Wrecking A Building Soon As Completed

In addition to furnishing fuel consumption saving of from 15 to 35 per cent—a boon greater to owners of large buildings, the Johnson Pneumatic System of Temperature and Humidity Control restores the building. Without automatic control, offices are constantly overheated, and the humidity in offices decreases to naught. This season, dry heat drives out the walls, floors and woodwork, warps them, cracks, opens the joints, and reduces the building's value to millions below cost. Natural building depreciation is rapid enough, without hastening it at the building's very beginning by this process of rot and ruin. Moreover, the building's desirability and rental value go down. All this, the loss is enormous and easily can be avoided.

For this very reason architects specify the Johnson Pneumatic System of Temperature and Humidity Control: to save the building from the foregoing disasters.

JOHNSON SERVICE COMPANY
Factory and Main Office
Milwaukee, Wisconsin

A 1922 ad promises energy savings of up to 35%.

<table>
<thead>
<tr>
<th>1912</th>
<th>1914</th>
<th>1924</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumatic clock systems were promoted as more reliable and less expensive than electric clocks.</td>
<td>Reliability of valves improved when metal diaphragms replace rubber ones.</td>
<td>Dampers, once made of wood louvers, use sheet steel by 1914. Original motors operated using rubber balls and springs.</td>
</tr>
</tbody>
</table>

For the war effort, the Company equipped defense facilities with temperature and humidity control systems, and also engineered special products for the military.

The radionuclide was developed to help gather weather data as an aid for combat pilots encountering unknown flying conditions. The devices were attached to helium balloons and collected and transmitted weather data while aloft. The Company also made leak detectors that were used to inspect barrage balloons used above military installations, ships, and landing lamps. Echo boxes, devices that tested motor sets, were produced in the 1960s.

After the conclusion of WW II, the Company's business began to swell with civilian construction orders and with them came a new surge of interest in air conditioning. Hospitals sought its beneficial effects and southern U.S. facilities claimed for year-round comfort. In 1958 the Company's sales had climbed to $50 million from $10 million in 1949.

CENTRALIZED-CONTROL
Buildings were getting larger and temperature-control systems more complex and diversified. In a typical large installation, hundreds of monitoring and control products were scattered throughout a facility, putting an enormous burden on a building engineering. The introduction of capillary tubing in the early 40s eased the monitoring task. These liquid-filled tubes provided an accurate, although somewhat costly, way of monitoring a temperature at a location up to 50 feet away from the sensing device.

Capillary tubes gave way to the principle of pneumatic transmission, with air pressure replacing the liquid. Not long afterward, twisted pairs of copper wire that transmitted control data electrically provided further economy.

The Johnson Service Co. began to fabricate and install pneumatic control centers in 1958. With these centers one individual could scan panels displaying individual room temperatures, ventilation conditions, chilled and heated water temperatures as well as the outdoor temperature. The need for a...
dedicated source of customized control panels led to the 1980 acquisition of a panel fabrication operation in Poteau, Oklahoma.

Back in Milwaukee, manufacturing space in the Company’s headquarters building at 307 E. Michigan Street was being squeezed. A building on the city’s north side was purchased to house its brass foundry and metal fabrication operations. Soon afterwards, the plant was expanded to accommodate an increasing amount of assembly and machining work.

**DIVERSIFICATION**

In the same year that the Company celebrated its 75th anniversary, Richard J. Murphy was elected its fifth president. While his term, 1960 – 1965, was the briefest of his peers, the microscope had started as a Johnson timekeeper in 1905 was responsible for starting the firm in several important directions.

After decades of serving overseas markets through a handful of offices and an export group, an International Division was established. Subsidiaries were set up in England, France, Australia, Belgium, Italy, and Switzerland. Construction of the first foreign manufacturing plant began in 1964 in Lomagna, Italy. Like those in the U.S. and Canada, the international offices were managed as virtually independent businesses providing customers with one source of support.

Murphy also decided to formalize the Company’s approach to its proliferating amount of control work in industrial and military installations. Since World War II, the Johnson Service Co. had earned a reputation for its expertise in atomic research plants and other projects requiring higher levels of reliability than commercial buildings.

