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THE CHANGING WORLD OF LEAD AND ZINC

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As a frequent speaker at these meetings I should like to say how pleasant it is to be talking to you at a time when the lead and zinc industry is enjoying such prosperity. Not only is world consumption of both metals at a record level, and still rising, but prices too are at their highest for many years. This is certainly an encouraging state of affairs, especially as it seems likely to continue for some time yet. Nevertheless, this very prosperity has now become a cause for concern as well as satisfaction since it has brought with it the danger of shortages and exceptionally high prices which in their turn encourage substitution.

The present position of the two metals is both fascinating and complex, and is directly linked to those changes in technology and industrial activity throughout the world which have been such a feature of the post-war years. I think we can best assess the future for lead and zinc by first looking at the way they have developed in recent years and then setting these developments in the broader world picture. Then I will look at the way ahead as best I can, bearing in mind that we are still in the midst of a period of rapid change.

Changes in the Growth in Demand

One of the most important changes in recent years for lead and zinc has been the acceleration in the growth of consumption. Free world consumption of lead, after increasing on average by about 2 per cent a year in the period

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between 1900 and 1950, increased by about 2-1/2 per cent a year in the next decade, and then by nearly 4 per cent in 1962 and by over 4-1/2 per cent in 1963. Zinc shows a similar pattern - rising on average by 2-1/2 per cent a year over the first half of the century, by 3 per cent a year between 1950 and 1960, by over 4-1/2 per cent in 1962 and by about 5-1/2 per cent in 1963. Undoubtedly these are encouraging trends but it must be recognised that they conceal the different rates of development that have taken place in various parts of the world.

Although free world lead consumption rose from an average of about 1.9 million tons* a year in the period 1952-1956 to about 2-1/2 million tons in 1963, this growth was by no means evenly distributed. Consumption in the United States, although fluctuating a great deal, and despite recent increases, has not grown appreciably and so now represents a smaller proportion of the world total. European consumption, however, has risen by nearly 40 per cent in the last ten years and now exceeds that of the United States. In Japan consumption went up 2-1/2 times in this period, and there was also a worthwhile growth in the total consumption in other countries although they still account for only 12 per cent of the whole.

The picture for zinc is much the same. World consumption rose from an average of 2 million tons a year between 1952-1956 to nearly 2.9 million tons in 1963. Again there has been little change in the United States as compared with the same 40 per cent increase in Europe. In Japan consumption actually trebled during the period. Growth in other countries has been encouraging although, as with lead, they still take only the same proportion of the total as ten years ago.

* metric tons are used throughout, and represent either metal content of ores and concentrates or tonnages of refined lead or zinc.

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However, these differences in rates of growth in various areas, although important in themselves, must be considered in conjunction with changes that have taken place in the pattern of end use consumption, taking into account the uses of lead and zinc in all forms.

Before the second world war the main use of lead was in cable sheathing, followed by sheet and pipe for building, pigments and then batteries. By 1950 a new pattern was developing and, although cable sheathing was still the main outlet, batteries were then in second place and building uses and pigments had declined in importance. Now batteries, thanks to the growth in the use of automobiles - particularly in the United States - have become the main outlet taking about 30 per cent of the world total. Cable sheathing has second place, taking about 20 per cent of the total, although in most countries outside the USA it still comes first. In Europe batteries have only just caught up with sheet and pipe. Although tetraethyl accounts for about 15 per cent of US consumption, at present it takes only 5 per cent in Europe and very little elsewhere.

The zinc end use pattern has also changed significantly. Before the war the major outlets were for brass, for sheet zinc in building and for galvanizing. By the early fifties galvanizing and other protective zinc coatings had replaced brass as the most important end use and, because of developments in the USA, die casting had become more significant in the world picture than sheet zinc - a traditional building use largely confined to Europe. Zinc oxide, though still important, was also declining. Now the new pattern has developed even further with galvanizing having become easily the largest use, taking nearly 40 per cent of the total world consumption, followed by die casting and brass each with about 20 per cent, and sheet zinc with 10 per cent.

