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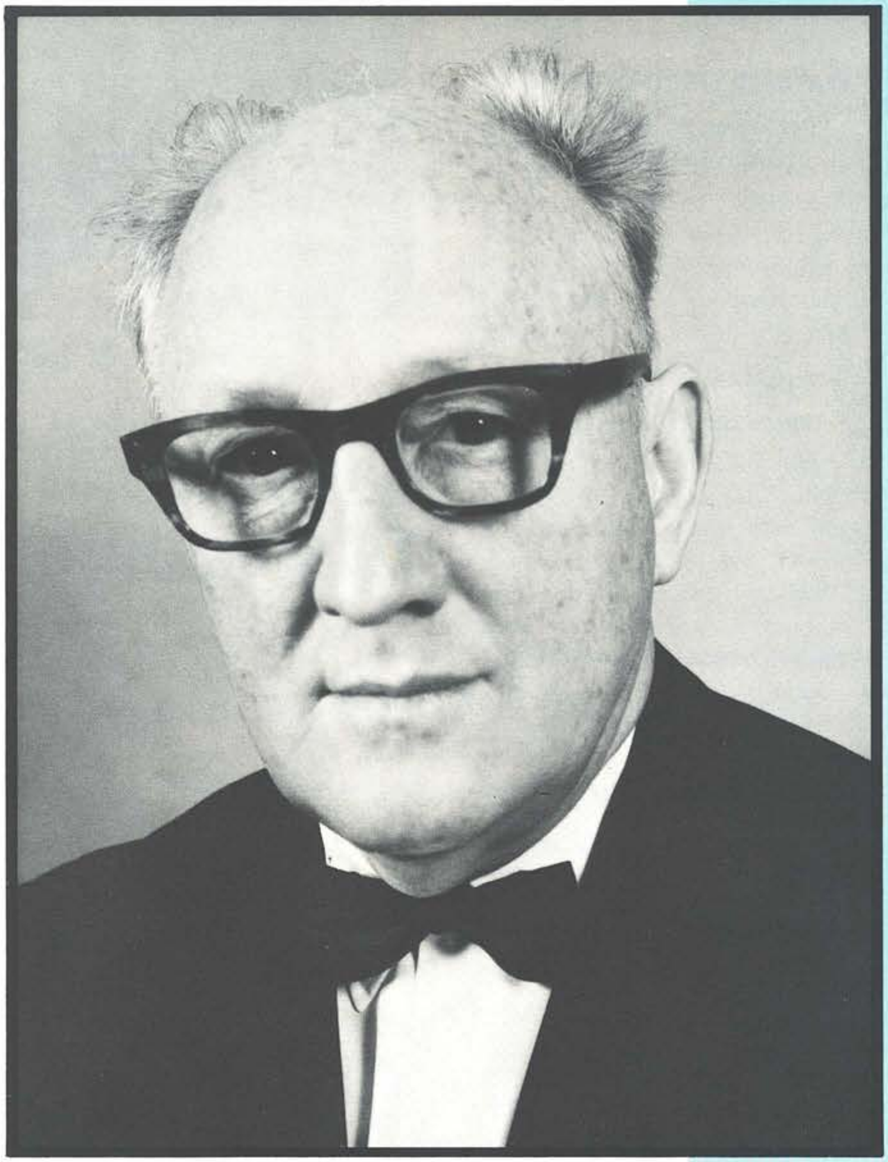

DR. LESTER W. STROCK
Featured Spectroscopist
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What's this issue all about?

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Dr. Lester W. Strock

FEATURED SPECTROSCOPIST

It is with deep respect and pride that this issue of Arcs & Sparks features Dr. Lester W. Strock. Many of the techniques used today are the result of Dr. Strock's early research.

Dr. Strock's career has been scientifically rewarding, exciting and colorful and we regret that only a short chronicle of his many activities can be portrayed here. It was suggested by Dr. Strock that the readers of Arcs & Sparks would perhaps be more interested in his early work in Spectrochemical Analysis than his other fields of endeavor. The following will refer mainly to the early years of his career.

Dr. Strock joined Sylvania Electric Company, a division of General Telephone and Electronics Corp. in 1952 at their Central Research Laboratory in Bayside, New York. Here his activities centered around the disorder in crystals in relation to these defects in the phenomenon of electroluminescence. He is now in the engineering laboratory of the Sylvania Lighting Division located in Danvers, Mass. where his work involves the crystal chemistry of metals, particularly the refractory metals widely used in lamps. A major effort is on tungsten, where the study is on the crystal defects and trace element content. This research is aimed at the development of filament materials suitable for modern high wattage halogen lamps.

Since joining Sylvania he has not often been involved with spectrochemical analysis but has maintained a constant professional interest in this field. He attends local and national meetings of SAS and served as councilor of the New England Section this past year and is chairman-elect for the present year. As a result of his various research and business activities he has published more than fifty research papers, many of them involving spectrochemical analysis. Dr. Strock has filled many speaking engagements, read papers at scientific meetings on spectrochemical analysis as well as in other research areas.

Born in Chambersburg, Pennsylvania, January 23, 1906, he completed high school there and went on to Philadelphia College of Pharmacy and Science, receiving his B.Sc. in 1927. Then attended the University of Pennsylvania, where he received his M.Sc. in 1929 and his Ph.D. in 1931. While studying for his degree in inorganic chemistry he became intrigued by the Werner Coordination Compounds, largely because of the simple geometrical arrangements postulated for their molecules. During the prior decade X-Ray crystal structure studies had shown that similar arrangements exist in most simple inorganic solids. While doing his graduate work on the crystallography of complex cobalt compounds, he was eagerly following developments in the new field of crystal chemistry, for this is where his scientific ambitions lay. During the late 1920's the field of crystal chemistry was just beginning. Research was underway in this new field in United States by Linus Pauling and in Europe by V. M. Goldschmidt in Oslo, Norway and later in Gottingen, Germany. Little did the young Lester Strock realize how soon he would be working along side the great Prof. Goldschmidt and become one of his regular research team.

