



**Charles Lipson**  
**Founding Member,**  
**Third SESA President**

The history of SEM (formerly SESA) must include an article about Charles Lipson. He was a founding member of the Society and served as its third President. Our goal in the SEM History series is to have the articles written by people who knew the biographee personally, but that is not possible in this case. Although I met him a few times at anniversary functions, I do not recall ever having a conversation with him. Yet in 1943 Lipson was the right man in the right place at the right time to be a founder of the SESA and he deserves more attention than he has received. Fortunately we have a wonderfully detailed history called "The SESA in the Beginning" written by William M. Murray and published in 1968 by the SESA as *The William M. Murray Lectures 1953-1967*. Most SEM members will recall that Bill Murray was a Cofounder, First President, First Secretary-Treasurer, Honorary Member and Honorary President of the SESA. Excerpts from Bill's historical article, together with some material written by Dr. Lipson form the basis of this current SEM History article.

Bill's historical account of the founding of the SESA describes Lipson's invaluable role in the process. Bill wrote the following.

### **1943 Conference in Detroit**

For the 1943 Spring Meeting, the Executive Committee of the Eastern Photoelasticity Conference decided to accept an invitation from Charles Lipson, on behalf of the Chrysler Institute of Engineering, to hold the next Conference in Detroit. In view of the interest in techniques other than photoelasticity, it was agreed to call this particular meeting, "The Seventeenth Semi-Annual Eastern Photoelasticity Conference and Experimental Stress Symposium." The decision to expand the title of the conference and, thereby, to give formal acknowledgment to the inclusion of subjects other than photoelasticity, was a sound one and produced amazing results. Under Lipson's very able leadership, and with financial support from the Chrysler Corporation, the local committee arranged for a three-day program, which included some eighteen papers. Of these, only three dealt directly with photoelasticity, whereas nine were concerned with various aspects of strain gages, two were related to brittle coatings, and the remainder covered miscellaneous allied topics. It was very apparent that, henceforth, the strain gage would be used for an ever-broadening range of applications which would be "limited only by the imagination and ingenuity of the users." Over the years, this prediction has certainly become true. The broadened scope of the conference also paid off in terms of attendance, which reached the unprecedented total of 265, more than twice as great as the largest attendance at any previous conference. There was also an interesting change in the registrants, about 90 percent of whom were now employed in industry, whereas, in the early photoelasticity conferences, registrants from academic institutions had been in the majority, even if the total numbers were small.

The success of the Detroit conference indicated that, by this time, industry was very much interested in the results which could be achieved with strain gages, brittle lacquer and photoelasticity. It was realized that these three techniques, instead of being isolated from one another, were really just different modes of approach to the same problem of experimental determination of stress, and that other techniques would likely be added to them as time went on.

### **SESA is Organized**

The unusually large registration at the Experimental Stress Symposium, and the fact that such a large percentage of the registrants came from industry, indicated the need for a more formal organization of the conferences if continuity were to be maintained, and a record of the technical discussions and presentations were to be preserved. At the early photoelasticity conferences, there was no registration fee, but it had been the custom to "pass the hat" to collect a few dollars necessary to defray the expenses for postage. However, as the attendance gradually built up, it was necessary to institute a very modest registration fee, which would be sufficient to defray the mailing expenses of the host institution. Later on, when the papers were published, the registration fee was increased slightly to cover the cost of preparation of the proceedings, a copy of which would ultimately be mailed, without further charge, to each registrant. Beyond this, there was no attempt at general distribution of information which was made available. The large attendance and great interest expressed on the opening day of the seventeenth conference, however, made it very clear that there would be a considerable demand for written versions of the technical papers from those who could not attend the meeting in person. Lipson realized that a more formal organization would have to be established, and he invited Miklos Hetényi and the writer [Bill Murray] to discuss the situation with him, at his home, in the evening. As a result of this discussion, it was decided to approach the members of the conference, when they convened the following day, to see if they would be in favor of supporting a dues-paying organization and, at the same time, to present a proposal for a name which would not be tied to any one particular technique. Accordingly, after much deliberation, it was agreed to propose changing the name of the organization to "Society for Experimental Stress Analysis."

At the appropriate time, after the conference had reconvened on the following morning, the proposal to set up a dues-paying organization with the new name was presented to the assembled group which expressed its approval and authorized Hetényi, Lipson and the author [Bill Murray] to proceed with the arrangements as rapidly as possible. Thus was born the Society for Experimental Stress Analysis!

From the very beginning, the history of the SESA has been an exceedingly happy story. It relates to the generosity and good will of many individuals and organizations which have graciously contributed time, effort and financial support. This does not mean that there have been no problems; far from it. However, when difficulties appeared on the horizon, or new projects were to be undertaken, it always seemed that some kind soul or group was willing to lend a hand and to provide assistance in carrying on, no matter what the nature of the problem happened to be.”