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Again these world trends tend to conceal differences in the pattern of consumption between individual countries. For example, zinc die casting and galvanizing are of about equal importance in the United States, together taking around 70 per cent of the total consumption, whereas in Europe die casting, although growing, still takes only about 15 per cent, while brass and galvanizing share the first two places and together account for around 60 per cent of total consumption.

The changing relationship of lead and zinc to plastics and aluminium - our main competitors - is another factor of considerable importance. Ten years ago the combined free world consumption of lead and zinc was equal to the combined total tonnage for aluminium and plastics. Now the picture has changed to such an extent that lead and zinc consumption together is only a third of the combined total for plastics and aluminium. Although the annual growth rates for lead and zinc might appear satisfactory to us they are low compared to the 10 per cent for aluminium and almost 15 per cent for plastics. Despite the fact that aluminium competes with steel and other metals, and plastics with metals and other materials, some part of their growth must have been achieved at the expense of lead and zinc.

While the dramatic rise in consumption of plastics and aluminium reflects the improvements in their technologies, of equal importance is the change in the relationship between their prices and those of lead and zinc and other traditional metals. Lead and zinc are mined products and the cost of the raw materials is a major factor in their production cost; with increases in production both have become relatively more expensive in terms of real values than before the war. By comparison the major factor in the cost of aluminium production is the power required, and although its price has risen

in recent years it is cheaper today in terms of real value than before the war. On the other hand plastics are manufactured products derived mainly from cheap raw materials and their prices have fallen with increases in production and improvements in technology.

To sum up, a number of factors have affected the overall trends in consumption in recent years. As we have seen these include the different rates of expansion in various parts of the world; the changing patterns in end use consumption; the technological developments especially in other materials; and the new relationship between the prices of lead and zinc and their main competitors. It is indeed fortunate that the factors favouring the growth of lead and zinc consumption have so far been more than sufficient to balance those favouring substitution by other materials.

Changes in the Growth in Supply

Naturally supply has expanded to meet the growth in consumption, and this expansion has necessarily brought with it some changes in the pattern of production. However, the main changes have followed logically from the development of new deposits to augment old ones, and unlike the changes for consumption, are readily understood and accepted. Although levels of production in different parts of the world have changed, the overall pattern has not altered greatly during the last ten years. For both metals mine production has expanded nearly everywhere, except in the United States where there has been little growth in zinc and where lead has fallen by about 30 per cent. In Australia lead mine production has risen from 275 thousand to 400 thousand tons and zinc from 250 thousand to 320 thousand tons in ten years. The greatest rate of growth has been in Japan where production has gone up 2-1/2 times since 1953 to 50 thousand tons for lead and for zinc has doubled to 200 thousand tons.

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The expansion in smelter production has also been widespread. Ten years ago however, it would have been difficult to foresee that so much of the increase would come from smelters dependent on imported concentrates, whose output has risen in proportion to the growth in total metal production. Eventually the output from the new electrolytic zinc plant in Canada, the lead refinery in South West Africa and the several ISV plants, some based on their own mines, will change the established pattern of metal supply.

More important in the overall supply situation, however, have been the significant changes brought about by stockpiling; by the rise in exports from the Soviet bloc; and by the growth in protectionism.

Between 5 per cent and 10 per cent of the free world production of lead and zinc was taken into the US stockpiles in most post war years until stockpiling was finally tapered off and came to an end early in 1962 with the barter deals for lead with Canada and Australia. 1963 was thus the first year since the war when all the lead and zinc produced in the free world was available for normal consumption. Stockpiling did of course stimulate production and it was unfortunate that, just as it was coming to an end, exports from the Soviet bloc began to assume significant proportions so increasing the pressure of oversupply.

Soviet bloc zinc exports have risen from about 60 thousand tons in 1959 to a peak of nearly 120 thousand tons in 1962 but seem to have fallen to below 90 thousand tons in 1963. Lead has been exported only in the last four years, recently at a rate of between 30 thousand and 40 thousand tons a year.

