

Servo's infrared hotbox detector features a scanner positioned on the outboard side of the rail and transducers on the inboard side. The company is currently developing linear array technology that could conceivably scan multiple points across an entire wheel.

COURTESY SERVO

Defect detectors get smarter

Existing systems are being fine-tuned and new ones are coming on the market—for example, a skewed/truck-hunting detector and an overweight-car detector.

By GUS WELTY
Senior Editor

“Safety is of the first importance in the discharge of duty,” quoting from the General Notice in the Consolidated Code of Operating Rules, dated 1959. That rule was there long before '59 and it's been there ever since, in one wording or another. It was written for railroad employees, but it applies equally to railroads and to railway suppliers—and in a special way to those suppliers who deal with defect-detection, and to those whose job it is to keep defects or hazards from happening in the first place.

Railroads and suppliers have spent millions of dollars in efforts to improve safety, to keep problems from happening and to detect problems before they happen.

When you talk about detection sys-

tems, the first thought is about hot-bearing detection systems, because a burnoff can occur very quickly once heat begins to develop, and a catastrophic situation can result.

But there are a lot of other needs for wayside detection systems—to detect oversize or overweight loads, to detect over-limit wheel impact loads, to detect faults in grade-crossing warning systems, and to detect trucks that are skewing or hunting.

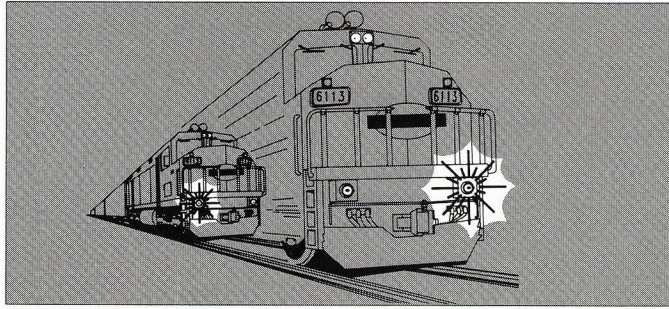
And the technology is getting better, some of it from household name suppliers and some from suppliers who are less well known.

Most people are familiar with Servo, Harmon, or Safetran, but there may be those out there who aren't acquainted with Salient Systems (where the phones have been ringing since the Association of American Railroads' Mechanical Division approved a rule applying to wheel

removal when high impact loads are detected and, importantly, allowing billing of the car owner). Salient Systems, now located in Dublin, Ohio, has been in business for quite a while, much of the time with its light under the proverbial bushel. But, its wheel impact load detectors have been well known, and it now has a Mark II second-generation device which provides greater speed, increased accuracy, and more flexibility than the original system.

Wheel impact loads have not before been a billable item when a railroad removes a wheelset from a foreign car, but that has changed. Under Rule 41.A.1.s., “wheel out-of-round conditions indicated by wheel impact load detector readings greater than 100,000 pounds” have to be verified in runout exceeding 0.050 inch on an AAR-approved gauge. What this means, in effect, is that removal and replacement of these wheels will now

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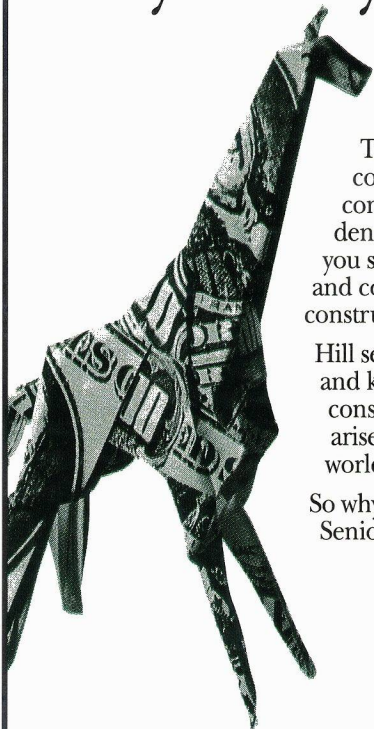
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be billable.

