EVALUATION OF THE HAWKINSON® NDT® AT FIVE ACCOUNTS

MAY AND JUNE 1986

RETREADING CONSULTANT SERVICES, INC.
Louisville Kentucky

OBJECTIVE

Evaluate the ability of the Hawkinson® NDT® to improve retreaded tire production and reduce adjustments. Calculate cost effectiveness of the machine. Report user comments.

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DISCUSSION

Hawkinson® NDT's® with the latest electronic updates were observed and evaluated as follows:

Sumerel Tire, Newport, Kentucky, two days, radial and bias truck tires - stand alone unit

Ray Carr Tires (truck plant), Harrisonburg, Virginia, one and one half days, radial and bias truck tires - inspection spreader unit

Ray Carr Tires (passenger plant) Harrisonburg, Virginia, one half day, radial and bias passenger tires - two stand alone units

Tristani Rubber Industries, Sabana Seca, Puerto Rico, truck spreader unit, passenger stand alone unit

THE HAWKINSON® NDT® IN THE RETREAD PLANT

Each of the machines was effective in finding nail holes which were missed after thorough visual inspection.

Each machine was liked by the operators who appreciated its ability to find pin hole leaks.

The machines were also liked very much by buffers and builders. One buffer operator at Central Tire reported that they averaged five blade changes per day before the Hawkinson® NDT® and are now down to two blade changes while producing the same number of truck tires due to nail detection and removal.

Buffer operators and Orbitread operators at Sumerel's also report that they no longer have leakers which must be sent back for repair. The Orbitread operators report that tread stripping due to undetected leaks has been elimimated.

Each of the plants visited indicated that NDT®'s were a very important part of their processing equipment and that they did feel that they were getting a good payout in production improvements as well as adjustment reductions.

ABILITY TO FIND PUNCTURES, IMBEDDED NAILS, AND TO REDUCE ADJUSTMENTS

Sumerel Tire, which runs every tire across the machine, indicates that adjustments due to missed nail holes have been virtually eliminated.

A comparison of bias versus steel radial truck tires in the sample at Sumerel's showed that approximately half of the bias tires had visually detected punctures when visually inspected for retreading, yet an additional 17% and 19.5% were found to have hidden punctures when checked by the NDT®. Radial truck tires had visible punctures in 38% of the tires which were set aside for repair. 3.5% of the tires which had no visible punctures were located by the NDT®.

Central Tire data showed 21% of radial truck tires had visible punctures, an additional 5% were located by the NDT®.

Ray Carr Tires found 10% additional punctures with the NDT® in radial truck tires, 17% additional on bias.

Passenger tires at Ray Carr Tires showed a 10.5% nail hole detection after thorough visual inspection. The tires were then checked after buff on two NDT®'s operated in the automatic mode. A sample of 17,000 tires showed that 1,263 or 7.5% were found to have additional undetected nail holes in need of repair.

A smaller sample of passenger production was checked to compare bias to radial punctures found by the NDT®. It showed a 17% incidence of missed nail holes on bias which were found by the NDT® and a 3% incidence on radials. The radial passenger tires show substantially fewer undetected nail holes, but the percent found would be a significant cause of production inconvenience or adjustment grading. Tristani in Puerto Rico has an NDT® for initial grading of passenger tires. 10% of incoming casings are rejected due to punctures located by the machine. All truck tires are run on the spreader type NDT® while visual inspection is taking place.

Radial truck tires have a tendency to hold rigidly imbedded nails in the belt which quickly ruins rasp blades. At Sumerel's 41% of the tires had imbedded nails which were located by the NDT® and removed. These were in addition to those removed at initial inspection.

Carr's found imbedded nails in 23%, and Central Tire found 31% had imbedded nails which were removed. Several of the holes from these imbedded nails were found to be in need of patch reinforcement after the imbedded nail was removed. One inspector stated that "You can't beat it for radials" because of this ability to detect nails as well as missed punctures.

MACHINE DURABILITY

The machines in these plants have run tens of thousands of tires since installation with no significant electronic problems or mechanical problems. The passenger tire inspector in Puerto Rico is in an open shed but has had no problems. The only comment on durability was frequent wear out of the gritted sleeves on the rotator of the free standing units at Ray Carr passenger tire plant, where 1,000 tires per day cross the two machines.

CUSTOMER CHANGES WANTED

Most customers indicated that they would like to have the unit screen further around the shoulder of the tire.