Although from year to year the total of Soviet bloc exports has not varied sharply there have been changes in their direction, the main supplies now going to the Continent instead of to Britain, perhaps with the object of

reducing their impact on the London market price.

Another change affecting trade in metal and concentrates in the last ten years has been the increase in protection in various countries. The most important development was, of course, the introduction of US quotas in addition to duties, and the growing significance of the duties and restrictions on imports into Japan. Last year the Common Market countries, who are gradually reducing barriers to internal trade between members, adjusted their external tariffs and moved one stage further towards the final Common Tariff of 0.6 cents per pound, the level to be reached by 1 January 1967 at the latest. Even Belgium, Germany and the Netherlands, which imposed no import duties before the Common Market was formed, now have a tariff of 0.4 cents per pound on both lead and zinc towards non member countries although some metal still enters under duty free quotas. The duty on metal, with none on concentrates, especially during recent periods of tight supplies, has been a factor in maintaining metal production from imported concentrates, a feature of the Common Market supply situation. The Common Market duties are lower than those of the United States and Japan and are not such a hindrance to trade as quotas, although they must be expected to bring some changes in the EEC supply pattern.

The Situation Today

Up to now I have been speaking about changes that have already taken place. Before looking at the future and the further developments we might expect in lead and zinc, I should like briefly to review the main features of the present supply and demand situation, as revealed by the provisional statistics for 1963 issued by the International Lead and Zinc Study Group - see attached table.

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For lead the figures show that there was practically no growth in mine production in 1963. However, metal production rose by about 150,000 tons and metal consumption by about 110,000 tons. After taking into account imports from the Soviet bloc countries, supply and demand were in approximate balance at close on 2.5 million tons each. The increase in total consumption at over 4-1/2 per cent was spread fairly evenly between the United States (up by 39,000 tons to 940,000 tons) and Europe (up by 31,000 tons to 1,111,000 tons), but the rate of growth elsewhere was relatively much greater (up by 40,000 tons to 434,000 tons). During the year producers stocks continued to fall, especially in the USA (from 141,000 tons to 66,000 tons) which was isolated by quotas and where there was no appreciable rise in mine production. For several years the free world demand for lead has in fact exceeded new supplies, and this situation continued throughout much of 1963 even though a statistical balance might have been achieved for the year as a whole.

For zinc there were notable increases during 1963. Mine production rose by 70,000 tons to 2,875,000 tons, metal production by 96,000 tons to 2,747,000 tons, and with imports from the Soviet bloc (which had fallen by over 30,000 tons to about 85,000 tons) the total of new supplies amounted to about 2,830,000 tons.

It was consumption, however, that showed the biggest gains for zinc, rising by 146,000 tons to 2,850,000 tons, an increase of about 5-1/2 per cent, and unlike lead, the increases were unevenly distributed. In Europe consumption at about 1,155,000 tons showed hardly any improvement over the previous year, but in the USA it rose by about 45,000 tons to 975,000 tons and in other countries by a total of 90,000 tons to about 720,000 tons. In Japan consumption increased from 243,000 tons to 285,000 tons, just passing that of Germany and making Japan the second largest zinc consumer in the world.

The 1963 statistics show demand for zinc exceeding new supplies by about 80,000 tons with producers stocks falling steadily throughout the year, notably in the USA where they dropped from 136,000 to 50,000 tons; in Europe they fall from 89,000 to 57,000 tons.

The greater growth in the consumption of both lead and zinc in 1963 compared with earlier years, reflected the industrial expansion that had taken place nearly everywhere rather than any spectacular growth in any particular end use.

During the first three months of this year this trend has continued, with the growth in demand even accelerating, especially now that industrial activity is again rising more quickly in Europe. This growth is, I think, likely to be maintained throughout much of the year, especially as both the US and British administrations will be anxious to maintain a high level of industrial activity before the forthcoming elections. How long it will take to raise supplies sufficiently to catch up with demand is a matter of conjecture. Many increases are under way and the overall supply position might also be affected by decisions on stockpile disposals and trends in Soviet bloc exports. In the meantime producers stocks of both lead and zinc are still falling.