● **New systems.** More than that, Salient Systems has two new products well into on-site testing. One is a skewed/truck-hunting detector, the other is an overweight car detector.

The purpose of the skewed/hunting detector "is to catch the cars that railroads typically refer to as 'bad actors,' cars that are constantly bouncing laterally. . . due to poor truck performance." This is important, since one of these "bad actors" can cause gyrations in the cars ahead and the cars behind, with implications for train handling and safety.

As for the overloaded-car detector, it's said to be able to weigh cars at train speeds and detect and report overweight cars, with printouts as to how much a car is overloaded, by weight and percentage.

And to think that it used to be that "wayside detector" meant a hotbox detector or a dragging-equipment detector or a high/wide-load detector.

● **Hotbox detectors, new and/or improved.** Not much has been heard lately about innovations in hot-bearing detection. Perhaps it's because effective detectors are out there, mainly Servo's infrared detectors and the ones Norfolk Southern is using, made by Southern Technologies. Perhaps it's because the jury is still out on how effective acoustic detectors are (and on who will help pay for continued development), and because the on-board systems under development are still being worked on.

The acoustic detector has been in development for several years, principally involving Burlington Northern and Servo (and, at one time, Harmon). Six acoustic detectors have been in operation on BN, with generally good results in terms of accuracy in detection—in the 90%-plus range as proved by bearing removal and tear-down. But only another half dozen acoustic units have been acquired by railroads (two by Union Pacific and one each by NS, Conrail, Canadian National, and British Rail). Further developmental work needs to be done to improve and expand the units' capabilities. But how the program proceeds may depend upon the degree of industry and/or government support for it.

In the meantime, Servo keeps building on its 40-plus years' experience with detection systems. In infrared detection, for example, linear array technology is in the developmental process. With this technology, it's conceivable that a scanner could look at multiple points, perhaps across a whole wheel, to detect hot spots.

Work here is in experimental phases, and a first application could come in another industry (possibly the space program, where Servo has also been active).

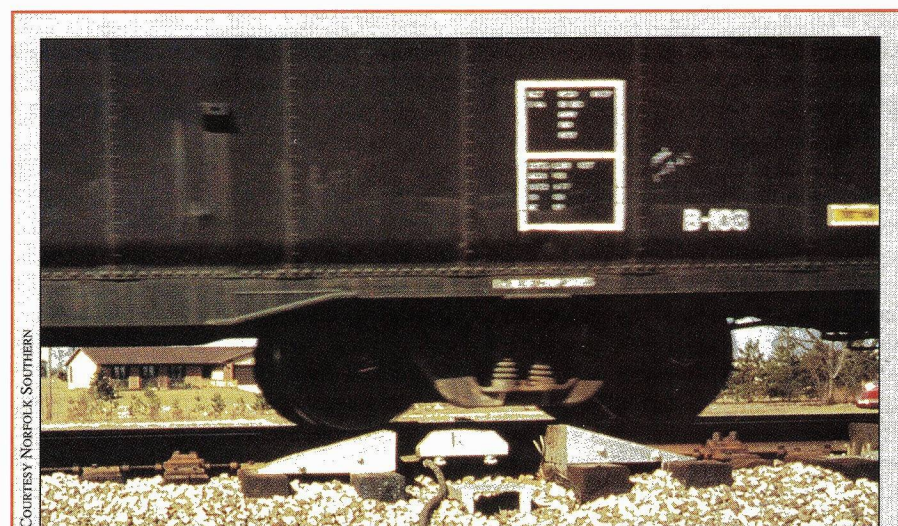
Servo has also developed a digitized hot-wheel detector. In addition to capturing data on every wheel, this technology can give a railroad the capability for a greater evaluation of conditions in terms of post-train analysis.

● **NS's simplified system.** As for Norfolk Southern, it's more convinced than ever that its system—conceived in-house and developed with Southern Technologies—is producing the results it needs.

