

ZINC

By Tony Wall

Record levels of metal and ore production, and of metal consumption, were achieved once more in 2000. Mine production increased by nearly 8% to a total of 8.63 Mt; metal production rose by nearly 7% to 8.93 Mt and consumption rose 5.4% to 8.81 Mt. Metal stocks began the year at 718,000 t and at the end of the year had fallen to 647,000 t (equivalent to five weeks' supply) – a new low for recent years.

Mine Production

Last year saw the seventh successive overall increase in the mined production of zinc. The increases were in Europe, America, Asia and Oceania with a small decrease in African output. Within Europe (up by 96,000 t) the increases were principally in Ireland, up about 63,000 t thanks to the start up of a new mine, and in Spain (up 50,000 t). These increases were offset to some degree by smaller changes elsewhere, including Finland (down 10,000 t) and Poland (down 12,000 t).

In the Americas, the total increased by a more modest 40,000 t to 3.5 Mt. Within this figure, it is worth noting that Canadian mine production fell by 24,000 t, more than offset by increases in Mexico (up 38,000 t), the US (up 17,000 t) and Peru (up 11,000 t) with smaller changes in other countries.

In Asia, by contrast to some recent years, there was a very substantial increase of 273,000 t to 2.52 Mt (some 34% of the world total). This compares with around 26% three years ago. Most of the increases came from China, although useful increases were reported from India (up 13,000 t) and Kazakhstan (up 34,000 t).

Australia, with a major new mine now in operation, saw a substantial increase to 1.33 Mt or 15% of the world total.

Metal Output

Production of zinc metal increased in all regions of the world except Africa where a small decline (to 136,000 t) was recorded. As in recent years, the greatest increase was in Asia where metal production rose to 3.7 Mt or 42% of the world total. In China alone, production rose by 216,000 t, so that this country now produces more than 20% of the world total. Substantial increases were also recorded in Kazakhstan (up to 262,000 t) and South Korea (up to 477,000 t). Full production from a new refinery in Australia took the total there up by 149,000 t to nearly 0.5 Mt.

Elsewhere, the changes were more modest – the total for Europe grew by 8,000 t. Most of the changes were small, including falls in Finland, Germany, Norway and Poland. The greatest increases were in Italy, (up 25,000 t) and Romania (up 24,000 t). UK production fell to around 76,000 t resulting from production problems. The increase in the Americas was proportionally smaller – 68,000 t – most of which was accounted for by the US, Mexico and, to a lesser extent, Brazil. There was little change in Africa.

Secondary Recovery

Environmental pressures, and the desire by the industry to be perceived as offering sustainable development, are encouraging the production of zinc from secondary raw materials. This pressure will increase in coming years.

There are three principal ways in which usable zinc can be produced from secondary sources. These are:

- Production of ingot indistinguishable from that made from ores, by refining from lower-grade scrap and residues.
- Production of zinc and alloy ingots by simply remelting and treating high-grade scrap.

- Direct use of zinc-bearing secondary materials in, for instance, secondary brass and zinc chemicals with no prior treatment (beyond sorting and grading).

The total recovery of zinc by all these means rose in 2000 to just over 2 Mt, or enough to meet nearly 23% of consumption in that year.

The production of refined zinc from secondary raw materials has risen by 85,000 t or 16% over the past three years reaching 603,000 t as technologies for the economical treatment of residues have improved. Those residues consist principally of dusts arising from electric arc furnace production of secondary steel from scrap containing galvanised steel. The zinc content of such materials varies from around 5% to over 30%. The higher zinc dust can be recovered directly in thermal zinc refining plants. Lower grades need to be treated to increase zinc content to about 50% at which level it may be acceptable as feedstock for electrolytic or thermal zinc production.

It has been estimated (by the International Zinc Association) that about 80% of the zinc becoming available for recycling is currently recycled. Most of the remaining 20% is in the form of low zinc EAF dusts which are currently awaiting technical improvements that will enable them to be recovered economically.

