

49th Census of World Casting Production

Modest Growth

in Worldwide

Casting Market

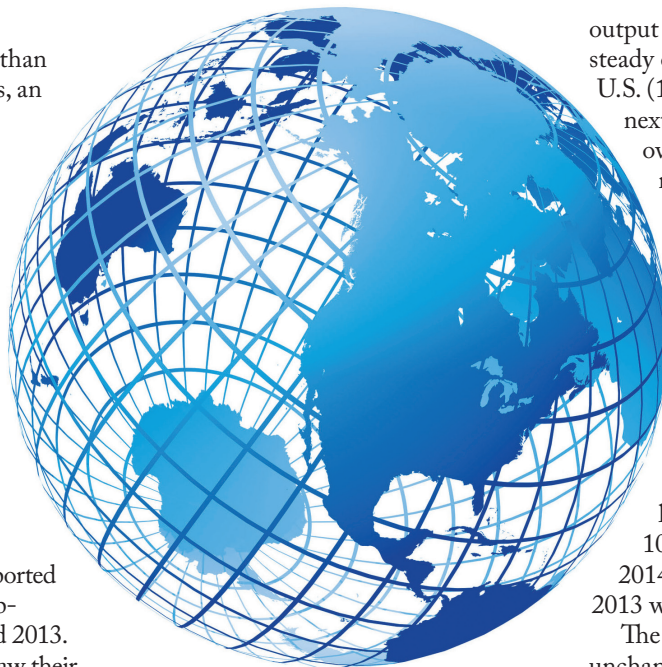
Global casting production continued its upward trend in 2014, growing by 2.4 million metric tons, a 2.3% increase compared to the previous year's total.

A MODERN CASTING STAFF REPORT

In 2014, global production increased to more than 105 million metric tons, an increase of 2.3% when compared to the previous year, according to this year's *MODERN CASTING* Census of World Casting Production. The total production in 2014 represents an increase of 2.4 million metric tons compared to 2013. This rate of growth is a slight decline from 2013's 3.4% boost.

This year's census includes 37 countries from four continents. Of the 34 nations that provided data for the past two years, 23 reported expanded production in total shipments when comparing 2014 and 2013. Fourteen countries, meanwhile, saw their industries contract in the last year.

Countries with developing metalcasting industries and smaller total outputs, as expected, had larger fluctuations, with Bosnia & Herzegovina



having the largest jump (40.7%) and Serbia the biggest drop-off (35.9%). China, the world's leader in total production of castings, increased its

output by 1.7 million metric tons, a steady overall increase of 3.8%. The U.S. (1.6%) and India (2.2%), the next largest nations in terms of overall production, also reported modest growth.

Three of the world's mid-tier countries in terms of production—Ukraine (14.3%), Turkey (13.4%) and Taiwan (14%)—boasted robust gains in 2014, while the majority of the largest casting producers showed more modest improvements. Brazil, meanwhile, the world's seventh largest metalcasting nation, lost 10.9% of its total production in 2014, erasing the gains made in 2013 when it expanded by 7.4%.

The rest of the top 10 list remained unchanged, with Japan producing 5.54 million metric tons, Germany 5.25 million and Russia 4.2 million. Behind Brazil, Korea (2.63 million tons), Italy (2.02 million) and France (1.73 million) round out the list. **MC**

World Totals (metric tons)

Gray Iron	Ductile Iron	Malleable Iron	Steel	Copper Base	Aluminum	Magnesium	Zinc	Other Nonferrous	Total
47,795,820	25,682,246	1,112,961	11,318,922	1,745,611	16,324,073	160,808	545,661	496,779	105,182,881

Individual Countries (metric tons)