Interested in mineralogy and geology since childhood, his university graduate research on inorganic chemistry and crystallography naturally merged into the broader field of crystal chemistry. A great portion of early crystal structure work was done on natural minerals because their crystals were already grown by nature and available for study. In those days trolley cars ran out of the city in many directions, getting off at one terminal and hiking cross country to the terminal of another line, sometimes a distance of 15 or 20 miles, gave the young scientist a vast outdoor classroom. Later while in graduate school, he organized and taught a course in crystallography for two years in his nearby undergraduate college, PCP & S. It was necessary to give up teaching this course when the University awarded him their Harrison Fellowship for two consecutive years while completing his Ph.D. work.

Young Dr. Strock graduated right into the middle of the great depression of the 30's. Like so many others, this event changed the course of his life. Eager and

(Continued on next page)

enthusiastic to begin his career in crystal chemistry he felt fortunate indeed to be awarded a fellowship by the Rockefeller Institute for Medical Research in New York. He was to work for a year in the X-Ray Crystallography Laboratory of R. W. G. Wyckoff. It turned out to be the most uninspiring year of his life. He was given the job of transferring endless numbers from a hand cranked calculator, to endless stacks of yellow paper; the color yellow annoys him to this day. Wyckoff and Corey were shifting atoms about in a cell seeking a structure for thiourea without ever explaining to the young scientist what lay behind their numbers game. His meeting with Dr. Ludwig Chrobak of Cracow University, Poland, who was spending a year in the laboratory on a Rockefeller Foundation Grant, destined the course his career was to follow for many years.

During the depression year of 1932, Dr. Strock found it impossible to locate any sort of academic position in chemistry, mineralogy or crystallography. Crystal chemistry was a subject almost completely ignored at this time in U. S. universities. Dr. Strock and Dr. Chrobak had become very close friends, so Dr. Chrobak arranged for the young scientist to work in his laboratory as a guest for a year. He sailed for Europe in July 1932. He lived comfortably on a small grant from the Wagner Free Institute of Science, Philadelphia, while working at Cracow University. Cracow, the ancient capital of Poland was a colorful old city steeped in Austrian-Hungarian culture. His lifelong hobby – history took much of his free time; in this old city and surrounding countryside he could study first-hand, the history of the area while following the long habit of field trips to study the geology and minerals.

On completing his year in Cracow he went on to Gottingen, Germany (1933), hoping to work with Professor V. M. Goldschmidt in crystal chemistry. Now, more than two years after graduating, he was going to be able to work in his chosen field, crystal chemistry, with the man who had been responsible for most of the knowledge of the science to that time. The young scientist was dismayed to discover that Goldschmidt's own research was now in the field of Geochemistry. The major emphasis of his work was on problems relating to the distribution of the rarer elements between the major divisions of the earth; i.e. atmosphere, hydrosphere and solid crust of the earth. These studies soon were expanded to the broader problem of the absolute abundance of all elements in the earth, the planets and the universe. This research was carried on by studies of meteorites and by utilizing data from astronomers on comets and stars. We must remember, this research was going on long before the uranium atom was split and the modern nuclear age opened, bringing with it the more sophisticated means of analyzing geological materials than were available to Goldschmidt. In 1937 Goldschmidt's abundance data were published. Ultimately, these abundance values became the basic experimental data used by physicists and cosmologists to test their own models and theories regarding the thermo-nuclear evolution of the chemical elements on a cosmic scale. To be with Goldschmidt during this period was a great experience for Dr. Strock and has been a source of lasting inspiration to him.

These then, were the experiments and theoretical studies in progress when Dr. Strock came to Gottingen. For a brief period he attempted to continue his crystal chemical research, but was soon caught up in the excitement of this new activity and joined in the geochemical program. This was the real beginning of Dr. Strock's very fruitful career in emission spectroscopy.

This abundance theory work had been in progress for almost four years when Dr. Strock joined the group in late 1934. It remained for Dr. Strock to further the progress of the program and develop many of the techniques and methods used by todays spectroscopists. He first used chemical methods to determine small amounts of As and Se in geological materials but within a short time was using D.C. arc as a means of determining low concentrations of the rare elements. It was fortunate that he joined the spectrographic group at that time, for extensive application had been made of semi-quantitive D.C. arc methods and work on more quantitive methods was in progress. It was at this time that he originated the use of the rotating step sector or stepped filter, placed before the spectrograph slit, each line in a photographed spectrum of a sample, provided an intensity calibration. Previous to this time such calibrations had to be placed on a photographic plate in a separate operation. By this new method, further calibrations for any wavelength desired was immediately available and for lines, rather than the usual continuum calibration then in use. It was during this period that Dr. Strock first introduced the use of carbon powder additions to samples, as a means of achieving more uniform burning and excitation. It was here too, that measurements showed the extreme importance of buffers in controlling line intensities and reproducibility in quantitative D.C. arc methods. These techniques are practiced in laboratories throughout the world today.

It was Dr. Strock who worked out the structure of Alpha AgI, which so well explains its extreme degree of ionic conductivity. A systematic review of all developments of the D.C. arc quantitative analysis by the Gottingen group during the 1930-35 period was presented in a paper at the Symposium, "History of Spectrochemical Methods," at the National Meeting of the Society of Applied Spectroscopy in Chicago, May 1968. It will be published in detail in a forthcoming issue of Applied Spectroscopy.

