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MONITORING THE FIELD

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CONTROL TUBING

The following is a review of a marketing research study done for the Copper Development Association. It reviews the type of tubing used for the pneumatic control industry and emphasizes changing trends in the field from copper to polyethylene tubing.

Major Companies

Five major manufacturers and installers of commercial control instruments were consulted for this study. They were; Johnson Service, Barber-Colman, Honeywell, Powers and Robertshaw.

The Market

The pneumatic control tube market has three major sectors.

1. *Commercial and Industrial Applications:* Tubing used in long lengths in environmental control systems and commercial applications such as schools, offices, hospitals and other public buildings and control systems in process and industrial applications. The total market here is about 95 million feet of tubing per year, of which copper makes up about 52% of the total.

2. *Control Panels:* The quantity of single tube used in the manufacturing of control panels for the pneumatic control market is about 8 million feet per year, of which 90% is polyethylene tube today.

3. *Control Mechanisms on the OEM Market:* The major market for tube in this field is in the manufacture of stoves, refrigerators, air conditioners, furnaces, etc. The market for tubing is about 400 million feet a year, the majority of which is copper.

The market study covered primarily the first sector of the market, commercial and industrial applications of control tubing.

The tube market in this field has been a strong market for copper for years, but changing methods and materials have weakened copper's position in the market so that *polyethylene tubing is gradually taking over the control field.*

History

In the 1920's and 1930's, most low pressure air for a pneumatic system was contained in galvanized steel pipe. In the late 1930's, the trend to copper developed, and until the 1960's almost all commercial systems used copper tubing.

In the 1960's, plastic tube producers saw the potential footage in the control field and some control manufacturers and installers realized that polyethylene tube could give them a cost edge over competitors using copper.

Advantages and Disadvantages

The advantages of copper in commercial applications are: (1) Fire Resistance; (2) Heat Resistance; (3) Sturdiness; (4) Durability.

However, the advantages of copper in most cases are outweighed by the advantages of polyethylene tube.

1. Cost. Polyethylene is cheaper than copper.

2. Easy handling. Polyethylene tubing provides a faster, lower cost installation, is extremely flexible

and available in convenient packages up to 1000 feet long. Barbed fittings can be easily pressed on without tools; clamps are also available.

3. Resilience. Plastic tubing is resilient and tends to return to its original shape.

Market Size

The consumption of copper tubing in the pneumatic control market amounted to 80 million feet or 84% of the market in 1965, while polyethylene tubing accounted for 15 million feet.

In 1970, copper tubing dropped to 48 million feet or 52% of the market, while polyethylene increased its share to 48% which represents 45 million feet. In the next several years, polyethylene will probably reach a usage rate of 80%, leaving copper with the remaining 20 percent.

Conclusion

Although this study was prepared for the Copper Development Association, you can see they recognized the trend toward and advantages of polyethylene tubing in the control market. Although our total usage is not to the 80% mark yet, it will reach that point if we keep up with our competition and with the progress in installation of pneumatic controls.

In subsequent issues of *Monitoring The Field* more information will be presented so that a complete series on control tubing is available to you.

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It was a hard fought battle but the Field Engineering Flashes lost the softball game to the Johnson Control team that plays in the City of Milwaukee Industrial League. The final score was 12 to 10 (one more inning and the Flashes would have won). Members of the Flash team included, seated in the front row, Marv Jordahl; kneeling, middle row, from left to right, Bill Mix; Dale Hawley; Gerry Kubiak; Dennis Totzke, and Guest Coach Alan McKenzie (imported from Australia). Standing in the back row were, from left to right, Larry Ourada; Gene Strehlow; Darrel Hermans; Bill McGinty; Bob Stahl; Glenn Lietzke, and Kurt Meenk.

Gremlins got into our typewriter last month to cause an inaccuracy in the list of pilot positioners with new high temperature limits. No, we do not have an addition to our line. There is no P-9502!