MY OBSERVATIONS AND COMPARISONS

With the exception of Tristani, each of the plants visited was inspecting tires in volume with two or more men. The stand alone unit at Sumerel's and the two stand alone units at Carr's passenger plant enabled all tires to be inspected by the NDT®. The inspection type unit at Central Tire is used only for automatic operation. Two men do visual inspection on other machines. The inspection machine with NDT® at Ray Carr's truck plant is used during visual inspection, but two or more inspectors are usually working, causing many tires to bypass the NDT®. This procedure will be changed.

When inspection requires two or more men a single stand alone unit is probably more efficient and cost effective. The one man operation at Tristanti operated well with visual inspection taking place while the NDT® was working.

ELECTRIC ARCS AND SHOCKS

Each of the inspectors said that they have been shocked occasionally by the machines and have become used to where and when to place hands during operation. None indicated any fear of the machine nor reluctance to handle the tire during operation.

The myth that the machine will burn holes in the tire was subjected to test. A piece of truck inner tube, which has a compound very similar to truck innerliners, was placed on a metal bridge across the grounding rollers. The electrode ball chains were lowered onto the rubber and allowed to arc for two minutes through a small area of rubber.

This rubber tube sample was then taken to our laboratory, clamped in a leakage detection ring and inflated to 40 psi, stretching the rubber to more than twice its normal area. No leaks could be found. The arc obviously is passing through the conductive carbon in the compound and does not make holes in the rubber. A photo of the piece of rubber being tested is shown on the attached.

PAYOUT

There were no exact calculations available on payout in the plants visited. Sumerel's plant manager estimated that a plant producing sixty or more tires per day could not afford to be without one. Each of the other plants incidated that they were satisfied that the machines were giving good payout.

The ability to save one large customer or prevent one possible lawsuit might payout the cost of the machine.

The numerically significant payout items are:

a. Reduction in leakage and separations.

b. Reduction in production delays at buffer or during building caused by leaks.

c. Reduction in buffer blade costs and increased buffer production.

The estimate of the cost of labor savings and adjustments vary widely from one account to the next. A simple payout calculation chart has been prepared which might assist potential machine users in calculating the savings possible by the use of NDT®'s.

Production figures for each type of tire during a period can be entered, multiplied by the percent of missed punctures found by the NDT® during this survey. This can be multiplied by the cost of production time saved on those punctures found later in production, and those which are delivered to the customer, but which later fail.

Payout Chart Rational

If we comprare tubeless and tubed type tire adjustments, I would estimate that over 90% of missed punctures will cause retread separations in tubeless tires, perhaps 30% in tubed type tires.

An example for a specific customer and tire type might be as follows:

1000 radial tubeless truck tires produced

5% or 50 punctured tires would normally be missed at initial inspection.

60% of these (or 30) might also be missed in further processing.

The twenty tires found after processing would be a labor expense if the tires are repairable.

The thirty tires missed at a probable 90% adjustment on this type would represent an adjustment of twenty-seven tires.

The adjustment on these twenty-seven steel radial tubeless truck tires would probably represent a cost of over $100 per tire for warranty and processing alone or $2,700, not counting the customer cost and inconvenience.

Based on this, the NDT® might be expected to save $2.70 per steel radial truck tire inspectected without counting the production savings.

Individual customers may have different values to assign to this and other items, but there is a significant savings on radial tires even though the percent of undetected punctures is less. Savings on bias tire production would be substantially more due to the higher percentage of missed punctures.

PAYOUT CALCULATION CHART

Tires Produced During Period of Time	X	Average % Missed Punctures	X	Cost of Production Delays and Adjustments	= Total
Bias Passenger	_____ X	17%	X	_____	=
Radial Passenger	_____ X	3%	X	_____	=
Bias Tubed Truck	_____ X	18%	X	_____	=
Bias Tubeless Truck	_____ X	18%	X	_____	=
Radial Tubed Truck	_____ X	5%	X	_____	=
Radial Tubeless Truck	_____ X	5%	X	_____	=

Estimated savings per time period - total _____

CONCLUSION

The Hawkinson® NDT® has brought effective new technology to the retread industry which nearly eliminates the problem of missed nail holes and imbedded nails.

These tests show that a substantial number of these anomalies found by the NDT® are missed even with the most thorough visual inspections.

The machines are well liked by the owners and the plant personnel and contribute savings in processing as well as adjustment reduction.

RETREADING CONSULTANT SERVICES, INC.