Cathode Layer, those two words have been associated with Dr. Strock since his days in Gottingen, but not everyone is familiar with how this came about. Professor O. S. Duffendack of the University of Michigan visited Goldschmidt's laboratory, but because he did not converse or understand German well, Dr. Strock was asked to take his countryman on a tour of the facilities. This was not as easy as it might sound, for more than two years Dr. Strock had been speaking German almost exclusively. He had learned many of the techniques and names of laboratory equipment in German and until this time he had never attempted them in English. The tour came off quite well, until he came to "Glimmschicht" – which he suddenly translated into Cathode Layer! The name has stuck with him ever since.

Dr. Strock decided it was time he became established in his own country and so it was that he and his wife sailed for America in November of 1935, stopping off in London for four months to write the small book "Spectrum Analysis With The Carbon Arc Cathode Layer" which Adam Hilger Ltd. was to publish as the first account in English on the quantitative use of the Carbon Arc. This was a widely used laboratory guide by a generation of spectrographers after 1936. From April 1936 to May 1937 he was employed in the commercial laboratories of Lucius Pitkin. Dr. Strock had been unable to locate an academic post in which to make use of newly acquired skills in Spectrochemical Analysis or Geochemistry. Opportunities in American Universities in these fields did not open up until World War II was underway. In the meantime Professor Goldschmidt had returned to Oslo, Norway, and had repeatedly asked Dr. Strock to join him. After a little more than a year in his own country, he was again on a ship bound for Europe, this time with a new member in the party, his eleven month old daughter Winifred. The laboratory in which he was to work was located in the Geological Museum in Oslo. It had been established for Professor Goldschmidt by the Norwegian Department of Commerce.

The above mentioned laboratory where Dr. Strock worked with Professor Goldschmidt from May 1937 until December 1938 has since been transferred to Trondheim. The laboratory is under the direction of Mr. Aslak Kvalheim, one of the assistants Dr. Strock first introduced to Spectrochemical Analysis Methods in 1937. It has recently been reconstituted as the chemical department of the Norwegian Geological Survey. Dr. Strock has been honored for his early work there by having a part of the spectrographic facility named the LWS LABORATORY.

By 1938 the threat of war hung heavy over Europe, Hitler had moved into the Ruhr, Czechslovakia and Austria. So when Dr. Oscar Baudisch offered him a position in Saratoga Springs, New York, he accepted. This post, in a new laboratory with some spectrographic facilities, was being established by the New York State Conservation Department. Working on a limited budget, Dr. Strock was just getting his "one man" laboratory nicely underway when World War II interrupted his efforts. Originally established to study natural waters, a rapid change converted his spectrographic laboratory into one devoted to a search for strategic metal deposits. Qualitative analysis was made of small prospectors samples collected by numerous ranchers in New Mexico.

The war years led Dr. Strock into the business world. While on a mission for Adam Hilger Ltd., seeking a source of optical grade fluorite in the U. S. A., Dr. Strock discovered notable amounts of tin in rocks scattered over a large area northwest of Hot Springs, New Mexico. He then organized the Saratoga Mining Corp. to explore for strategic minerals. His discovery of beryllium at Iron Mountain, while prospecting for tin, determined his spectrographic activities for the balance of the war. Beryllium, because of its great importance in nuclear technology, then being very secretly developed by the Manhattan Project, resulted in both the U.S. Geological Survey and Bureau of Mines initiating large projects on his Iron Mountain deposit. This activity led to his undertaking large scale beryllium assay contracts with all industries concerned with beryllium and with the Geological Survey and Bureau of Mines. During the war years he also produced and supplied purified carbon electrodes to spectrographic laboratories throughout the country. At the end of the war these activities were organized into a commercial laboratory, operated first as Saratoga Laboratories and later as Strock Laboratories, Inc. It could not help but be a great personal satisfaction to Dr. Strock to know that all this activity was the result of his first real opportunity in spectrographic analysis and metal prospecting in his own country.

As Dr. Strock looks back on those early years he recalls that while serving as a laboratory instructor in Physics (1925-27) at PCP & S, he made his first experiment in spectrochemical analysis, with a Cenco Table Model Spectroscope. The years in Europe with Prof. Goldschmidt were both scientifically and personally rewarding. It was in 1933 at Gottingen, his funds were exhausted, there was no position available at home, but he was always grateful that somewhere he found the courage to sell the return steamship ticket for his wife and himself so that he could remain in Goldschmidt's institute for a longer time.

During the years with Goldschmidt he met many well-known and famous scientists and many of them became personal friends. The laboratory in those days drew many visitors; he recalls well his first meeting with Professor George Von Hevesy, the discoverer of Haf-

(Continued on next page)

nium and the developer of X-Ray fluorescence equipment for making chemical analysis. Von Hevesy was then at Frieburg University and had made a special trip to Gottingen to discuss the structure of Alpha AgI, which Dr. Strock had just worked out at that time. One of his cherished possessions is a photograph of Goldschmidt and Vernadsky, the great Russian geochemist. His meeting with Archduke Joseph Franz of Hapsburg, heir to the throne of Hungary, was a connecting link between science and history, for the Archduke was a scientist first and royalty second. He constantly promoted higher level of technology in his country and is reputedly responsible for developing their glass industry. It was at Gottingen too, that Dr. Strock first met Father Gatterer of the Vatican Astrophysical Observatory. It was this early meeting that led, some 14 years later, to Father Catterer and Father Junkes visiting Dr. Strock at his home and laboratory in Saratoga Springs, New York. They came to ask Dr. Strock's aid in re-establishing "Spectrochemica Acta", after World War II. Dr. Strock served as American editor for several years thereafter.

All who are in this field are aware of the very significant role Dr. Strock played in developing the D.C. Arc as a reliable quantitative method. The depression which took him to Europe in the first place and kept him there for five years, was the unalterable factor which destined that he should arrive at Professor Goldschmidt's institute when the abundance studies were in progress. His work during those years is reflected in research laboratories throughout the world today.