Before considering possible changes in the supply and demand situation a word about prices will not be out of place.

Changes in Prices

Since the beginning of 1963 the prices of both metals have changed dramatically. The London Metal Exchange cash lead price has risen from £54 to its present level of just over £80 a ton, a rise of 50 per cent, and that of zinc from £68 to reach £114, a few days ago, a rise of nearly 70 per cent. Recently the zinc price has fluctuated by as much as £10 over a period of a few days.

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These new price levels, and the changes in the last fifteen months, must surely carry with them a great risk of damage to future consumption, and this has no doubt been recognised by US producers who have commendably held prices steady in recent months. At the time of writing (Friday 10 April) in spite of a 1/2 cent rise, the US zinc price was below the equivalent LME price for the first time since the Korean War.

The influence of price on consumption is difficult to measure. While the level relative to that of competitive materials is of paramount importance, wide variations in price can be as unsettling to consumers as high prices. Furthermore the influence of price varies from use to use and even from country to country.

Although on the whole prices reflect the balance between supply and demand, high prices are usually associated with a high level of demand and so their effect on future consumption tends to be overlooked. At times of high prices consumers intensify their search for substitutes and, even though several years may elapse before a decision to change over can take full effect, once the change has been made it may prove to be irreversible despite any subsequent fall in metal prices.

The effect of fluctuations is even more difficult to assess although there can be no doubt that wide fluctuations discourage investment in new fabricating equipment, as well as causing special problems to manufacturers in mass production markets who aim to hold prices within close limits over long periods.

It is more than a coincidence that the pattern of end uses has changed since the war, as the price of lead and zinc has risen in comparison with those of their main competitors. The greatest expansion has been in

galvanizing and die casting, and in batteries and tetraethyl, while in those uses in which the metal value forms the major part of the price of the finished product, e. g. in sheet and pipe and in pigments, there has been little or no growth.

The recent rises in the prices of both lead and zinc will certainly have repercussions on both supply and demand which must be kept in mind when considering the future.

Changing Outlook for Supply

During the last 12 months plans have been announced for important additions to mine and metal production of both lead and zinc, mainly in Canada, the USA, Australia and Japan. The main projects are well known - the new mine production at Mattagami Lake in Northern Quebec; in New Brunswick; at Pine Point in British Columbia; in Missouri and Tennessee; the expansion at Mount Isa and at Broken Hill in Australia; and the developments in Ireland and in Japan. These and other projects are expected to increase mine production of both lead and zinc by at least 400,000 to 500,000 tons a year each by about 1967. Furthermore, the present high price levels could pave the way for an even greater expansion.

Similarly a considerable growth in smelter capacity can also be anticipated, especially from the various new plants using the ISF process to produce zinc metal and lead bullion. Although much of the new metal production will be alongside mines, nevertheless zinc smelter production from imported concentrates should be well maintained particularly now that closer links are being forged by some smelters with overseas mines - between the Belgians and the New Brunswick mines, for example, and between the Norwegian refinery and Sweden.

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These developments in production are much as might have been expected and will not significantly alter the present pattern. However, changes in Soviet bloc exports and in stockpiling policy could affect the overall supply situation.

While no official figures on Soviet bloc production and consumption are available, there are indications that their consumption is growing. This has probably been responsible for the recent decline in exports, which have not this year increased for either lead or zinc from the lower 1963 levels despite the attraction of the present high prices and the apparent keenness of Soviet countries to earn foreign currency. The position could, of course, alter when the new ISF plants in Rumania and Poland begin production.

None of these developments, however, will have marked effects on the current supply situation which could perhaps only be radically changed by the release of metal from the US stockpiles. Although such action would especially ease the situation in the USA, it would be welcomed throughout the world. There is surely no greater measure of the remarkable change that has taken place in lead and zinc in recent years than the fact that stockpile disposals are now seriously being talked about whereas only two or three years ago the ending of stockpiling was a cause of so much concern.