BY H. R. Baumgardner

H. R. Baumgardner, General Manager

June 26, 1986

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SUMEREL TRUCK TIRE DATA

Truck Tires Inspected

Radial	139
Bias	64

Tires Without Detected Punctures

Radial	84 (60%)
Bias	29 (45%)

Tires With Visually Detected Punctures

Radial	52 (38%)
Bias	28 (44%)

Tires with Punctures **not** Visually Detected - Located With Hawkinson® NDT®

	Of Total	Of Total W/O Punctured Detected
Radial	3 (2%)	3 (3.5%)
Bias	7 (11%	7 (19.5%)

Tires in Which Non-Puncturing Nails Were Located Prior to Buffing, NDT®
Located - Missed During Inspection

	Of Total Across NDT®
Radial	36 (41%)

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RAY CARR TRUCK TIRE DATA

Truck Tires Inspected	
Radial	60
Bias	40
Tires Without Detected Punctures	
Radial	49 (82%)
Bias	15 (37%)
Tires With Visually Detected Punctures	
Radial	5 (8.3%)
Bias	10 (67%)
Tires with Punctures not Visually Detected or Detectable, Located With Hawkinson® NDT®	
Radial	6 (10%)
Bias	7 (17%
Tire in Which Non-Puncturing Nails Were Located Prior to Buffing	
Radial	14 (23%)

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CENTRAL TRUCK TIRE DATA

Truck Tires Inspected	
Radial	188
Tires Without Detected Punctures	
Radial	139 (74%)
Tires With Visually Detected Punctures	
Radial	40 (21%)
Tires with Not Visually Detected or Detectable Punctures Found by NDT®	
Radial	9 (5%)
Imbedded Nails Found and Removed From Belt	
Radial	58 (31%)

RAY CARR TIRES - PASSENGER PLANT DATA

Production Data Reviewed

Tires run during period examined	17,169
Punctures found by NDT®/Missed by Visual Inspection	1,263 (7.5%)

Sample Distribution Data Taken at Initial Visual Inspection

Tires visually inspected during visit	514
Nail holes visually located at inspection	54 (10.5%)

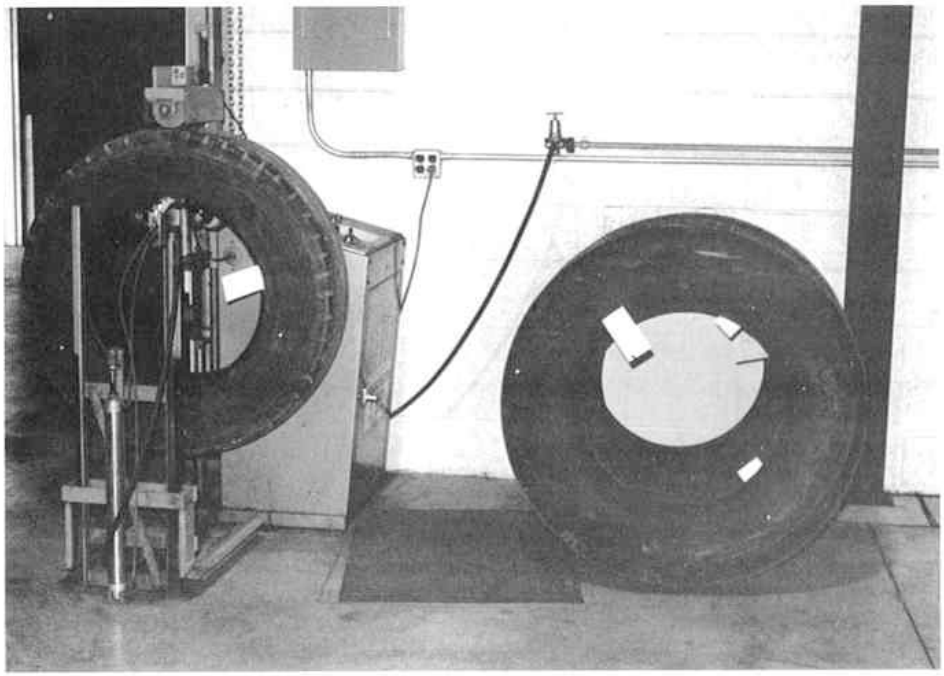
Check of Puncture Frequency During Visit (NDT® After Buff)

Distribution: One buffer bias, one buffer radial, full production approximately 50% bias, 50% radial

Tires rejected due to missed punctures, found by NDT® (of 248 inspected)