Those early years were not easy, for Dr. and Mrs. Strock always lived on an extremely limited budget. His free time was taken by geology field trips combined with the study of European history. Here he could view first-hand the museums, ancient churches and palaces in many countries of the continent. His was a study of the old Europe, before the changes made by World War II. His cultural experiences during this period were very rewarding and have provided a background for his continuing hobby — history. Those years of post-graduate work in four different laboratories of Europe in the fields of Crystal Chemistry and Geochemistry laid a firm foundation for his future discoveries and successes.

As we pointed out earlier the foregoing deals in most part with the early career of Dr. Strock. It is sincerely regretted that space limits us to this short biography. Dr. Strock, though a great scientist, is a warm, friendly man whose many interests have not only enriched his own life but those of the people around him. This interest in all that goes on about him, is being carried on by his son, Carl, a graduate of the New York School of Social Research in New York, who recently returned from a 20 month tour of duty in Viet Nam, for the American Friends Service Committee. Dr. Strock looks forward to retirement three years hence, so that he can devote full time to study and writing in the fields of Spectrochemistry, Crystal Chemistry and Geochemistry. He hopes to do this writing in cooperation with his son, Harold, who is now in his final year in Cornell University Graduate School in the field of Material Science.

We know that this future work will still leave ample time for his lively interest in history and field trips for study of geology. Our best wishes to Dr. Strock and his family and our thanks for giving us so much.

Following is a brief resume of additional contributions made by Dr. Strock which are not mentioned in the above biography.

1935-1937 — Papers were published in detail for Li and for Sc. The Li paper written in German, is in the Gottingen Academy of Science.

1938-1939 — Two papers written by Dr. Strock published by Spectrochimica Acta and a detailed paper in the Oslo Academy of Science on basic photographic photometry in converting photographic densities to spectrum line intensities. This research was reviewed and is in the proceedings of the 1955 New York Trace Element Symposium.

1940's — Methods of preconcentrating selected groups of trace elements from natural waters, (containing large amounts of Na Cl and Ca-carbonate) by precipitation with Cupferon. This was one of the earliest preconcentration methods used and published, in which enrichment factors of several thousand were achieved.

By D.C. arc methods and extensive use of buffers and standards, a method of determining minor elements directly in zinc sulfide ores (AIMI-1946), and for Be in all types of beryllium raw materials and in-process products. Continued research in this area led to his developing the method for determining trace impurities in Be-oxide and metal.

Use of D.C. arc methods in studies of residues from oil well brines led to his discovery of substantial enrichments of Sr over Ca in such waters.

Dr. Strock with the aid of Ladislav Dejnozka, developed methods for determining major elements in silicate rocks. Breaking up the rocks with various fluxes resulted in a convenient way of adding internal standards, diluting samples, and of compensating for varying sample composition. This method assures more uniform arcing conditions.

1948-1952, Dr. Strock in cooperation with George E. Heggen and Carl F. Edwards carried on a cancer research program for the Albany Medical School. They developed and applied a combination of Cupferon and hydroxy quinoline in determining trace elements in solutions of plants, animal and human tissues and organs. This program was carried on at Dr. Strock's Saratoga Springs Commission Laboratory.

The ITT Cannon Electric Materials and Processes Development Laboratory

A Laboratory for Connector Insulator Development

By A. H. HORNER

Manager, Materials and Processes Development Laboratory

ITT CANNON ELECTRIC
A Division of
International Telephone and Telegraph Corporation

Photographs by O. Alonso and K. Brzozowski, Laboratory Technical Staff

Electronic computers, gas turbines, airplanes, automobiles — name any technically based business and behind that business you'll find at least one laboratory, and usually many, supporting it in the marketplace. This month ARCS & SPARKS features the Materials and Processes Development Laboratory of the ITT Cannon Electric Division of International Telephone and Telegraph Corporation; it describes the laboratory's role in supporting the design, precision manufacture, and sale of a line of complex products — electrical connectors.

But first — just what is a connector? A connector is simply a portion of an electrical circuit that provides an interface. It might be considered as a switch, for instance, as it permits circuits to be made and broken. Alternatively, one might think of it as a fixture, as it eliminates the possibility of error through crossed wires; all circuits are fastened to properly identified leads. Interestingly enough, a connector, if it does its job properly, is not seen as part of the electrical circuit. Indeed, its purpose is to provide access to a circuit without it, in itself, adversely affecting the electrical performance of that circuit.

Where are connectors used? These pieces of "electrical nothingness" are used almost everywhere — low cost, mass-produced ones for automobiles, rugged, high reliability ones for rockets, and attractive, easy to use ones for home entertainment systems. Connectors come in all sizes, shapes, and circuit densities. Their applications range from gentle environments such as an air conditioned office to the extremely hostile environments encountered in outer space, deep submergence, or modern steel mills.

Since 1924 ITT Cannon Electric, with headquarters in Los Angeles, California, has been one of the leaders in the field of manufacturing electrical connectors. The hallmark of its leadership during this period has been its constant maintenance of high engineering standards. As an integral part of that engineering effort, ITT Cannon Electrical maintains a number of laboratories, one of which is its Materials and Processes Development

A laboratory is not just a collection of equipment, but rather an organization of trained people properly equipped to do a job. As such, a laboratory is portable in that M&P Laboratory people go directly to the floor. Here Sandy Ashlock (right) discusses with Russ Nagel, Foreman, Rubber Compounding and Rubber Molding, the computer analysis of a study of injection molding machine performance.