Country	Gray Iron	Ductile Iron	Malleable Iron	Steel	Copper Base	Aluminum	Magnesium	Zinc	Other Nonferrous	Total
Austria	40,709	108,397	-	16,936	-	131,410	6,619	-	13,883	317,954
Belgium	34,300	6,700	-	35,500	-	742 ^B	-	-	-	77,242
Bosnia & Herzegovina	15,200	3,600	-	4,100	-	9,410	-	-	-	32,310
Brazil	1,601,852	655,048	-	262,800	22,200	188,700	4,900	1,700	-	2,737,200
Canada	382,465 ^A	-	-	94,774	15,293	232,225 ^B	-	-	-	724,757
China	20,800,000	12,400,000	600,000	5,500,000	750,000	5,850,000 ^C	-	-	300,000	46,200,000
Croatia	33,400	10,000	100	100	183	22,075	-	30	20	65,908
Czech Republic	175,001	55,002	3,505	75,101	6,510	90,005 ^C	-	11,050	32	416,206
Denmark	30,800	48,100	-	-	1,099	2,756	-	-	102	82,857
Finland	17,198	33,113	-	12,952	3,953	2,854	-	250	-	70,320
France	566,154	745,155	-	82,278	17,864	297,117 ^C	-	18,083	2,754	1,729,405
Germany	2,355,957	1,520,855	30,486	206,894	72,064	993,874	14,921	51,493	13	5,246,557
Hungary	25,671	48,800	6	12,096	1,960	101,423	965	3,480	115	194,516
India	6,830,000	1,070,000	60,000	968,000	-	1,093,000 ^B	-	-	-	10,021,000
Italy	702,900	389,900	-	71,200	65,855	730,338	-	63,961	697	2,024,851
Japan*	2,135,794	1,683,250	45,001	181,679	76,611	1,382,015	-	27,293	6,394	5,538,037
Korea	1,091,800	707,200	5,000	164,300	26,900	622,500	-	-	13,200 ^{CD}	2,630,900
Mexico**	771,700	58,947	-	78,746	140,701	600,469	109	1,007	-	1,651,679
Norway	11,765	25,919	-	2,384	-	6,562 ^B	-	-	-	46,630
Pakistan	160,000	14,500	-	35,000	11,000	12,000 ^B	-	-	-	232,500
Poland	489,000	145,000	11,000	55,000	6,000	340,000	-	8,000	4,300	1,058,300
Portugal	33,516	80,748	-	7,263	10,464	23,168	-	1,296	-	156,455
Romania	25,065	4,510	1,026	14,218	7,180	50,925	5,000	299	145	108,368
Russia	2,982,000 ^A	-	-	756,000	-	462,000 ^B	-	-	-	4,200,000
Serbia	24,368	10,140	-	8,991	2,092	9,760	1	96	9	55,457
Slovakia**	2,700	18,200	-	4,100	-	46,000 ^B	-	-	-	71,000
Slovenia	80,496	34,234	6,107	32,188	754	37,244	441	6,889	-	198,353
South Africa	138,000	61,500	-	109,000	8,500	22,000	-	800	40,500	380,300
Spain	334,700	583,500	5,500	82,400	10,176	116,374	-	8,426	665	1,141,741
Sweden	140,700	48,900	-	14,800	7,722	40,613	1,302	7,041	-	261,078
Switzerland	14,900	28,600	-	1,700	2,090	17,120	-	1,207	-	65,617
Taiwan	618,209	237,038	-	83,122	40,128	340,724 ^B	-	-	-	1,319,221
Thailand*	72,400	28,800	29,500	29,800	26,100	105,400	-	24,400	-	316,400
Turkey	650,000	600,000	10,000	140,000	19,000	300,000	-	31,000	-	1,750,000
Ukraine	400,000	120,000	30,000	580,000	60,000	280,000	15,000	25,000	50,000	1,560,000
U.K.	133,100	189,000	1,100	48,000	8,832	110,000	3,400	7,900	1,000	502,332
U.S.	3,874,000	3,907,590	274,630	1,547,500	324,380	1,653,270	108,150	244,960	62,950	11,997,430