The Systems Engineering & Construction Division was formed in 1961 and was soon involved in all major Air Force missile programs including all missile launch systems.
complexes. Commendations for its work were also received from the National Aeronautics and Space Administration which turned to Johnson Service throughout the decade for "mission control" instrumentation for the Apollo-Saturn program. The division later undertook work in nuclear power plants requiring unmatched standards of performance.

The Company's move into projects requiring stringent quality standards was broadened through its 1958 acquisition of Associated Piping & Engineering Corp. and Western Piping and Engineering Company. These operations were headquartered in Los Angeles. They fabricated piping and expansion joints for nuclear and fossil fuel generating plants and a variety of industrial installations.

In 1967 Fred L. Brengel became the sixth president of the Company. Brengel was educated as an engineer and worked his way up through the branch sales organization. In the year following his election, the Company's sales were boosted about 20% to $355 million by the acquisition of Penn Controls, Inc.

Since its organization in 1917 by founders Ralph and Albert Penn, the Penn Electric Machine Company manufactured a diversified line of controls for original equipment manufacturers, distributors and wholesalers. After starting with their initial design for a water pump pressure switch, they gradually expanded to help supply the accelerating need for electrical controls. Through the acquisitions of Baxo, Inc., and Pioneer Electric, the Penn product line swelled to comprise controls for commercial refrigeration, compressors, oil and gas heating equipment, appliances, and air conditioning.

With the Penn acquisition, Johnson Service now had an in-house supply of electrical products for its installation projects. Penn also provided further impetus to international markets through its manufacturing plants and subsidiaries in Canada, The Netherlands, Argentina, and Japan.

**ELECTRONICS REVOLUTION**

Early in the 1960s Johnson Service management recognized that it needed to acquire another capability. It was apparent that electronics technology would not only be used in products and
equipment used by building occupants, but that it could be used to control the building.

In 1963 the electronics division of Fischbach & Moore was purchased, which served as a base upon which Johnson Services would increase its in-house electronics capability. Four years later, the Milwaukee Laboratory introduced the T-6000 solid-state, digital data logger.

Until the arrival of the T-6000, a building engineer for a large complex could have used a dozen pairs of eyes to watch over hundreds of dials on his pneumatic control center. The T-6000 was designed to operate on a "management by exception" principle: that is, an engineer's attention was needed only when the system announced that data variables were outside prescribed limits. If necessary, the engineer could stop and start mechanical equipment or reset a temperature, humidity, or pressure throughout the building from his command post. The amount of information and control instructions being transmitted was accommodated by multiplexing, individual pairs of wires to each sensing and control point were eliminated.

In addition to performing heating, ventilating, and air-conditioning functions, the T-6000 could also monitor fire and smoke detection, security and emergency lighting systems. During the decade, several small makers of program clocks and security and alarm systems were added to the Johnson organization as demand for protection of life and property increased.

Shortly after the T-6000 was interfaced with a digital computer, Johnson Services introduced the industry's first mini-computer system dedicated to building control, the JCT/80®. A typical control center of 1972 included a cathode-ray terminal with a keyboard, an intercom, a printer, and a minicomputer. In large installations the system used field units for distributed processing, furthering the management by exception principle.

One of the many customer benefits of the JCT/80® was that it lowered the degree of technical training required of system operators and eased people into using the computer's capabilities. The software programs also included monitoring and data collection features to aid in scheduling equipment service.
The introduction of the JC80 was timely. In 1973 international embargoes on oil were dramatic reminders of the world's tenuous energy supply situation. Energy costs shot up. Everyone began analyzing their utility bills for ways to reduce costs. Proper maintenance of energy-consuming equipment was seen as a fundamental way to save money. And although a JC80 system installation might carry a million-dollar price tag, its payback in reduced energy costs could be achieved in a few years.

In spite of the worldwide recession, in 1977 the Company's backlog of uncompleted contracts, involving building control systems and process control and piping systems, rose to nearly $500 million.

President Fred L. Bremmel's message to employees and shareholders was as appropriate then as it was for his predecessors.

"We believe that we hold a strong position in an excellent market. The incentives for spending on energy conservation measures, both in the traditional heating, ventilation and air conditioning areas, and for building automation systems, are greater than ever. High energy costs and the recognition by building owners of the ability to control these costs have significantly increased opportunities in the new and retrofit building markets."

