

ZINC

By Edouard Gervais and Murray Cook

World demand for zinc, driven by growth in Asia, rose to a record 9.2 Mt in 2002. However, total supply of refined zinc metal in the Western world exceeded demand by more than 300,000 t for the second successive year. Zinc prices fell steadily throughout 2001 from a January average of US\$1,033/t to US\$755/t in December, and during 2002 the average price was US\$779/t.

Mine production

Zinc mine production has risen steadily over recent years. This trend halted in 2002, with a combination of temporary and permanent mine closures resulting in a 1% fall in 2002 - the first decrease in mine output since 1993. The mines affected included Tara (Ireland); Los Frailes (Spain); Polaris and Sullivan (Canada); Balmat, Pierrepont, Montana Tunnels and Asarco's Tennessee mines (US); and a number of small Chinese mines.

The reductions were partially offset by large production increases in Peru (Antamina) and Mexico (Francisco Madero), and by smaller increases in Brazil, Finland, India, Kazakhstan and Turkey.

China's net imports of contained zinc in concentrates reached a record 391,000 t in 2002.

Metal output

World output of refined zinc metal increased by 3.9% in 2002. The most significant increases were in Republic of Korea (expansion of two plants) and in Canada where production at Teck Cominco's Trail plant rose after cut backs in 2001. Expansion of Asturiana de Zinc's San Juan Nueva refinery led to an increase in Spain. Small increases were seen in Australia, Brazil, France, Germany, Iran and UK.

China remains the world's largest producer, with more than 2 Mt/y of refined zinc metal. However, rising Chinese zinc demand led to a significant decrease in net Chinese exports of zinc in 2002.

Secondary recovery

Zinc is an inherently recyclable non-ferrous metal and there is a long history of zinc recycling. The further development of the zinc recycling sector is seen as a key opportunity for the zinc industry.

There are three principal ways in which 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; and
- direct use of zinc-bearing secondary materials in, for instance, secondary brass and zinc chemicals with no prior treatment (beyond sorting and grading).

The International Lead Zinc Study Group reported that total recovery of zinc by all the above means remained steady in 2002 at 2.1 Mt.

Growth in zinc recycling has come from the production of refined zinc from secondary raw materials which has risen by 20% since 1998 as technologies for the economical treatment of residues have improved and disposal costs have increased. Those residues consist principally of dusts arising from electric arc furnace production of secondary steel from scrap containing galvanized 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.

Recovery in the form of refined zinc is limited by technical and economic issues, and recovery by remelting and by direct use is limited by the 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

London Metal Exchange (LME) prices at the end of 1999 had increased to US\$1,245/t. 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/t by December. That decline continued throughout 2001, with the monthly average LME price dropping to US\$755/t in December 2001. Prices recovered slightly early in 2002 but averaged just US\$779/t for the year – a 12.1% fall over the 2001 average price. Prices have continued in a similar range early in 2003.

Demand

World demand for zinc grew by 3.1% to its highest level of 9.2 million Mt in 2002. This demand growth was driven by zinc's use in emerging markets, notably China, where zinc is a vital material in the country's growing construction and automotive sectors.

Demand in Europe remained steady in 2002 at around 2.8 Mt. Demand in the US remained at a depressed level and well below the levels which were reached in 2000.

The first-tier uses of zinc are estimated to be:

Zinc coatings	50%
Brass	18%
Zinc alloys	13%
Zinc chemicals	8%
Semis	6%
Other	5%

In terms of market application, zinc uses can be segmented as follows:

Construction	48%
Transport	23%
Machinery/equipment	10%
Consumer durables	10%
Infrastructure	9%

There are no significant challenges to zinc's main uses and markets, and growth in zinc demand in the Western world is presently constrained by adverse economic conditions. In fact, there are significant prospects for growth in certain zinc-coating technologies such as hot-dip galvanizing, in particular in developing economies. Continued industry market development efforts combined with economic recovery can be expected to return zinc demand at least to its historical long-term annual growth trend of 2%.

The industry's market development target is, in fact, to reach annual growth rates of 4%.

World zinc demand is dominated by its use as a protective coating for steel. These coatings take various forms, the most prominent being hot-dip coatings (galvanising) applied to either fabricated articles (ie batch or general galvanising) or applied continuously to steel strip (ie continuous or sheet galvanising).

Coatings applied to steel strip are also applied electrolytically (ie, electrogalvanising) but this method has become less important as hot dip galvanising technologies have developed.

General galvanising is mainly used to protect steel used in construction and infrastructure such as fencing, highway guard rails, but it has a wide range of other applications that make the process rather resilient to external market factors.

Continuous galvanised steel sheets have found growing application in white goods, construction applications and in automotive body panels. Zinc coatings on steel sheets are thinner and more ductile than those applied by general

galvanising. Hence, these steel sheets can be formed (pressed) to their final shape after coating.

Zinc castings, which account for about 13% of zinc use, 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 most modern solution to design and production requirements. The zinc industry is currently making strenuous efforts to educate designers about the advantages of 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, demand for brass now generally follows overall economic conditions and is presently on an upward trend.

Outlook

The International Lead Zinc Study Group (ILZSG) anticipates a 3.9% rise in world demand for zinc metal in 2003. Continued growth, of around 5.7%, in Asian demand is the main driver for this rise. Increased galvanized steel capacity in China is the largest single source of this growth. A recovery in the economic conditions in the US are expected to lead to a rise of 2.6% and, in Europe, a rise of 2% is predicted by the ILZSG.

With increased output in Australia, India, Ireland, Mexico, Peru and Thailand, it is expected that global zinc mine output will rise by 3.9% in 2003.

