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ABSTRACT

This paper addresses the difficulties that many school districts face when implementing educational technology throughout aging educational facilities and illustrates one school district's solution. Construction problems found and solved in the renovation process are discussed including issues surrounding equipment purchasing. Photos are provided. (GR)

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# Learning From a Mentor

By Bob Green

Many school districts throughout the country are facing a new challenge as information technology races into the future. Students need to be prepared for this fast virtual world. Many changes in equipment, training methods and instructor resources will need to be made to bring our students out on top in the next millenium.

The Mentor School District is located 25 miles east of Cleveland, Ohio on the shores of Lake Erie. It has 12 elementary schools, three junior high schools and one high school and serves 10,600 students. Mentor recently received a SchoolNet grant from the state, which promised to fast-forward them into the future. The school district was to receive sufficient funds from the state's "SchoolNet" program to cover the cost of communications cabling, raceways, computers and installation expenses for eighteen of their buildings.

## The Problem

As with so many schools across America, many of Mentor's structures were built decades ago. One building dates back to 1900. The move toward more technology is great, but it also puts a much heavier load on the electrical infrastructure. For schools like those in the Mentor district, an electrical upgrade is absolutely necessary before the technology can be fully utilized. Before the project began, their classrooms had one electrical outlet in the front and back of the room. Four or five classrooms were clustered on a 20 amp circuit. The SchoolNet initially provided four computers per classroom and each computer uses 2.4 amps. It doesn't take a mathematician or an electrician to realize these numbers will overload the system. In addition to overloading the system, there weren't enough outlets in the room to accommodate computers and other classroom electrical needs.

## Looking for a solution

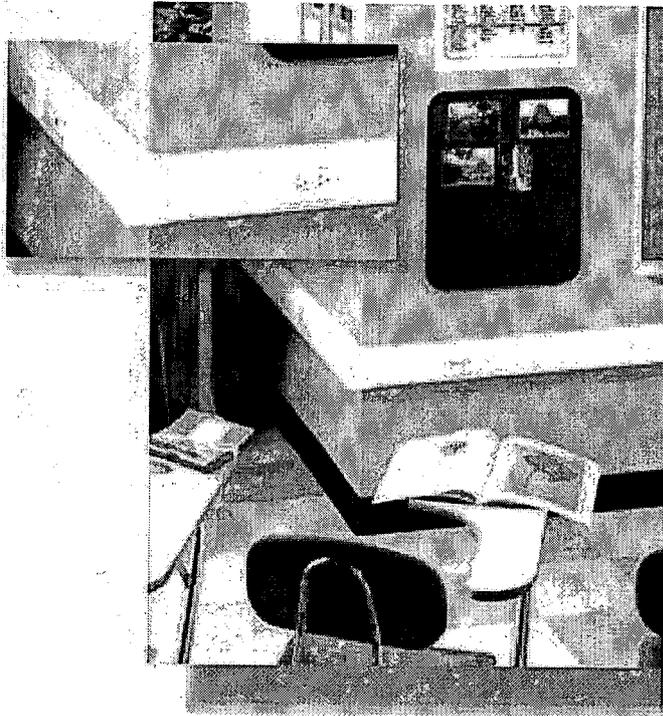
Tony Petro is the Maintenance Electrician for the school system where he's worked since graduating from Mentor High School 24 years ago. Now his children attend the same school. Needless to say, Tony makes a conscientious effort to achieve the best long-term interests of the district regarding electrical decisions. The dilemma was how to power up all the new technology on a limited budget. He began to search through trade magazines and asked for recommendations from trusted local electrical contractors and electrical suppliers. As a result of the feedback he received, it became apparent that a multiple channel surface raceway would help solve the problem. The new raceway would solve the issue of getting

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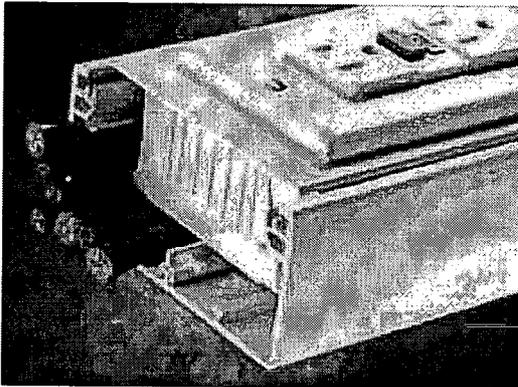
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power and communications cabling and outlets into the classrooms for the least amount of money with the maximum long-term benefit.

It appeared that the multichannel raceway could be easily attached to the wall, ceiling, or floor. Depending on which manufacturer's product would be chosen, it can be made of plastic or metal, and comes in lengths ranging from 5' to 10' in length. Removing the cover from a standard multichannel raceway reveals a wide channel with several dividers to provide separation and organization of the various types of cable that will be used. The better raceways have dividers that can be adjusted to accommodate varying numbers of cable per channel.