* 2013 Results

** 2011 Results

A) Includes ductile iron

B) Includes all nonferrous

C) Includes magnesium

D) Includes zinc

Metalcasting Plants by Nation & Trends

Country	Iron	Steel	Nonferrous	'14 Total	'09 Total	'04 Total
Austria	-	-	-	42	72	53
Belgium	11	5	6	22	31	27
Bosnia and Herzegovina	6	4	6	16	11	-
Brazil	516	194	630	1,340	1,331	1,315
Canada	42	30	111	183	185	150
China	15,000	5,000	6,000	26,000	26,000	12,000
Croatia	27	5	27	59	42	44
Czech Republic	85	34	66	185	180	186
Denmark	8	-	7	15	17	21
Finland	12	7	16	35	36	36
France	88	36	298	422	459	521
Germany	254	-	341	595	602	641
Hungary	26	14	88	128	190	166
India	-	-	-	4,500	4,600	4,200
Italy	149	25	913	1,087	1,121	1,106
Japan*	817	75	1,193	2,085	1,697	1,708
Korea	528	146	242	916	873	798
Mexico**	175	167	339	681	693	1,787
Norway	6	3	7	16	22	21
Pakistan	1,460	40	100	1,600	-	-
Poland	180	36	230	446	430	454
Portugal	30	7	31	68	92	80
Romania	42	37	60	139	169	268
Russia	-	-	-	1,200	1,350	1,900
Serbia*	12	8	18	38	38	-
Slovakia**	12	7	32	51	-	2
Slovenia	11	3	50	64	27	53
South Africa	47	46	77	170	256	256
Spain	46	30	52	128	142	158
Sweden	26	11	62	99	118	145
Switzerland*	18	4	50	72	65	60
Thailand*	280	40	260	580	476	73
Turkey	493	68	358	919	1,246	888
Ukraine	270	280	290	840	1,070	960
United Kingdom	221	-	205	426	450	550
United States	634	355	989	1,978	2,130	2,480
TOTAL	21,532	6,717	13,154	47,145	47,069	34,090

*2013 data **2011 data

At first glance, the total number of metalcasting facilities worldwide appears to have fluctuated wildly over the course of the last 10 years. At 47,145 for 2014, that total represents an increase of nearly 13,000 or 38.3% since 2004.

But much of the up-and-down can be pinned to China's rate of growth over the past decade. The world's largest producer of castings saw its number of metalcasting facilities grow exponentially, from 12,000 to 30,000 in 2013. But recent consolidation and slower growth in the Chinese market caused that number to dip slightly in 2014, settling in at 26,000, which still accounts for 55% of all the world's casting operations.

The North American market has continued its slight decrease, with the U.S. dropping below 2,000 for the first time in the history of the World Census. Other established metalcasting nations, including much of Europe, also saw their total facilities decline modestly.

Slicing the data another way, instead focusing on 2014's total versus that of five years ago, the global metalcasting industry has held steady in the wake of the economic recession of 2009. Total production (see the chart on pg. 27) has exceeded post-recession levels, while the total number of casting facilities has increased by 1,104 since 2009.

Increases in efficiency means existing operations are producing more tonnage per site (see chart on pg. 29), though the casting industry may continue to contract in total number of facilities.

Casting Shipments (value in '000s of U.S. dollars)

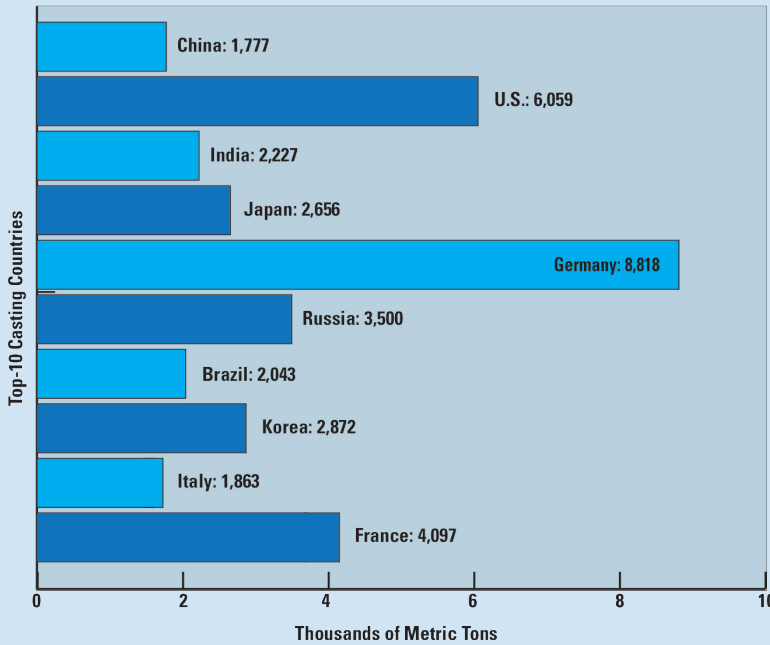
Country	Gray Iron	Ductile Iron	Malleable Iron	Steel	All Nonferrous	Total
Austria	508,482	-	-	-	994,000	1,417,911
Brazil	3,392,723	1,665,132	-	1,353,683	1,979,169	8,390,707
China	23,900,000	13,600,000	640,000	9,500,000	35,284,000	82,924,000
Finland	35,854	83,183	-	95,985	85,929	300,951
France	3,043,260 ^A	-	-	-	2,868,000	5,911,260
Germany	5,410,522 ^A	-	-	-	4,544,771	9,955,294
Hungary	-	-	-	-	-	630,000
India	-	-	-	-	-	18,000,000
Italy	2,713,600 ^A	-	-	-	4,410,000	7,123,600
Japan	3,824,000	4,197,000	177,000	1,166,000	10,002,000	19,366,000
Norway	63,200	89,800	-	32,700	57,600	243,300
Portugal	54,784	128,169	-	53,061	258,274	494,289
Spain	1,512,620	-	-	429,300	808,000	2,749,920
Turkey	950,000	1,150,000	50,000	500,000	2,230,000	4,880,000
Ukraine	960,000	336,000	99,000	1,653,000	2,384,500	5,432,500
United States	4,447,150	6,119,880	154,200	7,953,600	12,114,810	30,789,640
TOTAL	50,307,713	27,369,164	1,120,200	22,737,329	77,027,054	198,609,372