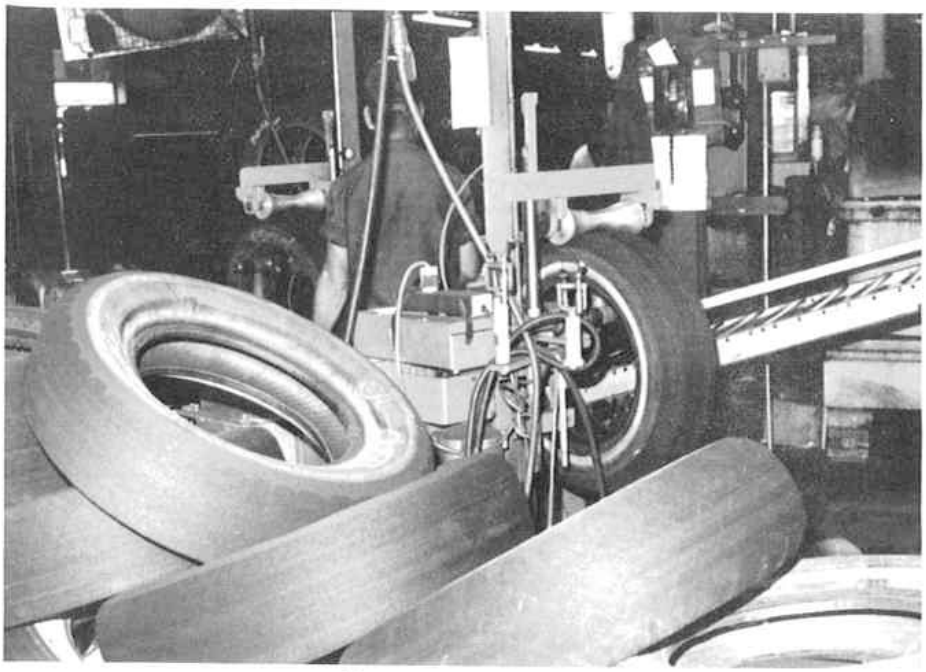
22 bias of 124 = 17% found by NDT®

4 radial of 124 = 3% found by NDT®

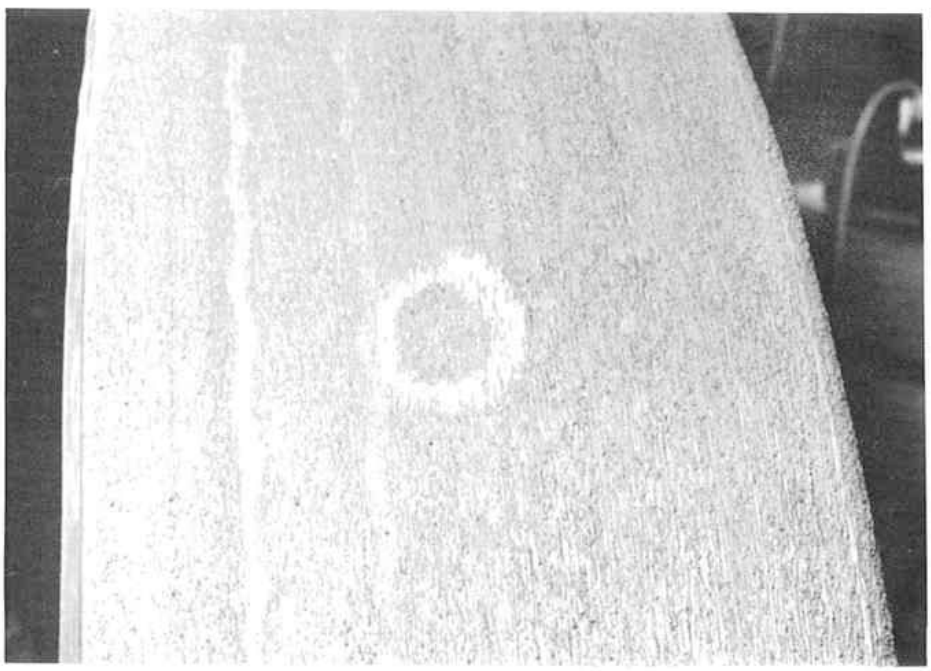


NDT® at Sumerel Tire, Newport, Kentucky, inspects approximately 100 truck tires per day.

NDT® at Ray Carr truck tire retreading plant in Harrisonburg, Virginia. Inspects approximately sixty tires per day.