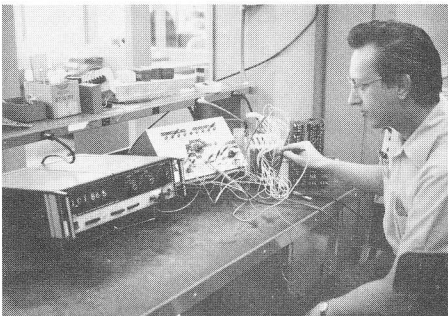
WHO'S WHO ON FACTORY ROW

The Quality Assurance Test Department of Johnson Service Company, Managed by Mr. Bob Leonard, is involved in a wide variety of activities, some of which are shown on this page. The testing laboratory occupies almost the entire top floor of our main factory building in Milwaukee. Some of the major functions of the department are described briefly as follows:

1. Verification tests of new Johnson products to determine whether they meet design specifications over the range of environmental conditions to which they might be subjected in the field.
2. Qualification tests of items manufactured outside Johnson Service Company, but which may receive the Johnson nameplate or which might be used in a Johnson product.
3. Calibration and maintenance of Johnson instrumentation.
4. Design and construction of production test panels.
5. Reliability determinations for Johnson products.
6. Quality audits of Johnson products and Johnson nameplated items.
7. Analysis of returned defective equipment.
8. Maintenance (through chemical analysis) of plating baths and other production processes.
9. Analysis of boiler water samples and corrosion products supplied by the field.
10. Receiving inspection tests of materials and components.



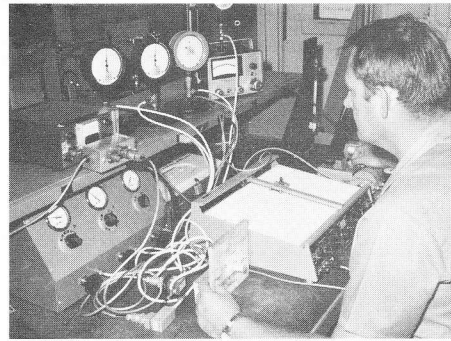
Some life tests are conducted at ambient temperatures (as with these new No. 5 operators), while others are conducted at temperatures ranging from -30°F to more than $+300^{\circ}\text{F}$.



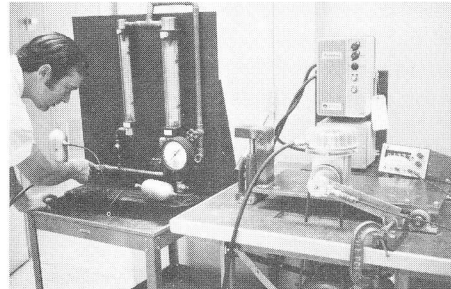
Newly designed printed circuit boards undergo bench tests before high/low temperature and relative humidity tests are conducted.



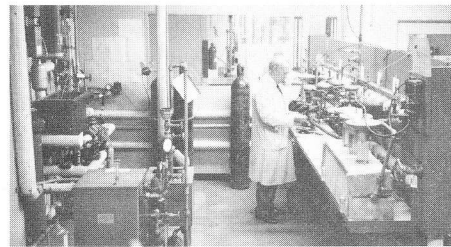
A new Dallas electric heat controller is checked at room temperature before elevated temperature tests are performed (all at full load).



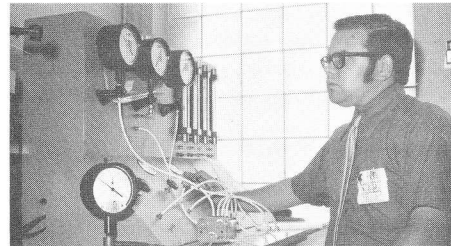
New fluidic devices are being checked with an X-Y recorder for input/output characteristics.