A) All ferrous

The combined total of this year's production value by nation is \$198.6 billion, an increase of almost exactly \$1 billion last year. But when factoring in the addition of India—and its \$18 billion in total production value—the 2014 total proves to be a significantly lower figure than 2013.

The growing global recession had plenty to do with this drop in overall value, with China's total shipments decreasing by more than \$6.7 billion. Brazil experienced a difficult year with its total value dropping \$3.2 billion when comparing 2013 to 2014. Germany, France, Spain and a majority of European countries saw total shipment values drop. The U.S., meanwhile, saw a slight bump in total value, gaining \$486 million in comparison to 2013.

Production Per Plant



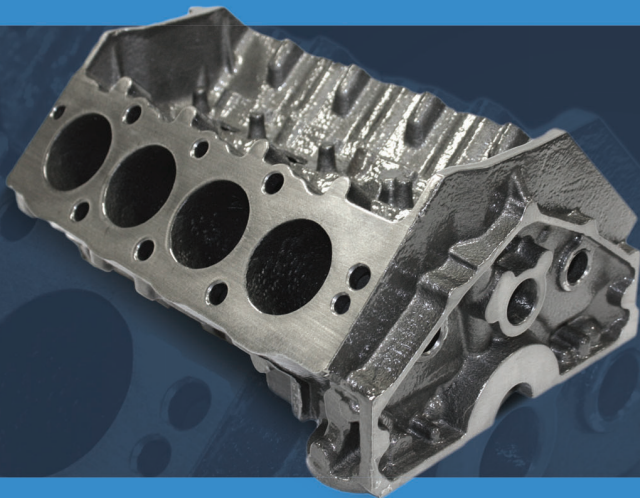
The slight decline in the number of metalcasting facilities coupled with growth in overall production can only mean one thing: metalcasters are producing more tonnage per plant. Facilities are able to fulfill demand with available capacity as underperforming facilities exit the market place. The industry emphasis on efficiency also helps explain how less are producing more.

Germany remained, far and away, the nation that produces the most castings per plant, shipping 8,818 metric tons per plant. The U.S., No. 2 in average production per plant, produced 6,059 metric tons per site, a slight decrease from 2013's figure.

China experienced the largest growth in production per plant in 2014, thanks largely to the contraction of its metalcasting facilities by 15%. Chinese metalcasters produced an average of 1,777 metric tons, up 294 tons from 2013. China and Italy, both with relatively different metalcasting industries, produce the smallest casting volume per facility.

Brazil, due largely to its 10.7% drop in overall casting production, experienced the biggest decrease in production average (229 tons per site), with its overall number at 2,043 tons. The U.S. and Brazil were the only two nations in the top 10 to see a decrease in production per plant.

