1stVision Inc.

Why the CLX10DER-LC, and why it's different from the competition and the CLX10DER.

What is a CLX10DER?
The CLX10DER was made when we realized there wasn't an adequate solution to extend the length of a camera link connection greater than the 10 meters limit.

It consists of an electrical to optical converter that takes camera link data electrically output by the camera and converts it to light, which is then sent via a fiber to another converter that converts the photons to electrons and provides a camera link interface to the user's frame grabber.

To the user it is basically a long camera link cable, except it is not made completely out of copper.

So what is the difference, and why the changes?
Plenty, and here is why.

The CLX10DER works well. But we wanted to get a product to market that would help relieve the situation described above. As we started to use the product, it became apparent that we could improve the product both in price and ease of use.

The MTP connector.
Our pre-release version had the fiber directly attached to the transceiver. It became apparent that to users who had long fiber applications, leaving 200 meters of fiber on the floor wasn't going to be acceptable. Typically, the fiber would be routed through conduit. And conduit is not very thick. So pulling the whole transceiver (2" wide) through conduit was not going to happen! We needed a solution where we could detach/reattach the fiber.

Since the fiber assembly contains 8 fibers, the best solution we had was to use a MTP connector. For those of you not familiar with fiber, the MTP connector is akin to what you see on your Ethernet cable. It lets 8 fibers terminate in a detachable snap in connector. So it let us have a detachable connector which is good, but unfortunately, this connector is very expensive (close to $200 for the mating pair), and difficult to service in the field.

Tuning.
The original design uses 8 fibers. Essentially, this has a few fibers for the control and serial communication, and 5 fibers for the high-speed data and clock signals (X0-3 & clk). Basically, it just uses a fiber for each of the camera link lines. As more units got into the field, we had to do minor tuning in a number of instances. It turns out that this approach would sometimes cause excessive skew between the camera link data and clock signals causing faulty reception at the frame grabber .. Further, not all cameras and frame grabbers were sending out data the same way, and this became an issue as well. So we had to tune for both certain camera/frame grabber combinations as well as length. We did

not have any situations where we could not make it work, but this problem frustrated both our clients as well as our engineers.

Why do you only have 2 fibers now.
We have dramatically improved the reliability of our system by doing the following. First, by using the Channel Link transceivers from National Semiconductor that are specified in the Camera Link specification we provide a perfectly compatible Camera Link interface to both the camera and frame grabber We then multiplex/demultiplex all of the Camera Link signals and send them down/up the fiber.

So for instance, we take the camera link output from the camera, receive it with a channel link device, then put all the data into a serializer and send it all down the fiber. In this manner, none of the data loses its phase information!

All of the data gets sent down one fiber serially, or up one fiber! So we only need 2 fibers.

This increases the reliability of the system, decreases the cost of the fiber, allows for much more flexible fiber (there are only 2 fibers, not 8), and allows us to use a standard LC connector, so you can do fiber work in the field!

Any disadvantages to this?
Yes. Because we have to serialize all the data, there is some added cost to the transceivers to do the serial deserialization (serdes). But this cost is offset by the lowered cost of the fiber. The fiber costs drops by about $4/m. For a 100 m application, the cost drops by $400!

What else have you added?
Probably the biggest feature we added was the ability to send generalized IO down the fiber.

Consider a typical situation, where a sensor detects some event, then triggers the camera to take a picture with a strobe. Normally, this sensor sends a signal to the frame grabber, the grabber sends a reset signal to the camera, and simultaneously sends a strobe signal. While the reset signal is part of the cameralink spec (ex sync), the sensor and strobe are not sent thru the camera link cable.

When all of your equipment is contained within a 10m distance (max specified by camera link), this is no problem. But if you are considering using our CLX10DER, this is not the case.

If the camera is 350 m from the grabber, usually the strobe is by the camera. So is the sensor for the trigger. This means you will have to build a strobe and trigger cable 350m, and send the signal this far! We thought it would make more sense to make a short cable, put it into the CLX10DER-LC, transmit via the fiber, and convert to electrical at the other end!