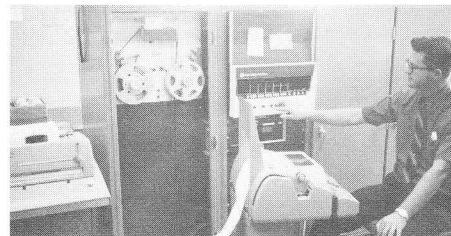
A Johnson diaphragm type compressor is tested on a dynamometer test stand for input (hp) versus output (air delivery) characteristics at various speeds.



A portion of the valve packing test facilities, this one for 320°F water.



One of many quality audit test panels; the quality audit section regularly tests all Johnson products to determine compliance with published specifications.



A computer controller facility is in use and is continually updated to test the majority of T-6000 printed circuit boards. Here, production personnel merely insert a printed circuit board in a fixture and push a button to test each component on the board under full electrical load. The sequence of tests for each board is directed by a computer program; all discrepancies are automatically printed out and referenced to the particular board tested. This procedure insures that printed circuit boards which reach the field are "good" and also helps to minimize repair time for defective boards.

MTF Photos by Rudy Mueller

AMP-FIT TOOLS REPAIR AND TRADE-IN POLICY

SPOTLIGHT ON CONSTRUCTION

The following policies have been agreed upon by Johnson Service Company and American Pamcor, Inc. All policies are in effect until December 31, 1972.

1. **Trade-In Policy:** American Pamcor, Inc., will accept as a trade-in, a worn out or damaged tool allowing 20% off the price of the tool purchased. For example, a \$32.50 tool less the trade-in allowance of 20% would give you a net cost of \$26.00 for a new tool.
2. **Repair Policy**
 - A. Tools on Hand: American Pamcor will repair all tools needing service.
 - B. Obsolete models of tools needing repair are to be traded in for new tools.
3. **Defective Tools:** Tools that have been found defective will be repaired or replaced at no charge.
4. **Damaged Tools:** Defective and repair replacement policies cover only tooling needing servicing that was not due to misuse or abuse. Tools that are beyond economical repair due to abuse or misuse may be traded under the trade-in policy.

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ATTENTION: APPLICATION ENGINEERS

Central Construction has recently designed several preprinted work sheets and vellums for preparing control drawings. These were designed to simplify the layout and drafting of drawings for air handling units and are primarily designed to make installation work easier for our mechanics.

If your office is interested in using these, contact Central Construction, Milwaukee, 8-428, and we will send an initial supply of the sheets for your use.



**Mike Martin, Construction Manager
Dallas Branch Office**

The overall supervision of the pneumatic and electrical capabilities of the Dallas Branch Office is the responsibility of Construction Manager C. M. (Mike) Martin. Mike has been a member of the Johnson Organization for the past eleven years.

After earning an Associate Degree in Air Conditioning and Refrigeration at Oklahoma State University in Stillwater, Oklahoma, Mike was hired by our Kansas City Branch in 1960. From 1962 to 1964 he served as Assistant Project Manager for the Titan II Missile Project in Little Rock, Arkansas.

In 1965 Johnson Service Company was awarded the contract to modify the air conditioning systems for all Minuteman Missile Sites so that they would function in colder weather conditions. Mike was named as one of five Wing Managers for this project. (Each "wing" consisted of 150 to 200 missile sites in a given area of the country.)

When the Minuteman project was completed Mike returned to the Kansas City Branch as Assistant to the Construction Manager. In January of 1968 he was appointed to his present position in Dallas.

While working for Johnson Service Company, Mike, his wife and two children have had the rare opportunity to live in several different areas of the United States. However, now that they're settled in Dallas, they enjoy the extra time that's left for golf.

ST. LOUIS BRANCH HOLDS RETIREMENT PARTY

An August 13th retirement party honored two men who have given a total of 61 years of loyal service to the St. Louis Branch of Johnson Service Company. Sharing the guest of honor spotlight were Mr. Jack O'Gorman, Foreman Pipefitter, with 36 years of service, and Mr. Peter Bettlach, Journeyman Pipefitter with 25 years of service.