Whilst recovery to refined zinc is limited by technical and economic issues, recovery by remelting and by direct use is limited by availability of the relevant, usually high grade, scrap and residues. Availability of scrap for recovery by these methods is limited by production of scrap and residues from current uses of zinc (the so called 'new scrap') and by the 30+ years average lifetime of a product containing zinc. Consumption of zinc 30 years ago was only about 60% of present levels, so limiting the amount of old scrap potentially arising. For this reason the tonnages of zinc recovered by these processes have remained virtually

unchanged over the past three years or so, and scope for substantial increases are limited.

Prices

In 1999, LME prices increased more or less steadily from around US\$900/t and finished the year at US\$1,245. Prices in 2000 fell in January and February, recovering in subsequent months and peaking at US\$1,224/t in September before declining to US\$1,059 by December. The decline has continued in 2001, reaching a low point of US\$783 in early April. Prices were still at only around US\$950 in mid-May 2001.

The reasons for price movements are complex. The record levels of consumption recorded in 2000 will undoubtedly have influenced the increased prices during much of 2000. However, indications of a significant economic downturn, particularly in the US, influenced the position towards the end of the year. Concerns have mounted in the early months of 2001. This, coupled with forecasts of significant surplus of supply over demand in 2001 and the prospect of reduced exports from China (where domestic demand is growing sharply), has given rise to sharp decreases in prices for zinc, which stood in mid-May 2001 at below US\$950.

Demand

Consumption in 2000 rose for the eighth year in succession – by 5.4% to 8.81 Mt. As in previous years the bulk of this increase, nearly 300,000 t or 8%, came from Asia, and in particular from China where an increase of 150,000 t took its consumption to 1.35 Mt or 15% of the world total. All the major countries in Asia showed significant increases in consumption. This includes Japan, where consumption of 676,000 t reversed the downward trend of recent years but did not reach historic levels.

In the Americas, the increase in overall demand was modest at 56,000 t with the US showing relatively low growth for the year as a whole of 33,000 t (around 2.5%). It is also

interesting to note that zinc consumption in the US is now almost exactly the same as that in China.

The overall position for Europe with consumption of more than 2.6 Mt also shows modest increases in several countries, offset to some degree by a reduction of about 30,000 t in Germany and 10,000 t in the UK. Italy showed the greatest increase (41,000 t), taking the total there to 377,000 t.

In the short term, demand for zinc will be determined by economic conditions – globally and nationally – which determine the production of the very broad range of products in which zinc is used. Beyond that, the properties of zinc are now so well known that dramatic new uses are unlikely to be found, although useful and profitable niche markets may become available.

Around half of the zinc consumed in the world goes into zinc coatings – generally but not exclusively galvanising – to protect iron and steel. The intrinsic properties of zinc in relation to steel are such that zinc coating is almost always the most economical and technically effective way of protecting steel from rust. This should secure its markets for the foreseeable future as long as economic and technical issues are allowed to be the determining factors.

More than half of the zinc used for coatings is applied to steel sheet to produce a thin ductile coating to be used in building (for roofing and cladding) appliances and automobile production. A significant part of the increased demand for zinc in the past few years has come from newly installed continuous galvanising lines, though concerns have been expressed that there is now a danger of significant over-capacity in that area as in many other sectors of the world-wide steel industry.

Zinc castings, which take about 15% of zinc consumption, are used in a wide variety of manufactured products including cars,

appliances, door locks, window fittings and tools. Zinc in these applications is the subject of intense competition, both from other metals and from synthetic materials. Whether zinc will retain those applications probably depends on the ability of the zinc and casting industries to convince designers that 'traditional' materials, such as zinc, are the best solution to design and production requirements. The zinc industry is currently making strenuous efforts to educate designers about the advantages of the zinc castings, as well as ensuring that die casters themselves are capable of producing castings to the exacting standards now required.