Two significant permanent refinery closures in Europe took place early in 2003 – MIM's Avonmouth plant (UK) and Metaleurop's Noyelles Godault refinery (France). This is forecast to lead to a 2.9% fall in European refined metal output. However, production increases in Australia, India, Iran, Kazakhstan, Republic of Korea and Namibia will lead to a 1.9% increase in world zinc metal output.

Although supply of zinc metal is anticipated to exceed demand again in 2003, the extent of oversupply should be reduced considerably.

The zinc industry's sustainable development activities were further advanced in 2002 with the approval of the first in a series of Guiding Principles (and associated codes of practice) developed by the International Zinc Association. These Guiding Principles underpin the industry's Sustainability Charter adopted in 2001.

Major advances were made during 2002 in research into the environmental aspects of zinc. A substantial research programme concluded in March 2003 and its outcomes (predictive models for zinc's bio-availability in the environment) will provide an improved scientific basis for an environmental risk assessment exercise on zinc's production and use that is being conducted within the European Union.

Table next page (over two pages)

Zinc Statistics ('000 t)									
	Mine Production⁽¹⁾			Metal Production			Metal Consumption		
	2000	2001	2002	2000	2001	2002	2000	2001	2002
Europe	1,063	1,053	918	2,776	2,880	2,923	2,715	2,822	2,780
Austria	-	-	-	-	-	-	47	48	49
Belgium	-	-	-	264	256	239	285	374	352
Bosnia	0	0	0	-	-	-	8	8	8
Bulgaria	10	11	14	84	88	79	10	13	14
Finland	16	20	35	223	249	249	47	52	53
France	-	-	-	318	329	334	310	327	318
Germany	-	-	-	357	357	378	532	549	512
Greece	17	32	35	-	-	-	21	26	22
Ireland	263	298	253	-	-	-	2	3	5
Italy	-	-	0	170	179	176	385	348	374
Macedonia	25	20	20	58	52	42	10	10	10
Netherlands	-	-	-	217	206	203	106	108	114
Norway	-	-	-	138	145	145	23	25	29
Poland	157	153	140	179	175	160	109	96	87
Portugal	-	-	-	-	-	-	12	12	13
Romania	27	30	25	52	52	48	22	24	25
Russian Fed	163	164	162	242	250	257	137	150	153
Spain	204	161	70	391	443	512	203	228	226
Sweden	177	159	158	-	-	-	40	27	25
Ukraine	-	-	-	-	-	0	65	65	65
UK	-	-	-	76	90	98	210	191	185
Serbia/Monten.	4	6	6	8	10	3	10	10	11
Other Europe	1	1	1	0	0	0	122	⁽²⁾ 129	130
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Africa	255	237	229	129	135	138	169	165	171
Algeria	6	7	10	26	26	24	10	11	11
Morocco	104	89	84	-	-	-	9	9	9
Namibia	40	38	41	-	-	-	_(3)	_(3)	_(3)
Nigeria	-	-	-	-	-	-	8	9	9
South Africa	63	62	58	103	109	112	92	89	92
Tunisia	41	41	37	-	-	-	5	4	4
Other Africa	0	0	0	-	-	2	45	44	
America	3,494	3,750	3,815	1,804	1,713	1,859	2,080	1,942	1,974
Argentina	35	40	37	36	40	39	38	36	34
Bolivia	149	145	148	-	-	-	_(4)	_(4)	_(4)
Brazil	93	93	121	192	193	255	188	198	216
Canada	1002	1,065	916	780	661	793	176	180	192
Chile	31	33	36	-	-	-	10	12	9
Columbia	-	-	-	-	-	-	18	20	21
Honduras	43	48	46	-	-	-	_(4)	_(4)	_(4)
Mexico	393	429	495	233	300	312	212	210	225
Peru	910	1,056	1233	200	190	171	66	67	71
US	837	842	783	363	329	289	1,340	1,181	1,168
Venezuela	-	-	-	-	-	-	15	16	14
Other America	-	-	-	-	-	-	17	22	23
Asia	2,553	2,394	2,423	3,736	3,977	4,132	3,669	3,765	4,040
Bangladesh	-	-	-	-	-	-	44	48	52
China	1,710	1,572	1,499	1,919	2,078	2,106	1,350	1500	1,650
Hong Kong	-	-	-	-	-	-	6	6	6
India	208	222	248	204	234	246	270	286	310
Indonesia	-	-	-	-	-	-	87	88	85
Iran	102	105	121	47	65	82	58	62	69
Israel	-	-	-	-	-	-	11	11	11
Japan	64	45	43	654	644	640	676	633	603
Kazakhstan	322	320	376	262	277	285	34	34	35
Korea DPR	34	28	28	37	31	30	15	12	10
Korea Rep	12	5	-	477	508	608	438	401	476
Thailand	27	24	25	101	105	105	90	103	107
Turkey	48	36	43	0	0	0	83	84	88
Uzbekistan	0	-	0	34	35	30	8	8	8
Vietnam	22	32	36	-	-	-	36	40	40
Other Asia	5	5	4	-	-	-	(5)463	(5)449	(5)
Oceania	1,379	1,476	1,444	494	556	567	231	238	240
Australia	1,379	1,476	1,444	494	556	567	217	222	223
New Zealand	-	-	-	-	-	-	14	16	17
World Total	8,744	8,910	8,829	8,939	9,261	9,619	8,863	8,931	9,205

¹ Metal Content.

² Includes: Croatia 9; Czech Republic 20; Denmark 10; Hungary 16; Slovak Republic 30; Slovenia 12; Switzerland 20; Other CIS 13.

³ Included in Other Africa.

⁴ Included in Other America.

⁵ Included in Other Asia.