The US stockpile, nevertheless, constitutes a huge reserve of metal of great importance to the lead and zinc industry everywhere, and it is to be hoped that an opportunity will be provided for other countries to be consulted before any immediate or long term plans for disposals are adopted. The announcement of plans, no matter how stringent the conditions in them, would go a long way to removing the uncertainty which surrounds the stockpile. At the same time consideration might be given to trade barriers and

especially to removing quantity restrictions, such as quotas, which seem to be somewhat out of place in the present situation. At long last Japan seems about to ease its restrictions on trade in lead and zinc.

Changing Outlook for Demand

In looking at the ways in which the individual uses are likely to develop it is worth noting that the fortunes of both metals are becoming more closely related to those of a few major industries, zinc having become highly dependent on the automobile and steel industries, and lead on the automobile and electrical industries.

The most important change for lead is likely to be in the growth in demand for batteries, which will increase with the increasing number of cars now coming into use, each requiring several replacement batteries during its life. Some idea of the scope for expansion can be seen from figures for Japan, where the automobile population is rising rapidly, which show that the ratio of replacement to new batteries has as yet only reached one to one, compared with the US and European ratio of three or four to one. The increase in demand should more than offset the reduced quantities of lead used in the present day battery as a result of improvements in technology, and it would not be surprising if this outlet eventually absorbed half the world's total lead consumption. The amount of tetraethyl lead consumed also depends on the number of automobiles on the roads and is increasing proportionately, especially in Europe.

The second major world outlet for lead is in cable sheathing. Despite what has happened in the USA, where exceptionally high prices, at the time of Korea, together with new technology, brought about the use of substitutes, there seems unlikely to be any rapid change away from lead in

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Europe and other countries even at present price levels. Although plastics have gained some ground, lead is still used for many types of cable and for example is regarded as the best sheathing for paper insulated power cables. Lead is still specified on both sides of the Atlantic when the very highest standards are required, and where reliability is more important than initial cost. Lead has been chosen for the cross Channel power cable between the UK and France, the new transcontinental telephone cable across the USA, and the proposed new power cable between Sweden and Denmark to name only a few outstanding examples. Losses to competitive materials have been largely offset by the general growth in cable production.

Several applications of lead are closely linked to the construction industries and although some, such as lead pipe and lead pigmented paints, are perhaps diminishing in relative importance, there may well be little change in their present levels of consumption in view of the continued growth in building.

The use of zinc by the automobile industry, in contrast to lead, is almost entirely in new vehicles mainly in the form of die castings but also, in the USA, in galvanized strip. Zinc die castings, perhaps more than any other lead or zinc use, could be adversely affected by high and fluctuating prices. They already meet vigorous competition from aluminium and plastics and, since they are essentially a mass-produced product, stability as well as the level of price is of great importance to the industry. This no doubt explains why during recent years die casters have been more vociferous in expressing views on price than any other zinc users. Nearly everywhere the main customer is the automobile industry - a keen buyer by any standards - but only in America and Britain has the automobile

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manufacturer fully exploited the advantages of using die castings. US developments are well known but it may be of some interest to mention that British cars, although smaller, contain on average over 60 lbs. of zinc die castings and in some of the more expensive models well over 100 lbs.

Although growth in the use of zinc die castings might be retarded by rising prices, total consumption, perhaps made up from smaller castings than formerly, could well continue to grow, especially as there is still scope for expansion in the European automobile industry which is now approaching that of the USA in size.

In Europe galvanized strip is not yet used in automobile construction but there has nevertheless been a steady growth in production and 28 continuous lines are now in operation with several others in course of construction. New European developments in prefabricated building might begin to make up for lack of progress in the automobile industry. Japan has done well in developing building applications for galvanized sheet using a thin gauge steel sheet with a light weight coating and has found export markets for this special product.

Perhaps of even greater significance has been the growing use of hot galvanizing, zinc spraying and zinc rich paints for rust prevention on all kinds of exposed steel work. About 800 tons of zinc were sprayed on to the Forth Road Bridge in the UK and other large bridges in Europe are to be similarly protected. It is becoming standard European practice to galvanize structural steel work for railway electrification schemes, power pylons and radio and TV masts. Another interesting application is the adoption of galvanizing for a new type of railway coal wagons. Everywhere growing maintenance costs seem likely to bring an increasing demand for the more permanent rust protection which zinc provides.