The Company, which was renamed Johnson Controls, Inc. in 1974, had additional reasons to enter the 1980s with confidence and enthusiasm. A host of new electronic control systems and devices were in the offering. An acquisition in West Germany would strengthen its position in the European market for building controls. And in 1978 it merged with Globe-Union, the largest U.S. manufacturer of automotive batteries. The merger doubled Johnson Controls' sales, expanded its strong financial base and gave it leadership in the field of energy storage. In 1981 Johnson Controls became a billion dollar enterprise.
Making it all work. It is the people of Johnson Controls, what they did and what they believed in, who have made the Company what it is today.

The most important reasons for a company flourishing and reaching its 100th birthday usually aren’t documented in the papers that find their way into its archives. By and large, these only report on an organization’s results, symbolic representations of millions of hours of labor, good and bad ideas, successes and failures, anguish and joy.

The real history of Johnson Controls is the stories about its people. Not just about what these people did, but also about what they deemed important. Each organization feels comfortable “hanging its hat” on certain key values. Warren Johnson had his. The Johnson System of Temperature Regulation was to be the best — without qualification.

1897
James Hamilton works on the first knownCourtesy installation.
Toronto’s City Hall.

1907
Thermostats are
received for shipment.

1912
The calm portrayed in these scenes inside the Michigan Street
headquarters belies the activity accompanying the Company’s
growth.

1913

1912

1913
Johnson had the same requirement about the people, his employees, who represented the Company. They needed to share his absolute confidence in the benefits provided to society by his control systems and to be determined to uphold promises of performance.

**EARNING A GOOD NAME**

The employees, most closely personified by the Professor were those asked to join his sales force. This hand-picked lot was true to the image of the classic American entrepreneur. Bold, ambitious and tireless, they were the pioneers who carried the story of the Johnson regulation system to distant cities and untapped markets.

Their success depended to a great degree on the personal integrity and friendship shown to their customers. Indeed, the reputation of a salesman often preceded the Johnson name. Neophytes making sales calls on contractors in the southwest, for example, were cautioned to expect an order only if they remembered to add that they worked for “Sheep” at the Johnson office in Kansas City.

F. A. “Sheep” Sheppard started at the Kansas City branch in 1911. He gave up the managementship in 1946, but was still putting in five half-days a week in 1977. As with other salesmen, Sheep fully appreciated that his good name depended on Johnson people back in Milwaukee.

The men employed at the Milwaukee factory were mostly sons of immigrant craftsmen, motivated by a desire to earn a secure livelihood helping to produce modern devices. The happenstance for their employment often involved curiosity propelling them across a street to see what was going on in the Johnson invention mill. Many stayed for over four decades.

**THE HUMAN CLIMATE**

Factory life in the early years had qualities that were found in most all successful organizations. The Johnson, Globe, and Penn companies earned reputations for treating their employees well. In each firm, the “old man” was frequently seen on the foundry or manufacturing floor, inquiring as to the health of a loved one or the grade of an aspiring youngster.
The feeling of family found within these three organizations was preserved, perhaps longer than in other firms, by the long tenure of their leaders. Johnson Controls counts only six presidents in its 100-year history. Globe was guided almost entirely by the Wronka family and the Pearsall organization by its namesakes.

The personal concern and desire to do what was right by their employees was backed up by the early adoption of all the innovations in employee benefits: hospital and surgical insurance, pension and survivor payments, and stock purchase programs.

Company policies of fair and equal treatment were extended beyond U.S. boundaries. It became standard procedure for nationals to staff and manage operations as distant as the Far East. In the 23 nations where Johnson Controls now operates, principles expressed in the corporate creed are mingled with local practice.

Many long-service employees are among those captured in a 1950 portrait in front of the Milwaukee headquarters. President Ellis is shown with cap in hand in the lower right.

The quiet phrase of fair and equal treatment was good performance. The nature of this relationship is captured in remarks by President Ellis while interviewing a young candidate for employment in 1950: "If you ever find an executive who says that he can tell by the shape of a man’s head whether or not he’d be any good, you can tell him for me that he doesn’t know what he is talking about. Go on to work. Come back in three years, and I’ll tell you whether you’re any good or not."

"On second thought," Ellis said, "as his newest employee relocated from the president’s office, "if you’re not any good to this Company, you won’t be here three years from now, so you won’t have to come back and ask me."

