

LEAD INDUSTRIES ASSOCIATION

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NEW YORK 17, N. Y.

SOLDER

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When I was asked to speak to you people here today, I couldn't help thinking of my earliest public appearance before a group.

I was playing in a violin recital, and I and another nine-year-old boy had been carefully rehearsed in our parts for a violin duet. We came out on the stage, bowed our heads embarrassedly at the audience, and bravely started out together. I know my part thoroughly, and began at a great rate. The only trouble was that I kept up that pace, and the other half of the duet didn't — I finished the piece, bowed, and left the stage while the other boy was still frantically scrambling through the final bars! The audience enjoyed the situation whole-heartedly, but I can't say the performers did ... and much as I want to entertain you today, I don't want to do it in such a drastic fashion!

They tell me my subject for today is solder. Well, there's not much that anyone could tell this group about solder, and not too much that's new about solder in any case.

According to Webster, solder is a metallic alloy for uniting metals — most generally a combination of tin and lead. In some instances there is antimony content as well, though there has always been some dispute as to the purpose antimony serves, and whether it is beneficial or detrimental in its effects.

Solder itself is anything but new; the ancient Romans had an alloy of one-third lead and two-thirds tin that they used as an all-purpose solder, and it worked quite well. Most solder is still used in much the same shape and form that it has been for hundreds of years — with the possible exception of core solder.

Our consumption of solder in this country is impressive; there are several sets of figures that give us a rough idea of what it is currently. The L. I. A. report for 1951, (figures based on domestic shipments in short tons) gives the 1950 total as 94,001 — lead content 70,694; the 1951 total as 70,638, lead content 53,737. The L. I. A. estimate of domestic lead consumption for solder only, in short tons, was 65,415 for 1951, and 68,120 for 1950. The U. S. Bureau of Mines also gives us some data in the form of estimated tin consumption in solder manufacture: 1950 — 27,460 long tons, and 1951 — 19,908 long tons. All these figures show a drop in 1951. The reason for this was the rush created by the Korean situation — as E. K. Austin of United States Steel contends, industry tried to crowd several years' business into a couple of months of that year.



Presented at the 24th Annual Meeting, Lead Industries Association, April 18-19, 1952, Chicago, Illinois.

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Little immediate change in this trend is expected during the rest of 1952.

In the past few hundred years, solders have begun to be produced under better metallurgical controls and in a wider range of special forms, such as wire solder, flux cored solder, special shapes, foil, washers, rings, and segments. However, the majority of common applications are not the ones that receive research attention. New soldering fluxes and solders are devised mostly for restricted use in specialized fields.

Because soldering processes have been such common knowledge for so long, there hasn't been much published literature on solder or soldering. To fill this gap in the nation's library of printed matter, the American Welding Society is now sponsoring a text on welding with a supplementary text containing material on soldering. The subcommittee on soldering, composed of members of the A. I. A., has already held a meeting and outlined its general procedures; preliminary writing assignments have been distributed.

To get back to factors affecting solder today: tin content is a problem. Some factors make it desirable to maintain tin content of solders at a minimum — the war situation and tin controls, and the cost of manufacture. But — low tin content solders remain unpopular. An example is auto body solders. As a member of the tin advisory committee to W. F. A. (and remembering the forming of the current M-8 Order on Tin conservation), I argued for 20/80 solder for use for auto body repair shops, instead of the 15% originally intended. My point was that 20% would cut down violations of the Tin Order which occurred during World War II. Though low tin content solders can be effectively used once the operator has learned the techniques, and though the techniques are not impossibly difficult, people continue to show willingness to pay premium prices for high tin-content solders — even on the black market!

Now special solders are, of course, keeping pace with our modern developments in aircraft, guided missiles, jet and rocket engines, and the like. Their properties are being adjusted to today's changing needs — higher temperatures, greater creep strength, greater impact strength, better electrical conductivity ... or special low temperature properties, or special wetting properties. For example, there are the solders used for silver printed circuits, and for glass.

In connection with any discussion of solder, it is only fitting that some mention be made of soldering fluxes. This field offers even more potential in the metallurgy of solder than solder itself — providing expanding fields of operation. Materials such as zinc chloride and resin, while still holding a big place, have recently been incorporated with other chemicals to improve their action tremendously — and, indeed, some of the new chemicals have supplanted these materials entirely in certain fields. The vast amount of research being done by the chemical industries has resulted in many new chemicals for which uses are not yet known and must be found; it has often yielded materials which have

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excellent applications in soldering fluxes. One example is the corenil soldering process recently announced by the Mathieson Chemical Corporation.

Some materials, such as aluminum and magnesium, are certainly still being soldered the hard way — and they present a real challenge when it comes to evolving truly satisfactory solders, soldering processes, and soldering fluxes (it's safe to admit this here, since the Aluminum Corporation of America isn't present). However, it's my opinion that our diligent efforts will solve these problems — and others as well — in the not-too-far-distant future.