upgrade includes over 4,000 network connections.

"We recommended a network solution that uses a high speed fiber optic backbone and copper connectivity within the classrooms," notes Ricki Fisher, Meeks

**"MOF saved us almost  
50 percent in installation  
time - that's a huge  
labor savings."**

regional director. "Right now, switched technology for copper is much less expensive than fiber optic switching. So, we created a hybrid network that relies primarily on copper today, but has the optical fiber in place to allow the school district to easily upgrade to an all fiber network in the future as the cost of optical electronics

comes down."

### **Future Proof**

Humble ISD and other school districts across the country are preparing kids from an early age to live in a technological world. That goal requires that technology be integrated with the learning process. While no one knows for sure what the future holds for technology, most industry experts agree that greater network bandwidth will be required.

The new Humble ISD network was designed to be easily upgraded when it makes the most economic and technological sense. By combining copper and optical fiber, the designers of the Humble ISD network have enabled the district to swap out easily-accessible electronics like switches and hubs when it comes time to upgrade. This hybrid network eliminates the need to rewire the entire district with new cable when additional network capacity is required.

### **MOF Saves Time In The Field**

Richard Bingham, media operations manager for network installer Ad-

vanced Network Solutions (ANS), of Austin, notes that his firm specified AFC's MOF cable in its bid for the Humble project because of his company's prior experience with the product and the inherent advantages MOF offers. "This was a very large retrofit project, and we knew that MOF would

save us a lot of time in the field because it is a one-step installation process, rather than two or three steps normally required with traditional conduit and cable."

Creating a cost-effective wide-area and local area network (WAN/LAN) to link this far-flung district required 400,000 feet of six-fiber, metal clad MOF cable and 4,000 feet of hybrid MOF. The hybrid MOF cable included six strands of optical fiber and four pairs of unshielded twisted pair (UTP) Category 5 copper in an interlocked steel armor and an outer jacket of ultraviolet-resistant PVC (polyvinyl chloride) plastic. This hybrid cable was used as an overhead outdoor line to link temporary classrooms at 17 of the district's schools.

ANS project manager, Lex Carroll, explains the advantages that MOF offers the field installer. "MOF is one unit with fiber and/or fiber and copper already installed at the factory. MOF was a little slower to pull than innerduct alone, but once you pull it, you're done. Just one pull. You don't have to go back a second time and pull fiber through the innerduct. MOF saved us almost 50 percent in installation time - that's a huge labor savings. Although the materials cost may be a break even in most cases, the labor savings makes the total installed cost less with MOF. It's an outstanding product!"

AFC's MOF cable is pre-assembled and pre-tested at the factory to save installers time in the field. It can be custom ordered to include a choice of fiber brand, single and multi-mode configurations, and almost any combination of fiber



**MOF cable is pre-assembled and pre-tested at the factory to save installers time in the field.**

and copper conductors. It is UL-approved for use in ducts, plenums, risers and environmental air spaces. MOF can be ordered with galvanized steel or aluminum armor. As noted above, an optional PVC jacket can be extruded over the armor for additional protection.

#### **Pulling System Saves Time And Worry**

"The strength of the MOF armored cable prevents any damage to the fiber during installation and afterwards, which is important to us because of the warranty we provide," Carroll notes. "In fact, it's so strong that we were able to bundle several cables together for some long runs, which saved us even more time. We occasionally would pull eight or nine cables at once."

Carroll explained his system for pulling MOF cable. "We measured each run in advance and marked the distance on the plan. When our crews arrived at a school, they could pull the lengths they needed off a 4,000-foot spool and mark those cables. Our longest runs were about 1,300 feet at the larger high schools. Those runs were from an upper floor down to the first floor and down a hallway to a main distribution frame (MDF)." According to Carroll, the MOF cable was supported through ceilings and other spaces by means of bridle rings and beam clamps.

"We had seven or eight crews working simultaneously. As a project manager on a large job, I can tell you that the physical strength of the MOF cable really puts your mind at ease. It's a relief to know that the fiber cable won't be dam-

aged during installation. There's nothing worse than installing a fiber run only to test it later and discover a break. With MOF, that's not a concern," Carroll adds.

#### **Network Design Uses Both Copper And Fiber**

Meeks Technology's network design called for a single MDF to be installed in each school building. Each MDF is connected to the local phone service's fiber network for school-to-school and school-to-Internet communication. In the district's largest schools, MOF cable connects classrooms to the main distribution frame, eliminating the need for the intermediate distribution frames that would be required with a completely copper network. The largest high school has 100 classrooms linked to the network.

In most Humble ISD schools, Category 5 copper cable provides the final network connection. MOF is also installed alongside the Cat 5 wiring down to the classrooms so that future network upgrades will require only a change of switch and hub electronics.

Each classroom that is linked to the ISD network has a hub mounted on one or more walls. The hub enclosure is about two inches thick and about a foot square. Each hub enclosure provides seven ports for use in linking computers to the network. The 100BaseT Ethernet backbone steps down to 10BaseT at each port.

"My experience using MOF cable on the Humble ISD project was great," Carroll stresses. "Why not use it? Materials cost the same or a little less than a two-step installation of innerduct and fiber, and you save about half your labor costs! You get all that and the physical benefits such as a more secure installation that can't be damaged during and after the installation process. A school maintenance worker can push an MOF cable out of the way and not damage it. The orange stripe on MOF also helps identify the cable as fiber optic."