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When the proceedings of the first conference were published the following note written by Lipson was included:

## **OFFICIAL OPENING OF THE CONFERENCE**

### **C. LIPSON, Chrysler Corporation**

#### *Members of the Photoelasticity Conference and Guests:*

In opening this, the Seventeenth Eastern Photoelasticity Conference and Experimental Stress Symposium, may I first of all welcome to Detroit our out-of-town members and guests. In these times of war it is particularly fitting that this meeting should be held here in Detroit, the city so closely associated with our industrial war effort. We are also pleased to see so many Detroit firms represented, for although we frequently consult each other on specific problems this offers a unique opportunity to meet for a more extensive purpose. It is our sincere hope that the technical papers you are about to hear, the exhibit you will see, and the personal contacts you will make will be of benefit to yourselves and to the war effort.

This represents the first time that men interested in all phases of stress analysis are meeting on a common ground to exchange ideas and to derive the benefit of each other's experience. Numerous diversified professional men are represented here, including metallurgists, physicists, chemists, mechanical engineers, designers, etc. It is through forums such as this that the extension of stress analysis will be given further impetus.

Your host at this conference is the Engineering Institute of the Chrysler Corporation. Our organization has long been interested in the subject of stress analysis and in the last few years this activity has received special emphasis from our Engineering Management. It is particularly fitting, therefore, to introduce to you at this time the man whose leadership and interest in stress analysis was largely responsible for the rapid development of this activity in our organization. It gives me great pleasure to present to you the Chief Engineer of Chrysler Corporation, Mr. James C. Zeder. Mr. Zeder.

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The best biographical information we have on Dr. Lipson is included in the announcement of his 1968 Murray Lecture. Presumably, the biography was furnished by Lipson himself.

### **1968 Murray Lecture to be Delivered by Charles Lipson at San Francisco Meeting**

Charles Lipson, one of the founders and a past president and editor of the Society for Experimental Stress Analysis, has been selected as the 1968 Murray Lecturer. His presentation, "Prediction of Percent Failures from Stress/Strength Interference," will constitute the highlight of an excellent technical program being prepared for the 1968 SESA Fall Meeting and Exposition to be held in San Francisco. It will be presented on Friday afternoon, November 1.

Instituted several years ago in honor of William M. Murray, former Secretary- Treasurer, as well as a founder, first president and now honorary president of the SESA, the lecture is presented each year by an outstanding authority in the field of science and engineering.

#### **The 1968 Lecture**

The lecture will deal with the development of a method for predicting probability of failure in mechanical components.

"In order to predict failures," Lipson has pointed out, "it is necessary first to convert life data of S-N diagram into strength data. The distribution function of these strength data is then determined. In the present investigation, it was found that three-parameter Weibull distribution fits these data best.

"After determining the distribution function for strength, the problem of distribution of stress is considered. On the basis of past experiences, the stress distribution is assumed to be normal. After values of the parameters of these interfering distributions of stress and strength have been determined, probabilities of failure of parts are calculated."

#### **Biography of Lecturer**

A professor of mechanical engineering at the University of Michigan since 1955, Dr. Lipson received a BSc degree from Muhlenberg College in 1930, and a PhD degree in physics from New York University in 1935.

From 1936 through 1946, he was associated with the Chrysler Corporation, being involved in problems of design, development, testing, weight reduction, prevention of fracture, infraction and fatigue. He is presently a consultant with this company.

Well known for his work in the field of reliability, Dr. Lipson has conducted a number of seminars and presented a number of talks on the subject under the auspices of several universities, technical societies and industrial organizations. Dr. Lipson has also written 15 papers on problems of reliability, design, stress analysis and prevention of fractures.

In addition, he is the author of the book *Wear Considerations in Design* and of the booklet *Why Machine Parts Fail*. He is the co-author of the books *Stress and Strength of Manufactured Parts* and *Handbook of Stress and Strength*. He is the co-editor of the *Handbook of Mechanical Wear*, and has written a chapter on "Design Practice" for the *Metals Handbook of the ASME*, and a chapter on "Methods of Crack Detection" for the *Handbook of Mechanical Wear*, and has written a chapter on "Design Practice" for the *Metals Handbook of the ASME*, and a chapter on "Methods of Crack Detection" for the *Handbook of Experimental Stress Analysis*.

Besides the prominent role that he has played with the SESA, Dr. Lipson is a member of the ASME, SAE, ASM and Sigma Xi. His activities also include: member, New York Academy of Science; member, Panel No.3 of National Research Council of the National Academy of Sciences; editor, Proceedings of the Society of Industrial Mathematics (1956); national lecturer, ASME (1951-53); and Woodside lecturer, American Society for Metals (1966).

*I hope that the material included above will emphasize the importance of Dr. Charles Lipson's contribution to the SEM*  
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