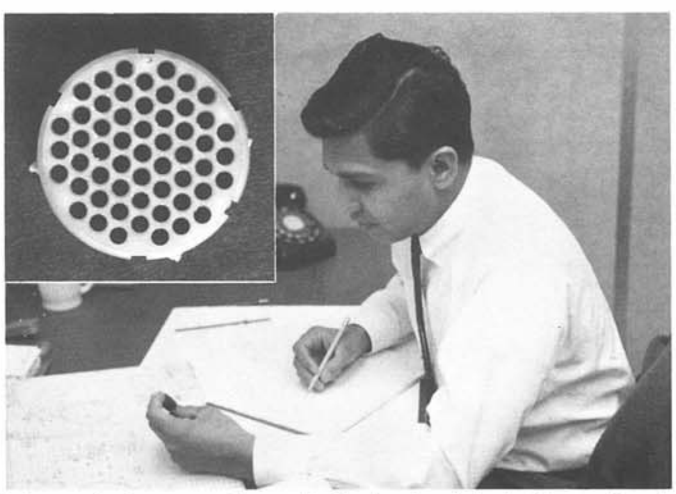
But will the compound process on the mill? Joe Palcher (left) of the Laboratory assures Henry Wade that the answer is "yes"; he uses his Monsanto Rheometer charts for proof. Raul Casas tends to the mixing.

Laboratory at its Santa Ana, California plant. The Laboratory is a business-oriented facility, organized to provide timely materials inputs to company profit and problem areas. These inputs are generated by well-equipped and professionally trained chemists and chemical engineers who provide accurate, informative, and interpretive solutions to engineering problems. The Materials and Processes Development Laboratory further contributes to company profitability by shrinking engineering and manufacturing lead time, by generating development leverage in vendor plants, by reducing manufacturing problems through the introduction of sophisticated process controls, by slashing product costs through enhanced product reliability, and by assisting in the development of the products.

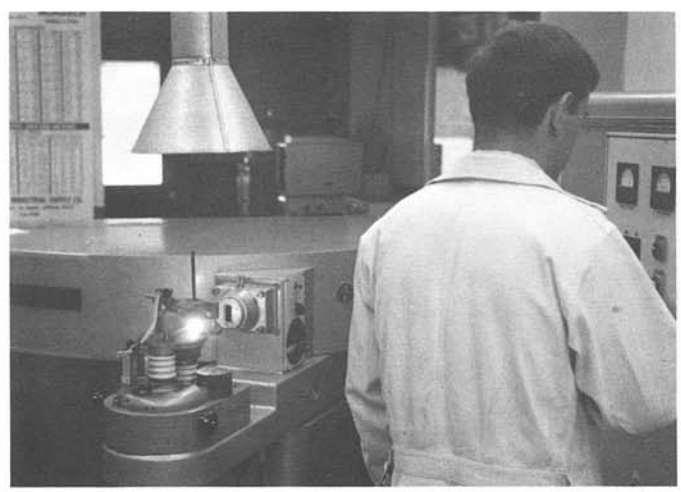
The Laboratory's work may be divided roughly into four areas: materials behavior, elastomer compound development, process development, and analytical chemistry. However, as the Laboratory is primarily a problem-solving oriented organization, these categories are simply indicative of the primary interests of the people concerned, rather than restrictive as to the function they perform. For instance, one of the guiding precepts of the Laboratory organization is that the facility is an interdisciplinary one. Each person, although he is an expert in his own field, has enough knowledge of and respect for the activities and the training of his co-workers in the Laboratory that he can call on them when their inputs are needed. In this fashion the total technical resources of the organization are brought to bear on a given problem. The Laboratory is so organized that each person develops his own work plans according to the business needs of the company and carries them out on his own. He has the most modern of equipment and related resources available to him; however, it's his mind and his drive that bring these projects to timely fruition. In so doing, he becomes a versatile specialist in materials technology.

But what's all this to do with making high quality connectors? Just this, good connector design demands an understanding of the necessary materials performance requirements right at the concept stage; and good materials input can come only from trained specialists. ITT Cannon Electric's connector engineers review with the M&P Laboratory requirements of each new application, preparatory to producing initial drawings. As a direct consequence, the producibility, the time/temperature dependent characteristics, dimensional stability, thermal coefficient of expansion, and other key characteristics of materials are incorporated into the system at the earliest possible time. For rigorous requirements, where performance data are unknown with respect to the application contemplated, engineering personnel will call on the M&P Laboratory to generate necessary data for design. An example of this might include applications for SST performance. Here cyclic performance from low to high temperature over a long time period is necessary to enable engineering to recommend a particular configuration. By devising special tests and test fixtures, it was possible to actually stimulate the flight profile of the SST aircraft. From such tests Laboratory engineers determined the effects of loads, operating environments and temperature cycling on proposed materials for this kind of application. Tests such as these may see periods of greater than 3,000 hours under specific kinds of stimulated service.

"If you can't squirt it, you don't have a product!" The Laboratory looks at connector insulator manufacture as one of process flow – consequently, this guide line to elastomer compound development at ITT Cannon. It emphasizes that processability is equally important with product capability in new compound development.



Trying to laminate a spider web? That's what it looks like to Naresh Patel as he contemplates the bonding areas on the plastic insert (see close-up) used in one of ITT Cannon's high density connectors. Attention to critical engineering details such as bonding area and bond strength at operating temperature assure that ITT Cannon's connectors perform reliably in service.



It's not 218 Alloy if magnesium volatilizes from the die cast pot! This and other problems such as mixed stock, out of spec, iron content too high are some of the production perils that arise if close control is not maintained on incoming and in-process materials. Mike Buyaki checks out the Spectograph preparatory to auditing a vendor certification.