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Among the traditional uses zinc sheet is worth special mention. Since the war the main use in Europe has been in the renewal of old roofs, gutters and rainwater pipes, but now new building work is beginning to assume greater importance. A recent development has been the growth in the production of zinc copper titanium alloy in sheet form - nearly 20,000 tons in 1963 in Europe. This new product is at present mainly used in traditional building applications but once its better properties are exploited it should open up important new uses.

The other large use of zinc in Europe is in brass. Consumption has not changed much in recent years, and the future for this outlet depends more on copper than on zinc, with further expansion dependent to a certain extent on developments in the copper market.

To sum up, the greatest expansion in the future is likely to be in coatings for zinc and in batteries for lead. The second largest uses, die castings and cable sheathing, are more likely to be affected by exceptionally high prices which could also make it difficult to maintain some of the traditional uses. Moreover, the pattern of development will vary in different parts of the world with Europe offering the best prospects for increased consumption in the future, although developing countries are now beginning to take a bigger share of world consumption.

However, the changes in the development of consumption are encouraging and provide a sound basis for future growth but there is still much work to be done to expand and improve existing uses and to develop new uses.

Changing Attitude to Research and Development

It is fortunate therefore that perhaps the most significant change of all in recent years has been the growing attention given to research and development work.

Since the International Lead Zinc Research Organization was launched over 5 years ago, research workers and technical people throughout the world have begun to take a new interest in both metals. ILZRO has not only helped to co-ordinate and expand the research effort on lead and zinc but has also played a part in bringing about a new attitude to the future. This is particularly important with old metals such as ours where so much of the present consumption is still based on traditional outlets. It would be a pleasant outcome of the research programme if it were to result in a greater diversification in the uses of lead and zinc, particularly at a time when they are perhaps becoming dependent on a few major outlets to an extent that might prove dangerous in the more distant future.

Development and promotional work has also been greatly strengthened in recent years and now makes a much greater impact on consumers. The first steps have been taken towards a closer co-ordination in the work of the associations in the USA, Britain and other European Countries who now meet regularly to exchange information and ideas. Development work has also been extended with the establishment of new lead and zinc associations in Australia and India, and is now more truly on a world scale than ever before. However there is still scope for more promotion in Japan, Africa and South America. Further, our promotion and research efforts are still on a small scale when compared with those of our main competitors, and support for these activities would seem to be neither as large nor as widespread as is necessary.

CONCLUSION

At present, however, this would seem to be a less urgent problem than that posed by recent developments in prices. If wide fluctuations and

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high prices were to become a permanent feature of lead and zinc, then not only would growth in consumption be in jeopardy but the many benefits now being derived from research and development work might largely be lost.

Earlier I observed that both lead and zinc had been fortunate in that the factors favouring the growth of consumption had more than outweighed those which tended to encourage substitution. Although the future will no doubt be affected by recent developments in price I am nevertheless confident that as industrial activity continues to grow throughout the world it will bring with it a steady growth for the main uses of lead and zinc so providing us with a firm basis for continued prosperity.

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LEAD AND ZINC

Free World Balance Sheet 1961-63

	1,000 Metric Tons					
	L E A D			Z I N C		
	1961	1962	1963 (est)	1961	1962	1963 (est)
Mine production	1769	1853	1850	2649	2806	2872
Metal production	2370	2320	2468	2570	2652	2747
Soviet bloc net exports	+50	+32	+36	+90	+115	+90
Stockpile changes*	-45	-52	+ 8	+14	+ 9	+ 1
Total supply	2375	2300	2512	2674	2776	2838
Consumption	2291	2376	2486	2586	2704	2852
Balance	+84	-76	+26	+88	+72	-14

* US stockpile intake and UK and Swedish stockpile releases

Source: International Lead and Zinc Study Group statistics