Mistic 200 Wrecks Cars

MIRA, the Motor Industry Research Association, was formed in 1946 to provide research, automotive information, and shared facilities for automobile and component manufacturers. Today, from its headquarters near Nuneaton, Warwickshire, England, MIRA offers a comprehensive range of facilities to the world's automobile industry as well as an Automotive Information Centre. Research is provided through its consultants, scientists and engineers, all of whom can call upon several advanced testing facilities such as climatic and aerodynamic wind tunnels and a full-scale Impact Testing Laboratory.

During 1993, the full-scale Impact Testing Laboratory, affectionately known as the Crash Lab, was upgraded and expanded. The all-new, fully-automated crash lab reinforces MIRA's position as the leader of crash technology — MIRA owns the only fully-equipped indoor crash test facility in Great Britain.

The lab incorporates a movable 150-ton impact barrier, which hovers on cushions of air for ease of removal from its normal position (behind the camera pit) to the side of the laboratory. The block is used for frontal, angled, center-pole, offset and under-ride impact testing. When it is removed, side-impact, rear-impact, vehicle-to-vehicle and other tests can be performed. The impact block is faced with MIRA's Microcell Barrier, which has 488 load cells. These build up a visualization of the impact forces, thus helping engineers to design vehicles that can better manage impact energy.

There are photographic facilities above, below and to either side of the impact area as well as laser speed measurement systems, environmental monitors, and 200 channels of on-board or off-car instrumentation. These, combined with a hydraulic winch allowing for variable acceleration profiles and speeds up to 70 miles per hour, all require split-second timing to synchronize systems before and during a crash test. After all, when crashing a prototype — be it the latest version of a family hatchback or the most expensive and exotic super car — the consequences of getting it wrong are severe.

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At the center of the control in the Crash Lab is the director of the show, the Facilities Control System (FCS). The FCS interfaces the many different types of equipment allowing them to synchronize, and giving feedback to the crash test engineers operating the laboratory as to the current conditions and status.

Designed around the Opto 22 Mistic 200 control system, the FCS consists of two Mistic 200 controllers and a PC on a token passing network (MisticNet, based on ARCNET). The controllers are connected to various types of devices either via "single point modular" I/O, or via RS-232 interfaces. "We needed a control system that was flexible, multitasking, and easy to program and debug, but most of all it has to be of high integrity and predictable," said MIRA's principal electric and electronic engineer, Joe Jurado.

Before a vehicle is crash-tested, time is taken to design the lab setup and parameters for the impact. Camera and lighting arrangements or "plots" are also produced. This is achieved both online (interactively) using a laptop PC plugged into a serial port of Mistic 200 controller number one, or off-line by the designer sitting in his office typing the plots into the laptop. Plots can be downloaded directly to the Mistic 200 controllers at any time using a serial data link connection. Plots within the laptop can be archived, new or old ones downloaded, or existing ones modified.

Before a crash commences, the operators go through a question-and-answer sequence on a console in the control room. This procedure makes sure that the appropriate lighting plot is loaded and notifies the Mistic 200 system which one of the instrumentation packs is to be used. The Mistic 200 control system will test the status of these systems and report any that are unhealthy or in an incorrect mode or position. These checks even go as far as to determine whether the impact block has been secured to its fixings or not. If everything checks out, the laboratory door interlocks are tested, and if they are all secure, the winch firing circuits are enabled.

Operators start the crash manually using a hard-wired push-button. Once the crash is under way, the Mistic 200 continues to check to be sure that all the instrumentation being used remains healthy. The system will abandon the impact and alert the operators if any malfunction is detected right up to the point at which the test can still

Due to the scalability and flexibility of the Mistic 200 system, MIRA's investment in their Crash Lab will always be protected so that when they need to expand their Facilities Control System further, the Mistic 200 system will grow with them.

MIRA was so impressed with the Mistic 200 system that it now offers it as the standard control system on all its external (as well as in-house) projects.

be aborted. These decisions are coded into the Mistic 200 Control System using Cyrano, its flowchart-based programming language.

If the crash is going ahead, the Mistic 200 triggers the lights and cameras at the correct time intervals so that they are all running at the appropriate point of the vehicle's travel. It's akin to "Everybody all right? Lights... Cameras... Action!" except that many cameras need to be triggered with 250-millisecond accuracy.

Mistic 200 controller number one is responsible for the light pattern; it checks on those lights that are in use. It then triggers the cameras and monitors the door interlocks. Mistic 200 controller number two is concerned with the instrumentation packs, the Microcell Barrier, the impact block, the laser speed-control, environment monitors, and the winch signals.

"We were able to program and commission the system easily and quickly using just the one tool: Cyrano (Mistic 200's flowchart language)," said Joe Jurado, MIRA's electrical and electronic project engineer. "The debug facilities [within Cyrano] meant that the Facilities Control System was able to fault-find and commission all of the system's interfaces with this one tool. This certainly saved us a lot of time and hence expense."

About Opto 22

Opto 22 manufactures and develops hardware and software products for applications in industrial automation, remote monitoring, and enterprise data acquisition. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's SNAP systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, or electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel. Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability. Opto 22 products are sold through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at 800-321-OPTO or visit our Web site at www.opto22.com.

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