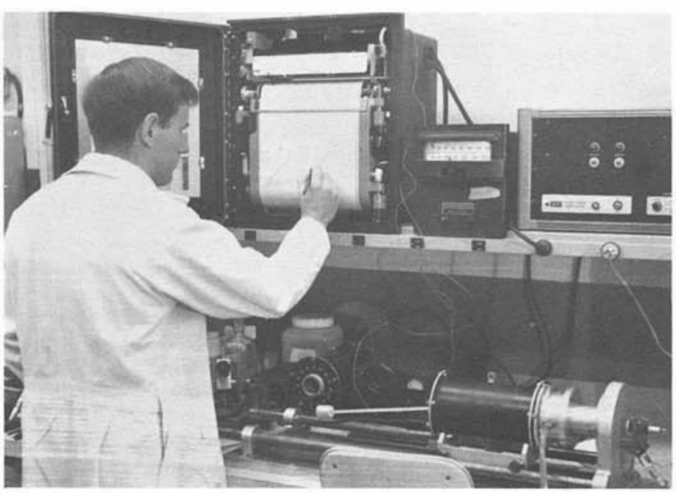
During the development stages of a new elastomer system, the Laboratory staff develops not only the performance behavior of the stock, but also its processability with respect to flowing through the factory. All important process control parameters such as compound rheology, molding pressures, and curing temperatures are developed simultaneously. It's in this fashion that ITT Cannon not only assures itself that its product does the job, but also that it is economically processable.

Back in 1924 when ITT Cannon first started making connectors, it was customary to use compression molded natural rubber stock. Cure times ranged upwards of 15 minutes. Naturally, if the time ran over or under a bit, it didn't make too much difference – you still ended up with a part that represented the state-of-the-art of that day. Tolerances on curing conditions didn't matter too much. Nowadays, however, the synthetics such as neoprenes and silicones are injection molded in 60 to 90 seconds. Even 15 seconds variance in optimum curing time can make a difference of 10 to 20 points in the Shore A Durometer of the product. This in turn directly influences the state of cure of the part and, even more significantly, the performance of that part in operation. It is now necessary that the Laboratory define very specifically the time, temperature, and curing profiles of a given elastomeric stock. It's only in this way that a "manufacturing window" can be designed which will enable the factory to produce the products on a repetitive basis at a satisfactory yield.

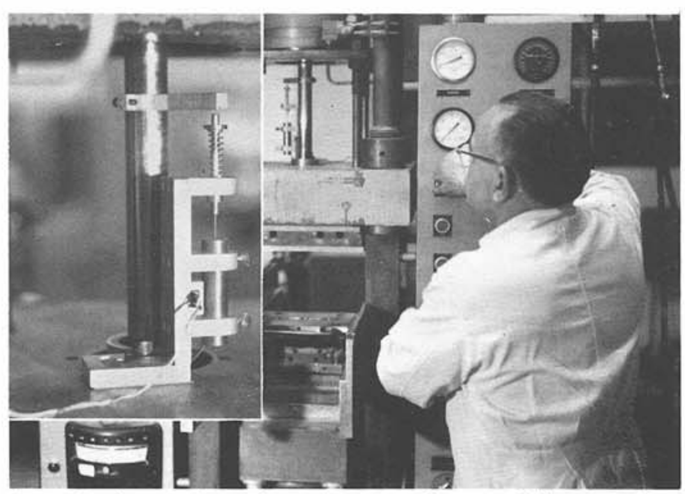
The interdisciplinary approach to problem solving is perhaps best illustrated by the compound development activities. The efforts of the elastomer chemists in developing a new product are supported and enhanced by those who specialize in time dependent behavior. Additionally, the process development engineers look into the producibility aspects such as moldability, bondability, and prototype tooling needs. The analytical group develops process control techniques, incoming material inspection procedures, and constituent identification. The end result is that ITT Cannon has complete understanding of its formulations. Additionally, should field troubles or processing problems arise, the Laboratory can backtrack along known paths.

Let's take a look at another area of Laboratory interest, new process development. Hewing to its line of business orientation, the Laboratory takes pride in upping the yield of its currently used machinery, and also in looking for new processes to make current products more profitably. One of the key tools in this kind of work is the use of statistically designed experiments and computer analysis of the results. Current programs are aimed toward developing processing parameters of large injection molding machines, establishing the adhesive strength of bonding systems and measuring the variability on a batch-to-batch basis of thermo-setting plastics supplied by vendors.

Once processes are set up, they must be monitored. This is the province of the analysts. These chemists spend approximately 50% of their time in so-called routine control. This includes not only continued monitoring of the die cast operations, but also routine troubleshooting that comes in on a daily basis. Mixed metals, a broken wrench in the die cast pot, stress cracks in thermoplastic parts, substitute materials in lead wires, monitoring vendor certifications, polymer degradation during regrind, these are just a few of the surprises that can show up during any given day. The analytical group is not confined to mere routine control activities, however, but as time permits and as business demands, it might also find itself involved in projects such as competitive products analysis, developing new test procedures for fluorocarbon resins, or perhaps even develo-



Mike Buyaki measures the thermal coefficients of expansion of an insulator material. Basic data such as these, covering operating ranges, are usually not available in handbooks.



Marty Martinez monitors the performance of a ram follower used to study the molding behavior of thermosetting plastics. This and other special equipment is built in the Laboratory when necessary.

ping flame retardant additives for high temperature insulating system materials.

The Laboratory feels strongly that its output must be used, or the Laboratory itself is of no value; therefore, a continuing output of information is maintained through the use of reports, personal conversations, and technical seminars. The Laboratory conducts continuing educational programs. For instance, a polymer course, taught in non-technical terms, brings across the idea to both engineering and manufacturing personnel that polymer systems are definable and, once defined, are controllable. Concepts such as molecular weight, molecular weight distribution, and electrical behavior are introduced through the use of simple artifacts such as pop-it beads. The Laboratory preaches the concept that if factory personnel will substitute the idea of a viscometer for a micrometer, it can control chemical processes.