HIGH PERFORMANCE CASTINGS



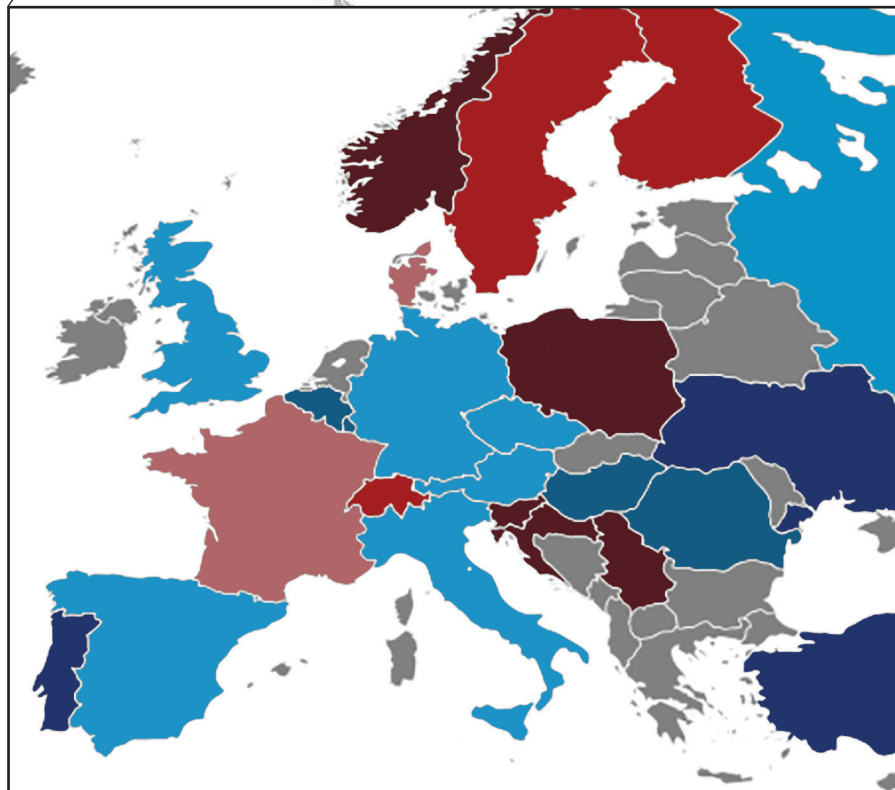
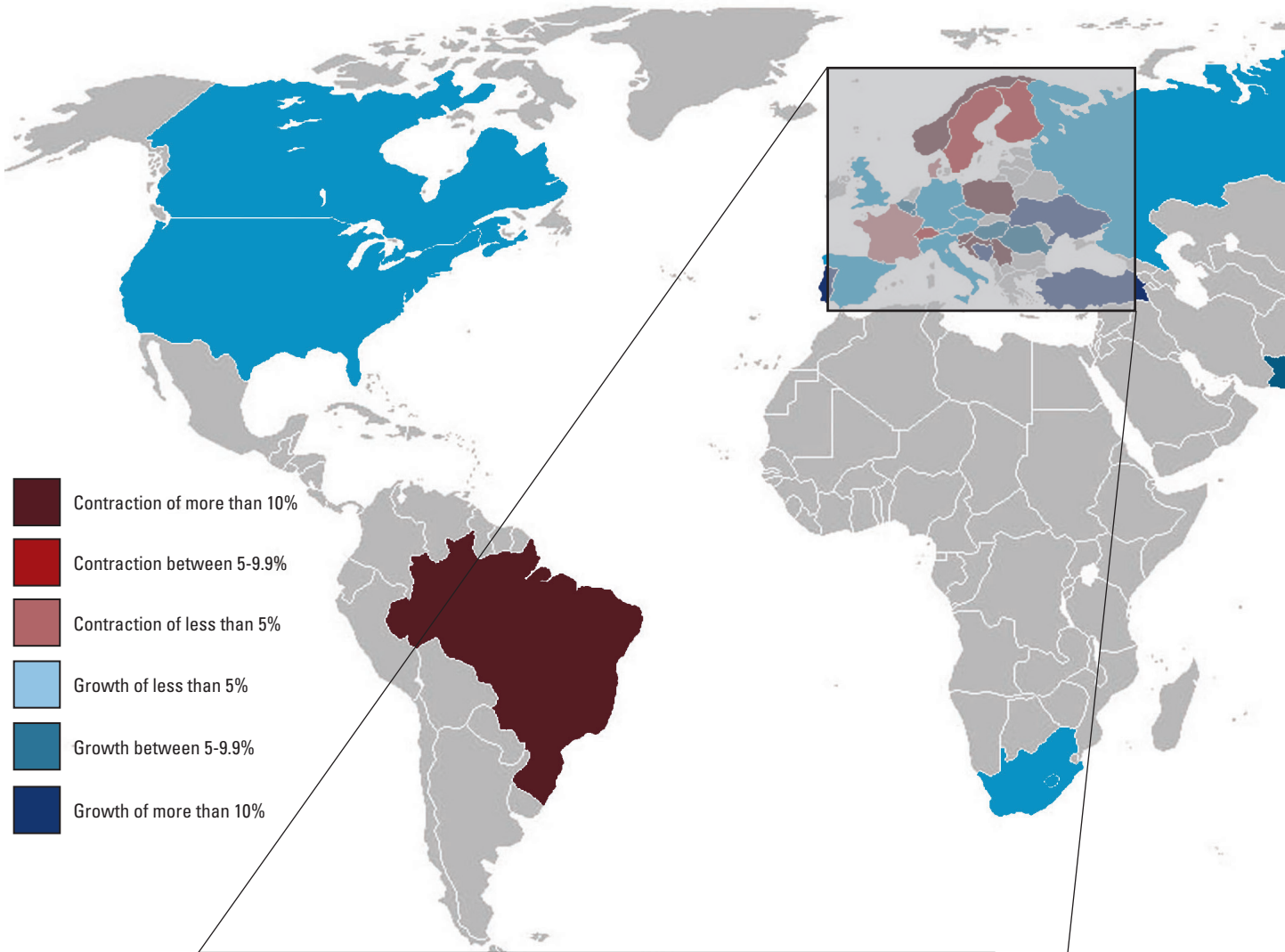
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