After looking at the samples of product from various manufacturers across the country, the one that appeared most promising was from a manufacturer with corporate headquarters less than thirty miles away. Carlon ([www.carlon.com](http://www.carlon.com)), based in Cleveland, is one of the oldest and most well-known plastics extruders serving the electrical and datacom markets in North America. At the time of Tony's search, Carlon had recently



introduced a new PVC multichannel raceway that was much heavier than the other raceways he had seen. Also, unlike the other products, this one accepted standard single gang boxes, so any standard NEMA device would work with it. Another nice feature was swing out cable retainers every few feet. As the installer is placing cable in the raceway, all they have to do is unsnap the retainers, place the cable in the channel, and then snap the retainer over it to keep it in position until all the cables are in place. The covers can then be

easily installed without pinching the cables.

Based on Mr. Petro's findings, the district decided to run a field trial of the product. They placed the multichannel vertically on either side of a support column in an open mezzanine area to connect to the wires strung through the ceiling. They set desks in two semi circles ("islands") so the desks were facing outward and then bolted them to the floor. The raceway was then attached to the outside of the desks. On a floor below where less space was available, they made another small island surrounding the structural support with the desks facing inward.





The communications wiring would be placed by the state contractor so one channel was reserved for that application. Tony and his assistants placed the electrical wiring into one of the other channels. Standard single-gang electrical outlet boxes were placed every few feet. Later on, when the state contractor placed the communications wiring, all they had to do was remove the cover, place the cable and set the boxes for modem devices right into the raceway. It went without a hitch

and after a year and a half in a high traffic area, there has been no damage to the raceway, testifying to its durability.

### Learning Curve

There was one thing they learned when cutting the plastic that bears mentioning. If the installer needs to fabricate an odd bend, cutting the proper angle is best accomplished with a sliding compound miter saw. They were using an eight-inch blade and discovered that a 100-tooth carbide bit blade gave them the best results.

Whereas most manufacturers provide standard bends for their product, occasionally a unique angle is needed.

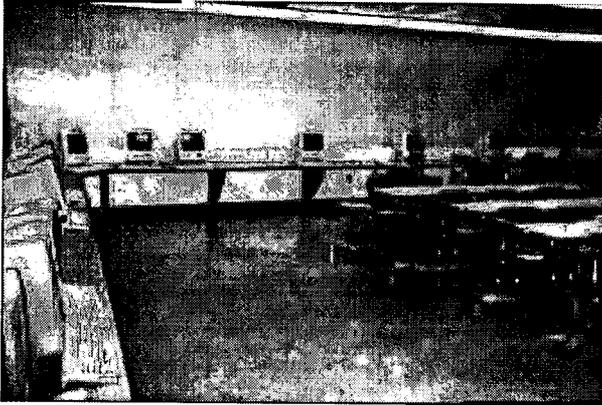
Trying to hand cut these joints or using coarser blades can distort the plastic and leave unsatisfactory results.



The decision was made to utilize the product throughout all of the buildings. They were allowed to use ten percent of the SchoolNet Plus funding for electrical upgrades. The district also took out a loan for the balance of the electrical upgrades. Some difficulties were experienced when the SchoolNet contractor wanted to use another manufacturer's raceway that had already been evaluated and rejected. The contractor pointed out that the raceway that they were determined to use was approved by SchoolNet. The Carlon product was not. A telephone call to the Carlon manufacturer's rep found a willing ally for their cause, and Barb Banks with Consolidated Electrical Distributors in Mentor quickly got the approval that was needed. Barb was also extremely beneficial in making recommendations on how and where to place the raceway. After further negotiations with the contractor, the Carlon product was installed.

Once construction began, the project was completed within three months. Since school was in session during much of the installation period, the work took place at night and on weekends to minimize disruption to the daily class schedules. Tony credits good planning as well as continual oversight for their success. The school district hired a consultant, Project and Construction Services, Inc. of Cleveland, Ohio to help with the bid documents and project management. They had set up contractor meetings to review the project once a week, but as Tony stated, "they can get a lot of work done in a week that you weren't satisfied with. I eliminated that problem by staying on top of it every day." On a regular basis, Tony and Anna Zimnoch of PCS would visit each of the active job sites and inspect, encourage,

and troubleshoot. Mentor personnel could have sat back and just accepted whatever the contractor wanted to do. That would not have given them the system designed precisely for their needs, nor would it have given the added flexibility for expanding technological needs in the future. Tony maintains that qualified school personnel must get involved with the consultant and contractor and remain a part of the process for the job to be a success.



During the onsite interview, Mr. Petro took me to one of the rooms he was most pleased with. It was a learning center. The technology committee had initially decided to put computers on rolling carts up against the wall so the instructor could teach and monitor every student from the center. Instead of the rolling carts, Tony designed a counter to be built around the room. The surface raceway was mounted on the wall just above the counter top with electrical and modem outlets for each computer. This idea was less expensive and provided more space for more students and computers.

With the wise and frugal application of the state and local funds, the Mentor School District students have a jump start on the future. In addition, when future wiring or outlet upgrades are needed, the raceways are already in place. Through Tony Petro’s willingness to share their experience, those who face similar projects can gain some valuable insights.

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