ITT Cannon, as befitting the international nature of its corporate parent, is itself an international organization. In addition to plants in Santa Ana and Los Angeles, California, Phoenix, Arizona, and Monroe, Louisiana, it also has plants in Torontò, Canada, Basingstoke, England, Toulouse, France, and Beutelsbach, Germany. The Materials and Processes Development Laboratory serves as a materials consulting function for the whole system. Materials input, especially to distant plants, is furnished on an "as requested" basis. Rather than attempting to set up long range controls for these facilities, the Laboratory takes the approach that its formulations, its processes, and its technical guides should be so explicit that each of these organizations should be able to compound, manufacture, and process control, using local materials, in any part of the world.

In summary, connectors, from an electrical viewpoint, do nothing; but good connectors should "do nothing" well. It's through the maintenance and support of a professionally trained and motivated Materials and Processes Development Laboratory that ITT Cannon Electric assures its customers that its connectors "do nothing" the best.

Analytical equipment is an aid to good judgment, not a substitute for it. Kathy Brzozowski finds that even though she has access to one of the best equipped analytical laboratories in the West, the answers still don't come out on punched cards. Here she reviews an AAU curve with Arch Horner.

Good connector design considers materials performance right at the concept stage. Here Bruce Arnold, Manager of Product Engineering for ITT Cannon Electric, reviews time/temperature performance data developed by Sandy Ashlock of the M&P Laboratory on elastomers for high temperature aircraft service.

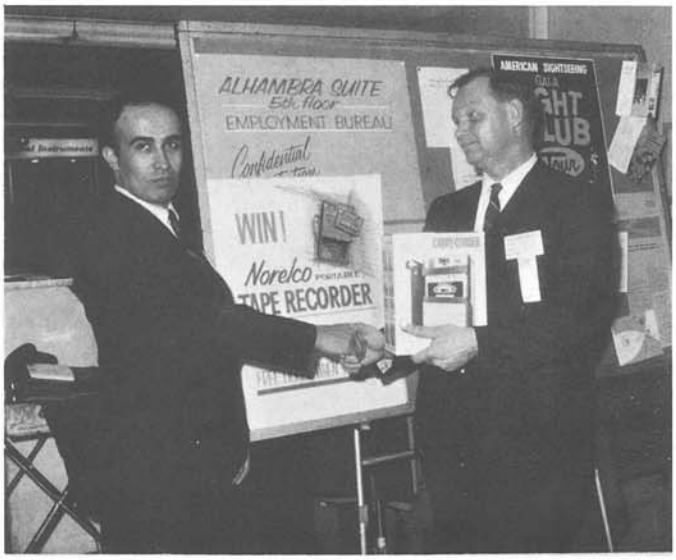
From a non-destructive testing viewpoint, it's hard to beat an X-ray for quality assurance. Here Kathy Brzozowski and Mae Rousey review quality control on a key connector line. Flaws such as shown on the inset called for a process change.

Bob Bera and Oscar Alonso review Instron stress/strain curves of polymer materials tested at -65°F. It's through studies such as this at actual operating conditions that a real understanding of materials is gathered.

7th NATIONAL SAS MEETING

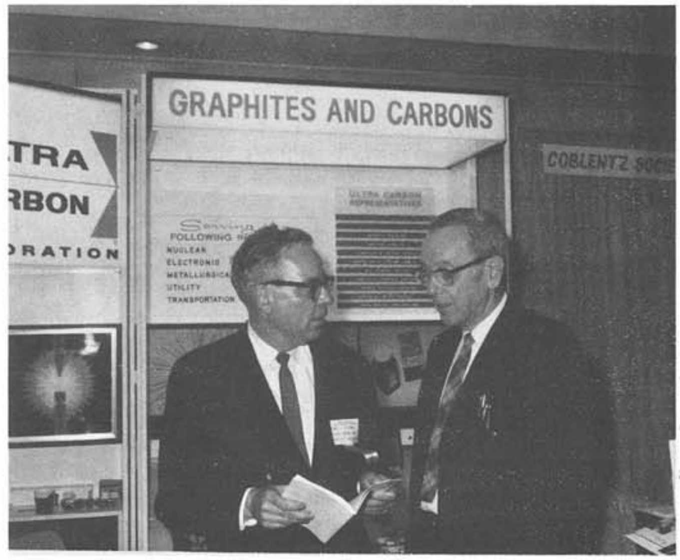
FOCUS ON YOU

MAY 13-17, 1968 CHICAGO SHERATON HOTEL CHICAGO, ILLINOIS



Ahmad Khosrovi, Institute of Gas Technology, one of the winners of the Tape recorder.

Frank Thacker, American Can Co., Registration Chairman of 7th Mid-West Conference.



Carl J. Leistner, Ultra Carbon Corp., A. T. Meyers, U.S. Geological Survey.

Dr. Lester W. Strock, Sylvania Electric, Lighting Div., Cyrus Feldman, Oak Ridge National Laboratory.

Joan Steffen, American Zinc Co., David Schmidt, Granite City Steel, Gus Lentz, Sherwin Williams Co., H. G. Zelinske, Amsted Research Laboratory, R. W. Scott, Sherwin Williams Co., Frank Thacker, American Can Co., Genevieve Bonini, Jarrell-Ash Co., J. E. Hawley, Mallinckrodt Chemical Co., Rose Marie Carey, Alcoa, P. T. Badame, Jarrell Ash Co.

7th NATIONAL SAS MEETING

FOCUS ON YOU

MAY 13-17, 1968 CHICAGO SHERATON HOTEL CHICAGO, ILLINOIS

George Matz, Jarrell Ash, Dr. A. Stephan Michaelson, Tech. Research International Corp., Dr. J. W. Robinson, Louisiana State University, Raymond Goulet, Jarrell Ash, Charles North, National Lead Co., Titanium Div., Francis McDonald, U.S. Dept. Bureau of Mines, Tomas Hirschfeld, Block Associates, Dr. Frank S. Parker, N.Y., Medical, Ray Baney, Ultra Carbon.