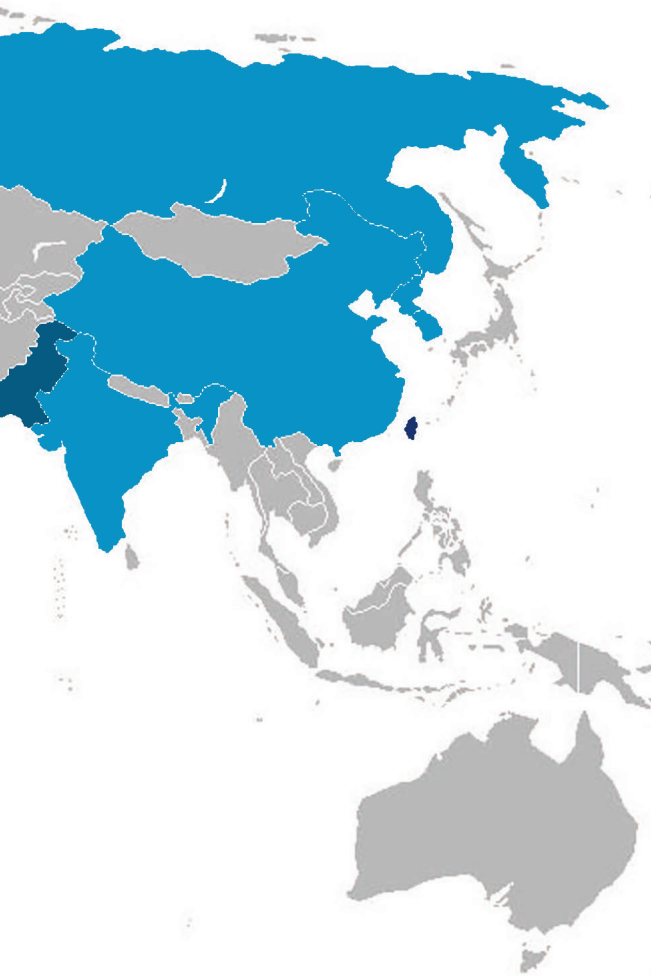
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Global Trends in Production From 2013-2014