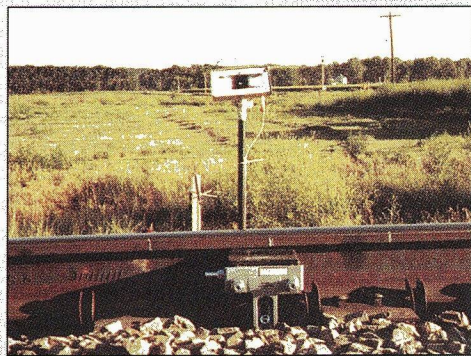
Essentially, this system produces a go/no-go reading. System "sophistication" may be less than that provided by other systems, but purchase/installation costs are also lower. And NS is able to install more detectors toward a goal of having a detector every 10 miles on lines where this kind of spacing is advisable. There are now close to 500 detectors on the former Southern Railway part of the system, and NS is into the third year of a program to equip the former Norfolk & Western, re-spacing detectors and filling holes on N&W (which used other types of detectors from several manufacturers). Like other roads, NS continues to attack the "false-stop" problem. But it seems reasonably satisfied with the record thus far.

As for acoustic detection, NS has tested it. "We wanted it to work," one officer says. But the consensus, now, is that installation of acoustic detectors would provide no advantage in the absence of hard evidence that sound has anything to do with the prevention of burnoffs. Current thinking is that while an acoustic system can detect "defects," many of these are of no consequence.

● **Quest for quality.** False stops, however, are of consequence to a number of roads, and it's here that Quest Corp.,



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Norfolk Southern's simplified hotbox detection system (above), developed with Southern Technologies, produces a go/no-go reading. NS's goal is to have a detector every 10 miles on lines where this type of spacing is advisable.

The acoustic detector has been in development for several years, principally by Servo (left) and Burlington Northern. BN has six units that produce results in the 90% accuracy range.

with its HBS-1000 hot bearing simulator (licensed by Conrail for manufacture and marketing) can play an important role. The simulator is designed to provide an accurate test of wayside detectors for proper operation under speed and load conditions.

Quest's simulator has been in action on CSX Transportation, with good results, and it's also in use on Union Pacific. It will be on other roads, if budgets are approved. Quest is also in negotiations to get the system working in Europe on the Netherlands railways.

Of course, every railroad would like its

hotbox detectors to be like the well-known Maytag repairman—there, but with nothing to do, nothing to report. Perfection, though, is impossible to come by. But Timken and Brenco keep striving for it.

Timken, for example, calls attention to improvements in material processing which have resulted in use of much cleaner steels, which contributes to reliability and an increase in fatigue-life.

Timken also notes improvements made possible by use of its HDL seal, which provides an effective seal with "significantly reduced torque," which in turn provides for generation of less heat and thus



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less chance of a detector setting off an alarm. The company has done value analyses designed to demonstrate the advantages to railroads in terms of fewer false setouts, fuel savings, and elimination of axle-grooving. But up to now, the principal market for the HDL seal has been for application to bearings on heavy-axle-load and/or high-mileage cars.

For its part, Brenco notes a "quantum leap" in terms of bearing retention, with zero loose-bearing problems with new bearings and a great reduction in problems with reconditioned units. Brenco has a new seal out, the DDL, for double-dust seal, designed to reduce heat on the inside and contamination from the outside, with AAR conditional approval hoped for in March. The DDL represents a further effort to improve the rubbing-lip seal.

What both manufacturers are doing is what has to be done—constant improvement of the product, looking at what can be done to add to the life of the product (the roller bearing), to reduce conditions that will produce false hotbox readings, and to improve the safety of railroad operations.

● **Premium products, premium prices.** There are concerns as to what may come. As railcar weights go up to

286,000 pounds and maybe higher, components under the floor are going to take more of a beating. For bearings, this can mean increased dynamic loads, more deflection, and greater fretting wear.

The manufacturers believe they can cope. But again, it will be with improved products that carry a premium in price. And the rail industry's record is not great, when it comes to paying a premium for improved performance.

What about other available wayside defect/hazard detection systems?