Brass, the oldest and still the second most important market for zinc, is so diverse that it has seemed immune to large-scale substitution. Used in the form of castings, sheet, rod, extrusions, tube, wire and stampings, it finds its way into enormous numbers of manufactured products: it is difficult to find anything manufactured that does not contain at least a small amount of brass. Nevertheless, there has been no major growth in the overall market which generally follows overall economic conditions.

There is, however, evidence that the production of semi-manufactures (including tubes, bars and rods) is moving towards the developing economies.

Future

Detailed forecasting is outside the scope of a review article such as this. However, it is worth noting that the International Lead Zinc Study Group forecast that mine production worldwide will increase in 2001 to 9 Mt (yet another record) as a result of a new mine coming up to full production in Ireland, increased capacity elsewhere, and new mines in Mexico and Peru, partially offset by reductions in other countries. Production of refined metal is forecast to rise by 4.6% to 9.34 Mt, thanks to rises in several countries in Europe as well as Korea, Australia, China and Mexico. Canada is the exception, where Cominco has decided to sell power and

Zinc Statistics ('000 t)									
	Mine Production ⁽¹⁾			Metal Production			Metal Consumption		
	1998	1999	2000	1998	1999	2000	1998	1999	2000
Europe	880	926	1,022	2,686	2,682	2,740	2,649	2,607	2,685
Austria	-	-	-	-	-	-	45	48	48
Belgium	-	-	-	205	232	264	260	275	285
Bosnia	1	1	1	-	-	-	7	7	8
Bulgaria	18	11	-	83	84	84	9	9	10
Finland	31	20	10	199	225	223	38	36	47
France	-	-	-	320	318	318	285	298	310
Germany	-	-	-	361	361	357	573	561	530
Greece	20	18	17	-	-	-	15	15	17
Ireland	180	200	263	-	-	-	2	2	2
Italy	5	0	-	232	145	170	373	336	377
Macedonia	20	21	20	57	46	51	10	9	10
Netherlands	-	-	-	217	221	217	104	106	105
Norway	1	-	-	138	144	138	25	21	23
Poland	158	160	148	175	180	174	112	95	105
Portugal	-	-	-	4	-	-	12	14	14
Romania	25	29	28	29	29	53	19	20	22
Russian Fed	114	132	136	192	221	222	110	120	119
Spain	128	154	204	378	383	391	197	190	203
Sweden	161	175	177	-	-	-	37	38	40
Ukraine	-	-	-	0	0	-	62	62	65
UK	-	-	-	79	89	76	219	220	210
Yugoslavia	14	3	2	14	4	2	12	8	10
Other Europe	1	1	1	0	0	0	⁽²⁾ 121	⁽²⁾ 118	⁽²⁾ 125
Africa	257	268	259	138	140	136	153	155	163
Algeria	4	4	5	31	32	33	8	8	10
Morocco	112	112	110	-	-	-	7	8	9
Namibia	42	37	39	-	-	-	⁽³⁾ -	⁽³⁾ -	⁽³⁾ -
Nigeria	-	-	-	-	-	-	8	9	9
South Africa	70	70	63	107	108	103	91	87	90
Tunisia	28	45	41	-	-	-	3	5	5
Other Africa	1	1	1	-	-	-	40	39	40
America	3,409	3,465	3,505	1,741	1,785	1,853	1,972	2,060	2,116
Argentina	35	34	34	39	40	36	39	38	36
Bolivia	152	145	144	-	-	-	⁽⁴⁾ -	⁽⁴⁾ -	⁽⁴⁾ -
Brazil	88	96	93	177	187	195	177	187	191
Canada	1,063	1,021	997	745	777	780	170	169	175
Chile	16	32	31	-	-	-	9	11	11
Columbia	-	-	-	-	-	-	18	18	18
Honduras	37	41	43	-	-	-	⁽⁴⁾ -	⁽⁴⁾ -	⁽⁴⁾ -
Mexico	395	354	392	229	219	245	186	200	212
Peru	869	900	911	184	191	197	63	64	66
US	735	843	860	368	372	400	1,282	1,342	1,375
Venezuela	-	-	-	-	-	-	15	16	16
Other America	-	-	-	-	-	-	13	16	13
Asia	1,999	2,242	2,515	3,114	3,409	3,707	2,888	3,318	3,610
Bangladesh	-	-	-	-	-	-	31	32	33
China	1,273	1,476	1,710	1,469	1,703	1,919	920	1,200	1,350
Hong Kong	-	-	-	-	-	-	6	6	6
India	195	185	198	189	186	205	232	254	270
Indonesia	-	-	-	-	-	-	59	57	62
Iran	80	79	80	17	21	34	44	45	46
Israel	-	-	-	-	-	-	9	11	11
Japan	68	64	64	608	633	654	659	634	676
Kazakhstan	224	288	322	240	243	262	28	28	30
Korea DPR	44	37	34	43	40	37	18	17	15
Korea Rep	11	10	12	390	430	477	318	389	419
Thailand	25	21	27	89	95	101	70	74	90
Turkey	58	54	48	36	27	0	68	70	75
Uzbekistan	0	0	0	52	27	18	8	8	8
Vietnam	18	18	16	-	-	-	32	34	37
Other Asia	5	3	3	-	-	-	⁽⁵⁾ 458	⁽⁵⁾ 445	⁽⁵⁾ 482
Oceania	1,020	1,110	1,332	311	344	493	213	226	240
Australia	1,020	1,110	1,332	311	344	493	192	210	223
New Zealand	-	-	-	-	-	-	21	15	17
World Total	7,560	8,009	8,633	8,019	8,361	8,929	7,875	8,366	8,814