EMPHASIS ON ENGINEERING

Performance requirements of employees took a decidedly technical bent following World War II. To meet the surge in new building construction and keep up with the wide range of control demands.

<table>
<thead>
<tr>
<th>1942</th>
<th>1942</th>
<th>1943</th>
<th>1943</th>
<th>1944</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early adoption of all employee benefits: hospital and surgical insurance, pension and survivor payments, and stock purchase programs.</td>
<td>Wartime brings women into the Johnson factory. Globe first hires women for assembly positions in 1942.</td>
<td>Junior Achievement players present radio dramatizations to help &quot;build up the morale of young Americans.&quot;</td>
<td>Loyalty awards programs are initiated.</td>
<td>Employees, families, and friends gather in Milwaukee for presentation of the Army-Navy &quot;E&quot; Award for outstanding war production.</td>
</tr>
</tbody>
</table>
and applications, Johnson Service began a major recruiting effort for graduate engineers. By 1952, the number of engineers and technicians in the field organization was more than three and one-half times the pre-war level. Approximately 355 engineers were hired, more than there were in the entire Company at this time.

In this process, President Cutler brought to bear his experience as a college engineering instructor. He lectured before engineering societies, architects, conventions, and a variety of educational meetings where he sought individuals who could measure up to Johnson standards.

The rapid changes in technology pointed to the need for training existing employees, as well as new recruits. In 1946 the first job training program was developed for clerks, mechanics, drafters, and administrators at the branch offices. The next year, newly hired engineers began attending training classes of five to six weeks duration in Milwaukee. While in-house training provided employees with knowledge unique to the business, a tuition reimbursement program was also instituted to fund continuing education at colleges.

In 1959 the Company added another dimension to its commitment to do more for customers than just sell them devices. Training classes were expanded to include personnel responsible for operating control systems in customer buildings. Today, the Johnson Controls Institute offers some 80 different courses to customers and employees, ranging from the basics of heating, ventilating and air-conditioning, and programming direct digital controllers to sales skill development.

**CUSTOMER COMMITMENT**

If there is a single value that permeates each organization that has come together to form Johnson Controls, it is the commitment to customer satisfaction. By tracing the growth of each business, whether it be building controls, batteries, process controls, or piping systems, one can see that the impetus was customer need. Helping to make customers successful is recognized as the most compelling way for the organization and its employees to succeed. The customer is seen as the ultimate source of employee, shareholder, and community benefits; it is the customer who determines whether the Company fulfills its mission of leadership in its industry.

Today, more than 20,000 employees carry on this obligation and tradition of customer satisfaction by providing excellent value through improving productivity, quality, and service. This means that for every effort employees make, every resource they use, there are results that count. It's using new tools and technology and Johnson Controls people offering ideas, being creative, and making suggestions.

Being a quality company takes even more than offering products and services that are good. Quality is an attitude that involves striving for the best, doing it right the first time, and people taking responsibility and pride in their work. Responsiveness to customer needs and expectations is vital.

---

<table>
<thead>
<tr>
<th>1945</th>
<th>1947</th>
<th>1952</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salesmen demonstrate the power of compressed air with their pneumatic kites.</td>
<td>Salesmen demonstrate the power of compressed air with their pneumatic kites.</td>
<td>Johnson Service Foundation is established to support causes such as the arts, education, and health.</td>
<td>New York City branch office moves to Long Island City.</td>
</tr>
</tbody>
</table>

**FAMILY DAY**

*March 24, 1945*
Of the various factors that have contributed toward the success and leadership earned by Johnson Controls, the fundamental reason is considered to be its ability to satisfy its customers. So although Johnson Controls steps into its second century as a more diverse organization than when it began, the values its people deem important have changed little.

Joseph Culler, center; John Richard Murphy, right; and A. J. O’Shea for a taste of 75th anniversary cake. Culler serves as president from 1938 to 1950 and remains on the Board of Directors until 1975. Murphy is president until 1982 and is presently a director emeritus of Johnson Controls.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Children of employees compete for the Company’s new college scholarship program.</td>
<td>Sales of $155 million place the Company in the list of largest industrial firms.</td>
<td>Employees are hired to fabricate piping in a new facility in Clearfield, Utah.</td>
<td>Pledge of customer satisfaction is rewarded by top supplier honor from Soorte.</td>
</tr>
</tbody>
</table>