Safetran Systems is in with its wheel detector, a sensing unit that detects loose, misaligned or narrow-gauged wheels at speeds of up to 50 mph. This is a unit that can be installed on its own or put in place at hotbox and/or dragging equipment detector locations where circuiting and telemetering can be used to transmit information.

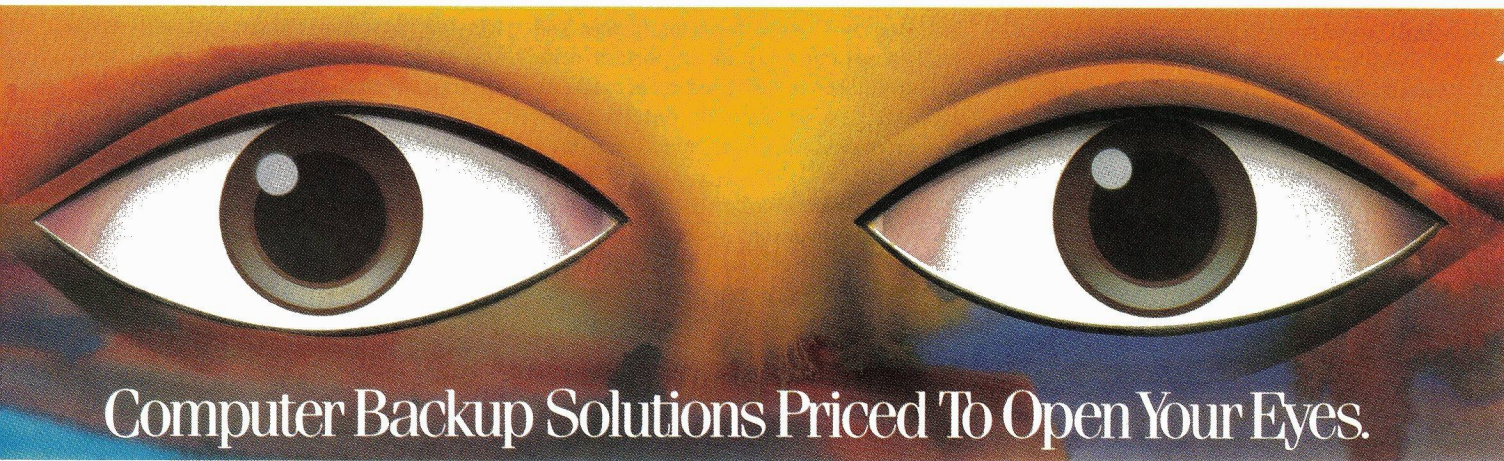
Safetran also can provide a micro-processor-controlled voice-alarm system that can monitor up to six basic functions in connection with grade-crossing warning systems and sound an alarm in the event an abnormal condition is detected.

So far as Harmon Industries is concerned, its acoustic hot bearing detection program is currently dormant. But Har-

mon provides infrared hot bearing and hot wheel systems, along with dragging equipment and high/wide load systems with various means of communicating defect information. The most common of these is electronically generated voice communication direct to the train crew via radio. Digital communication is also available to central monitoring points. And for stand-alone installations, where hot bearing monitoring is not required, the company can supply "Many-Talker" units which, via voice synthesis and radio, tell the crew of the presence of a defect, but without the associated axle count.

In one of its most unusual installations, Harmon did a custom job for Union Pacific—a cold wheel detector. UP wanted a means of checking brake operation. The system was set up on a grade where brake applications were required—and a report of a cold wheel would indicate a car with some brake malfunction.

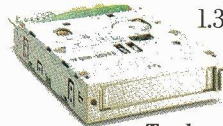
Not a lot of new companies seem interested in entering this field to provide new safety factors for rail operations. But the existing suppliers seem to be filling the bill. What remains to be seen is whether railroads will be willing to pay the "bill" for detection equipment that may have to become increasingly high-tech. ■



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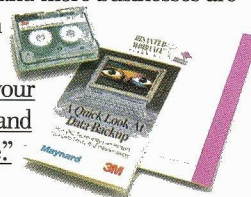
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