Attending the retirement party in honor of Mr. O'Gorman and Mr. Bettlach were, from left to right, Herb Storey, General Foreman (Electricians); Pete Bettlach; Harold Schroeder, General Foreman (Pipefitters); Mrs. Bettlach; Jack O'Gorman; Mrs. O'Gorman; D. E. McGovern, St. Louis Branch Manager, and Mrs. McGovern.

SAFETY FIRST! UNIQUE ACCOUNT OF EYE ACCIDENT

The following is probably the most unusual form of accident reporting ever encountered by *Construction News*.

We laud the efforts of the poet, Clark Green of Pocatello, Idaho, who took time out from his job as a machinist to produce this work entitled, appropriately, "Wear Your Goggles":

Many times these signs I've seen, while walking through the shop.
"You guys wear your goggles, accidents have gotta stop."
Many times I've cursed them, for thirty years or more
Yet I had to wear them, or be kicked right out the door.

Many times I've cursed them, and taken them off with a jerk.
Wiped them off, put them on, then gone growling back to work.
Many times I've cursed them, as through dingy lens I tried to look.
I've hated the guys that made them, or wrote the Safety Book.

Then one day a lens was shattered, by a hardened chip of steel.
It struck with the speed of lightning, and the impact made me reel.
Slowly I removed them, and when I unscrewed the band,
A shattered glossy powder crumbled in my hand.

I slowly raised my eyelid, and gave a little sigh.
Except for a dusty powder, there was nothing in my eye.

To the men who made me wear them
Though I've heaped reproaches at your door
For this one time I wore them, I'll be grateful evermore.
For the misery they have caused me
For all the "naughty" words I've said
Just for this one time I wore them, I'd write a receipt marked PAID.

Upgrading jobs already installed.

Improving office efficiency and "winning the paperwork war."

Expanding present service contracts to cover filters, refrigeration maintenance, electrical maintenance, coil cleaning, etc.

Obtaining service contracts covering Penn systems, Standard Electric Time systems and smoke and fire systems.

Servicemen soliciting extra work while on the job. Measuring the efficiency of ourselves and our people.

Setting priorities for our time, based on potential \$ return.

Selling **Total Maintenance** - designed to satisfy the owners' individual needs.

Involving all branch personnel in a team effort.

Insure job profit.

REMEMBER, "SUCCESS IS" . . .

- Individual, departmental, branch, and regional enthusiasm.
- Owner confidence, satisfied customers.
- Sales proficiency, personal satisfaction, prosperity.
- Diversification, meaningful growth, expanded capabilities.
- Increased volume, increased profit, exceeding forecast.

Next month we want to share your ideas and "Success Is" stories with the entire field. How about participating! Send your ideas to George Maxwell in Milwaukee, 8-310.

"\$UCCESS\$ IS"

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Beginning this month, a section of *Monitoring The Field* will be dedicated to the Service and Service Sales segment of Johnson Service Co.

Undoubtedly many things have occurred since the sales meeting in Dallas last March. We'd like to get some feedback from you regarding your "Success Is" stories so that they can be shared with others. Hopefully, seeing the first few successful ideas in print will spark the thinking of all service salesmen and servicemen. Let us hear from you regarding any jobs sold in interesting ways. We'd also like to hear about your **SUCCESSES** in:

Establishing new capabilities in the branch office, including filters, water and air balancing, security, electrical, refrigeration, total maintenance and coil cleaning.

Getting the salesmen out selling.

Improving communications between servicemen and salesmen.

In-house training of salesmen and servicemen.

Training by vendors and other outside sources.

Promoting the Johnson "Think One" image.

Uncovering and promoting new customers.

Establishing automatic followup procedures for securing service contracts on jobs going out of warranty.

Securing service contracts **before** warranty is over.

Improving the accuracy and speed of estimating.

"Shot gunning" owners of Johnson systems with service contracts for acceptance.

Pursuing control center service agreements.