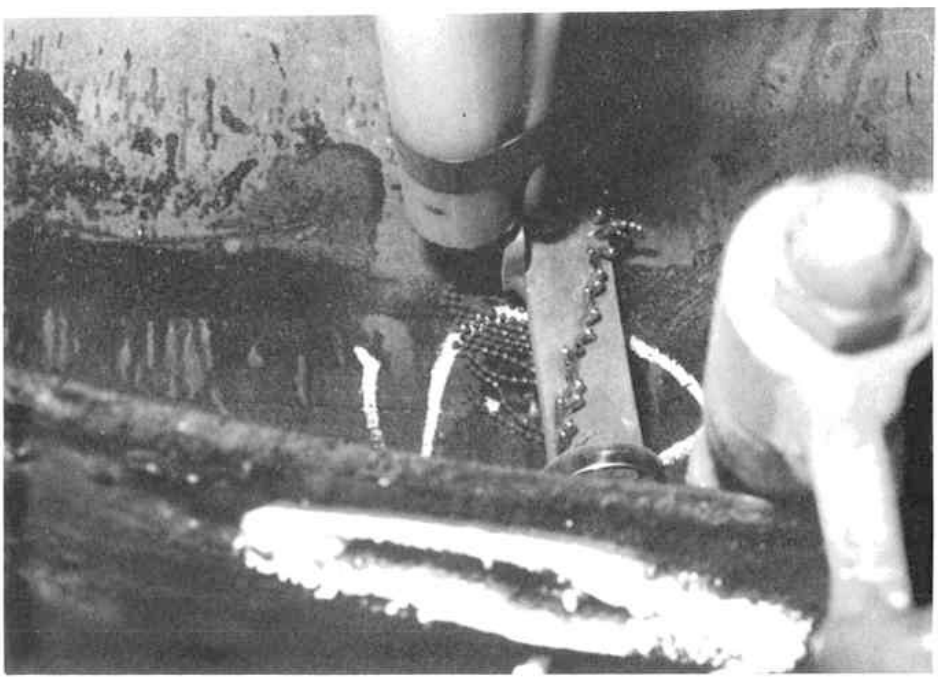


Two Hawkinson NDT's® at Ray Carr passenger plant. Inspect 1,000 tires per day. Missed puncture tires in foreground.

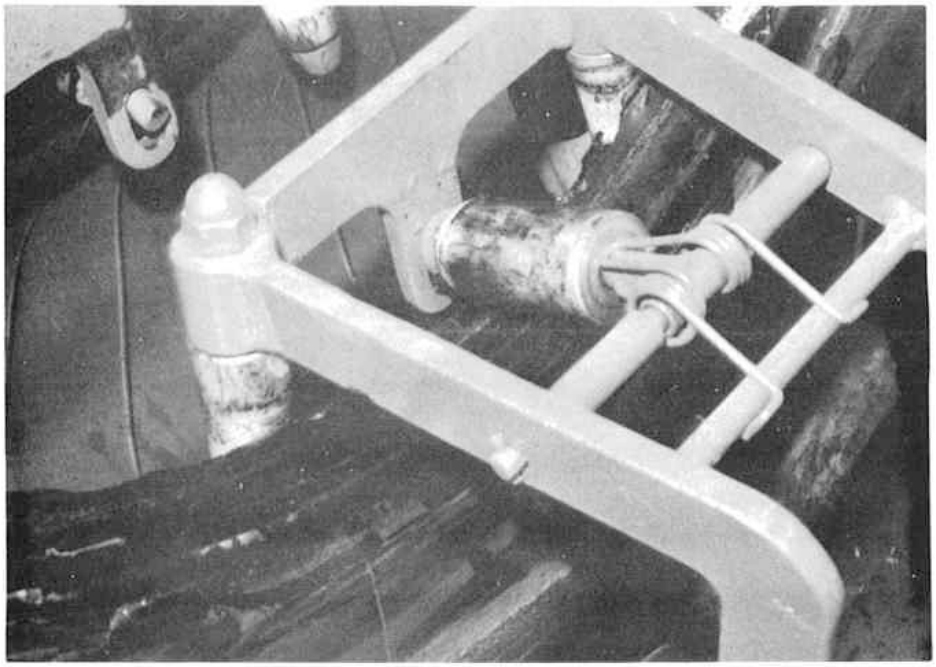


Missed puncture located by NDT®. Ray Carr Tires.

NDT®at Central Tire, Verona, Virginia.