¹ Metal Content.

² Includes: Croatia 10: Czech Republic 17: Denmark 15: Hungary 15: Slovakia 28: Slovenia 17: Switzerland 20: Other 3.

³ Included in Other Africa.

⁴ Included in Other America.

⁵ Included in Other Asia

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Source: International Lead Zinc Study Group

Note: Some data for 2000 may be subject to revision

reduce its zinc production at Trail in British Columbia.

Demand in 2001 is likely to be lower than in 2000, at least in a number of significant countries as a general economic downturn takes effect, although its severity and duration is uncertain. It seems certain therefore that there will be a significant surplus of supply over demand in 2001.

In the longer term, there will be additional factors impacting on the state of the industry – these includes environmental issues and the move towards sustainable development.

Environmental issues centre around the Risk Assessment Review currently being carried out on behalf of the European Commission. Given the importance of this issue, the zinc industry has devoted considerable effort to supplying data required to establish a picture of the environmental impact of zinc, and on its health and safety issues relating to its production and use. Most of this work has been carried out on behalf of the industry by the International Zinc Association and IZA-Europe, and follow up will also be carried out by International Lead Zinc Study Group.

Sustainable development is defined in many different ways, but basically it means assessing the current environmental, social and economic effects of the mining, refining, use and recycling of the metal, to ensure that

today's industries are not mortgaging the future. The International Zinc Association has a major programme under way to establish the sustainability of zinc and, at intergovernmental level, the Study Groups for copper, nickel and lead/zinc have held an international forum on the issues. A programme of work is now under way covering production, product stewardship and research requirements. The zinc industry believes that it is sustainable because of its high and increasing recycling rate, its essentiality to human, animal and plant life, its relatively low dispersion in production and use and its contribution, through many manufactured goods, to the quality of life. The work now under way should establish the sustainable status of zinc in a more formal way.

No commodity materials can buck economic trends completely. However, the zinc industry is making strenuous efforts to maintain and increase its markets through providing technical support for users, and working alongside those users to find new applications in all the principal areas where zinc can be used effectively. Such efforts, backed by the close attention given to environmental concerns and to the growing interest in sustainable development, should ensure that zinc retains its position as the world's third most important non-ferrous metal.