Al Perkins, University of Illinois, Clarence Postmus, Argonne Nat. Laboratory, Dean Bryce, L. Crawford, University of Minnesota.

Jim Paterson, C.E.C., Frank Galletta, Youngstown Sheet & Tube Co., Urban Diveen, Armco Steel Corp., Richard Knauer, Armco Steel Corp.

Dexter Reynolds, New Mexico Tech., Frank N. Tindall, Duval Corp., John D. Crozier, Newmont Exploration Ltd., Bill McCarty, Marathon Oil Co.

John Forrette, Velsicol Chem. Corp., Rose Marie Carey, Alcoa, Joan Steffen, American Zinc Co., J. E. Hawley, Mallinckrodt Chemical Co.

7th NATIONAL SAS MEETING

MAY 13-17, 1968 CHICAGO SHERATON HOTEL CHICAGO, ILLINOIS

Andy Rekus, Baltimore Gas & Electric Co., Dr. and Mrs. McGinnes, Sherwin Williams Co., Mr. and Mrs. Alvin Bober, U.S. Customs Laboratory.

Frederick Brech, Jarrell-Ash, Betty Mitchell, Union Carbide Chemical, Dr. Marvin Margoshes, N.B.S., Dr. J. W. Robinson, Louisiana State University, Bruce M. LaRue, National Steel Corp., and President of SAS, Grady L. Roberts, Monsanto Co.

Guy Dontevieuex, C.E.A., Cachan, France, L. R. Pearson, American Can Co., Bob Bender, Ultra Carbon Corp.

Bill Baer, Nalco Chemical, H. G. Zelinske, Amsted Research Labs, L. R. Pearson, American Can Co., Dr. Elma Lanterman, Borg-Warner, R. W. Scott, Sherwin Williams Co., R. L. Terry, Sinclair Oil Corp., Frank Thacker, American Can Co.

SOS Members Dinner Party

AT

1968 PITTSBURGH CONFERENCE

CLEVELAND, OHIO

LOOKING AHEAD

If the program chairmen of the following meetings will forward pictures of any special event, Arcs & Sparks will endeavor to include them in a future issue. Our space is limited and we cannot promise that all photos will appear. Photos submitted must be glossy and no smaller than 3¼ x 4¼. The event and persons appearing in photo should be clearly identified. Photos cannot be returned.

* * * *

SEPTEMBER

Meeting on Molecular Structure & Spectroscopy, September 3-7, 1968, Ohio State University, Columbus, Ohio.

156th National ACS Meeting, September 8-13, 1968, Convention Hall, Atlantic City, New Jersey.

Water Pollution Control Federation, September 22-27, 1968, Conrad Hilton Hotel, Chicago, Illinois.

OCTOBER

ORNL 12th Conference on Analytical Chemistry in Nuclear Technology, October 8-10, 1968, Mountain View Hotel & Motor Lodge, Gatlinburg, Tennessee.

Assn. of Official Analytical Chemists, October 14-17, 1968, Marriott Twin Bridges, Washington, D. C.

NOVEMBER

Pacific Conference on Chemistry and Spectroscopy – 7th Pacific Meeting – Society for Applied Spectroscopy, Jack Tar Hotel, November 6-8, 1968, San Francisco, California.

Eastern Analytical Symposium, Statler Hilton Hotel, November 13-15, 1968, New York, New York.

* * * *

SPECIAL ANNOUNCEMENTS

The 1969 Pittsburgh Conference will be held March 2-7, 1969, at the Cleveland Convention Center, Cleveland, Ohio. Authors who wish to present papers at the Conference should submit three copies of a 150 word abstract no later than October 15, 1968, to William M. Hickman, Westinghouse Research Laboratories, Pittsburgh, Pennsylvania 15235.

* * * *

XV Colloquium Spectroscopicum Internationale will be held in Madrid, Spain, May 26-30, 1969. Additional information can be obtained by contacting Dr. E. Arsensi Alvarez-Arenas, Serrano, 119, Madrid-6 (Espana).

William J. Poehlman

A few months ago, Bill announced his retirement after 40 years with A. O. Smith Corporation, Milwaukee, Wisconsin. The first president of SAS, and an energetic worker in organizing local societies throughout the country, Bill has more than earned the right to relax and enjoy himself. Our best wishes for the future and a heartfelt thanks for your devotion to bettering our society.

TO OUR READERS

We would like to publish letters from our readers on unusual, novel and interesting uses they have found for the emission spectroscopy equipment in their labs. We know that many of you utilize your equipment for other purposes than those for which it was originally purchased and our readers would like to hear about it. The writer will be identified unless he requests to remain anonymous. This will become a regular feature in Arcs & Sparks, so come on, let's hear from you. Direct your letters to:

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Ultra Carbon Corporation
P. O. Box 747
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NEW BOOKS AVAILABLE

**LIST OF CONVERSION FACTORS
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A. Cornu and R. Massot, Commissariat a l'Energie Atomique, Centre d'Etudes Nucleaires de Grenoble, Grenoble.

Published April 1968. Hard cover. Gold Block Titling. Size 6¾" x 9". Price 4.5.0 ($10.00).

**A NEW CHEMICAL STRUCTURE CODE
FOR DATA STORAGE AND RETRIEVAL
IN MOLECULAR SPECTROSCOPY**

L. C. Thomas, Ministry of Defense, Chemical Defense Experimental Establishment, Porton Down.

Published April 1968. 72 pages. Size 11' x 8½". Artboard cover. Price 1.15.0. ($4.00).

Purchase from Publishers:
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London, NW4.