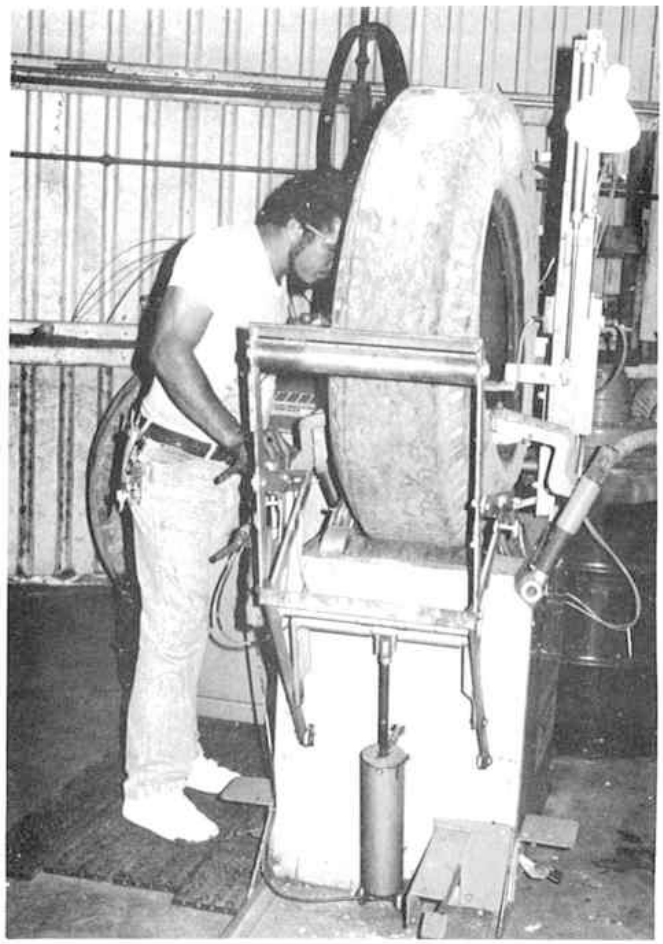
Chains arcing at punctures - Central Tire.



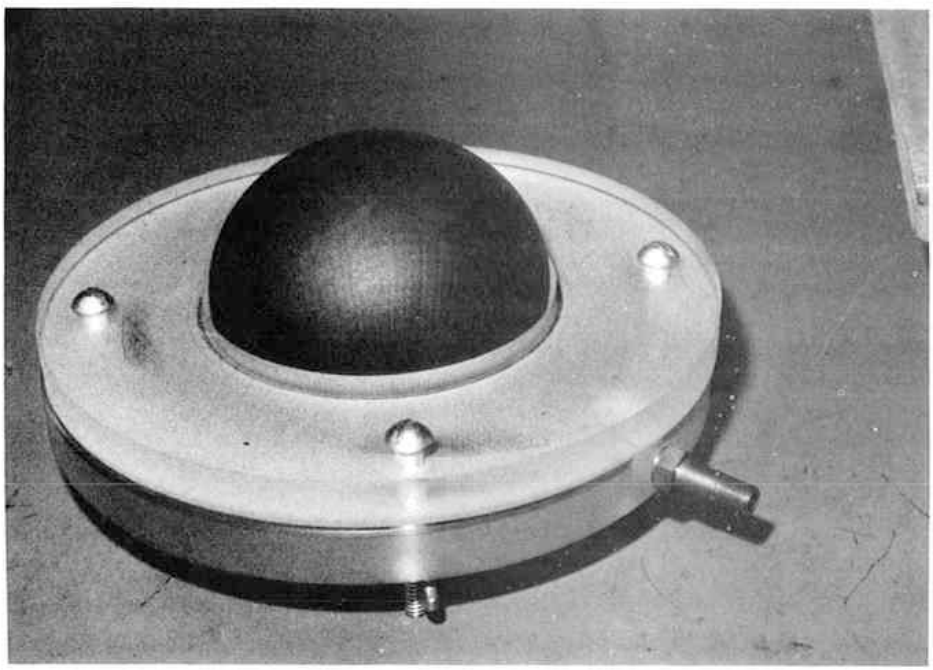
Roller arcing at damaged radial bead - Central Tire.

"Outdoor" unit at Tristani, Puerto Rico, inspecting rough graded casings.

Using HAWKINSON® NDT® outside is NOT recommended by Hawkinson and voids all warranties.



Truck tire inspection and NDT® test at Tristanti.



Innertube section holding air after two minutes of arcing in the NDT®