Production Shipment Trends (metric tons)

Country	2014 Total	2013 Total	+/- % 2014 vs. 2013	2009 Total	+/- % 2014 vs. 2009
Austria	317,954	316,795	0.4	243,468	30.6
Belgium	77,242	72,046	7.2	79,812	-3.2
Bosnia & Herzegovina	32,310	22,956	40.7	16,669	93.8
Brazil	2,737,200	3,071,400	-10.9	2,296,916	19.2
Canada	741,757	705,037	5.2	735,105	0.9
China	46,200,000	44,500,000	3.8	35,300,000	30.9
Croatia	65,808	79,011	-16.7	53,797	22.3
Czech Republic	416,206	408,358	1.9	270,961	53.6
Denmark	82,857	83,935	-1.3	87,604	-5.4
Finland	70,320	77,800	-9.6	75,741	-7.2
France	1,729,405	1,748,166	-1.1	1,736,704	-0.4
Germany	5,246,557	5,186,727	1.2	3,901,665	34.5
Hungary	194,516	179,905	8.1	132,303	47.0
India	10,021,000	9,810,000	2.2	7,443,200	34.6
Italy	2,024,851	1,970,968	2.7	1,668,802	21.3
Japan*	5,538,037	-	-	4,385,998	26.3
Korea	2,630,900	2,562,000	2.7	2,135,000	23.2
Mexico**	1,651,679	-	-	1,485,324	11.2
Norway	46,630	59,763	-22.0	72,535	-35.7
Pakistan	232,500	220,000	5.7	-	-
Poland	1,058,300	1,266,100	-16.4	770,000	37.4
Portugal	156,455	138,927	12.6	127,043	23.2
Romania	108,368	103,038	5.2	89,894	20.6
Russia	4,200,000	4,100,000	2.4	4,200,000	0
Serbia	55,457	86,497	-35.9	89,145	-37.8
Slovenia	198,353	245,571	-19.2	140,494	41.2
South Africa	380,300	375,000	3.1	493,222	-22.9
Spain	1,141,741	1,112,045	2.7	902,078	26.6
Sweden	261,078	282,200	-7.5	194,600	34.2
Switzerland*	65,617	69,113	-5.1	68,134	-3.7
Taiwan	1,319,221	1,157,550	14.0	914,683	44.2
Thailand*	316,400	-	-	304,100	4.0
Turkey	1,750,000	1,543,000	13.4	1,030,500	69.8
Ukraine	1,560,000	1,365,000	14.3	1,000,000	56.0
U.K.	502,332	483,750	3.8	389,900	28.8
U.S.	11,997,430	11,807,000	1.6	7,408,281	61.9
TOTAL	105,174,781	102,780,514	2.3	80,343,266	30.9

* 2013 Results
** 2011 Results

Note: The total production may differ from aggregate of national totals because countries with only one reported year were excluded.

Metalcasting Trends

The worldwide market expanded in 2014, but plotting this year's data against the total production figures from 2013 and 2009 can highlight specific trends. Global changes over the course of the last year can be seen in the world map on these pages. Countries in red experienced a decrease in total casting production, with the degree of loss shown by various shades of red. Similarly, blue signifies a nation's market expanded in 2014 when compared to the previous year.

Asian and North American markets grew modestly, with the U.S., China, India and Russia reporting growth rates below 5%. Curiously,

Brazil's market experienced a significant drop in production, making it the only BRICS country to report diminished production.

The European market proved especially varied in its growth rates. Established markets generally experienced slight growth or contraction, while nations in the east and southeast proved much more volatile. Croatia, Serbia and Slovenia had difficult years, while Ukraine and Turkey were among the world's leaders in growth rate. Another notable trend was the difficult years for northern Europe, with Norway, Sweden, Finland and Denmark all

reporting losses in total production.

While nations' fortunes can change from year to year, the global market as a whole looks quite strong when compared to the census of world casting production for 2009. Listed on the right columns of the above chart, the metalcasting market of five years ago was one still in shock from recession. Much of the world, both developing and mature countries, have experienced encouraging growth in the past half-decade. Worldwide output has increased by more than 30%, exceeding totals from before the economically turbulent times.