

Global impact of the accelerating cost increase of metals

The price of tin has always exhibited volatility, but since 2003 the price has remained in a range of \$6,000 to \$9,000 per metric ton. In the last 6 months, however, the price of tin has increased over 40 percent and the price continues to climb. The participating members of the IPC Solder Products Value Council¹ are compelled to clearly articulate the current situation regarding the global supply and demand of two crucial metallic elements to the electronics industry. The cost of tin and silver have reached 19-year highs and it is important for our industry to understand the implications of this kind of cost increase on the supply of solder alloys.

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Table 1. Global tin supply/demand balance.

[Source data - CRU-ITRI Report Forecasts (Release date: 19 Feb 2007)]

('000 tonnes)	2004	2005	e2006	f2007	% of change
Production	315.2	348.5	351.9	337.0	-4.2%
DLA Sales	9.2	7.7	9.3	10.0	
Consumption	330.6	334.8	363.7	377.7	3.9%
Market Balance	-6.2	21.4	-2.5	-30.7	
Reported stocks	27.2	36.5	33.0	21.0	-36.3%
Stock Ratio (weeks consumption)	4.4	5.4	4.7	2.9	-38.7%

Source Data — CRU-ITRI Report Forecasts (Release date: 19 Feb 2007)

Cost impact of current tin supply

The International Tin Research Institute² (ITRI) has published a report forecasting a potential shortfall in tin availability in 2007. ITRI is projecting that global demand for tin will exceed production by 30,700 metric tons. The primary reason behind this shortage is a 30 percent reduction in tin exports from Indonesia.

Because of this shortage, the price of tin on both the London Metal Exchange³ (LME) and the Kuala Lumpur Tin Market (KLTM) has reached a 19-year high. The key driver to this shortfall in supply is tied to the important Indonesian tin industry.

A dealer told StarBiz that price movement had been volatile over the past one month as Indonesia tightened tin export regulations and clamped down illegal mining operations mostly in the Bangka-Belitung province, which account for almost half of the republic's refined tin exports. "We are looking at daily price movements of US\$200 to US\$400 per tonne. Early this year, the metal had jumped by US\$1,000 per tonne on a single-day trading," he added. "Market players were now waiting to see whether the metal can touch the US\$15,000 per tonne mark next week, the dealer said," reports HANIM ADNAN of StarBiz, 23 February 2007.

The price of tin has always exhibited volatility, but since 2003 the price has remained in a range of \$6,000 to \$9,000 per metric ton. However, in the last 6 months the price of tin has increased over 40 percent and the price continues to climb. The negative impact of this price volatility on the electronics assembly industry is particularly acute due to the increased consumption of tin by our industry due to the

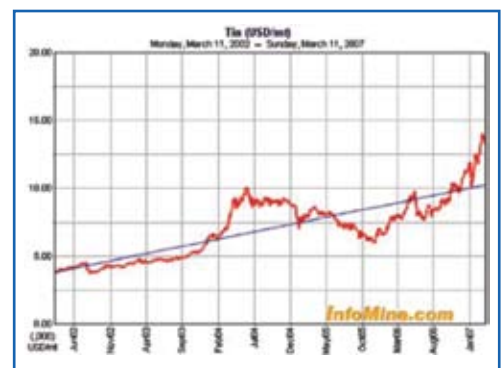


Figure 1. The cost of tin in USD, March 2002 through March 2007.

accelerating transition to high tin lead-free alloys.

Lead-free solder paste contains more than 85 percent tin by weight and is priced per kilogram. Therefore, each kilogram of solder paste contains 0.85 kilos of tin. At today's approximate \$14,000/metric ton price or \$14.00/kg, the cost of tin in solder paste is \$11.90/kg. Indicated in Figure 1, this represents a cost increase for the tin in solder paste of 25 percent in the last four months and almost 116 percent since just the beginning of last year! This excludes the impact of the tremendous cost increase of silver in the same time period. Additionally, it does not include any other inflationary cost increases associated with the conversion of alloy to powder, manufacturing solder paste, packaging or other overhead costs.

Silver cost impact

Different market forces have also caused the price of silver to climb dramatically in the past

Table 2. The cost of tin in solder paste has increased 25 percent in the last four months and almost 116 percent since the beginning of 2006.

Date	Cost of Sn on LME	Cost of Tin/kg Solder Paste (@ 89% Metal)	% Increase	Period of Increase
3/1/07	\$13,800	\$12.28		
12/1/06	\$11,00	\$9.97	25%	4 Months
1/1/06	\$6,400	\$5.70	116%	15 Months

Table 2. The cost of silver per kilogram of solder paste has increased 59% in just 14 months.

Date	Estimated Market Price of Ag	Troy oz of Ag Per Kg of SAC305 Solder Paste (3% Ag @ 89% Metal Loading)	Cost of Silver/kg Solder Paste	% Increase	Period of Increase
3/1/07	\$14.30	0.85	\$12.22		
1/3/06	\$9.00	0.85	\$7.69	59%	14 Months

Note: 1kg = 32.15 Troy Oz

18 months. Silver was priced in the \$7.00 to \$8.00/troy ounce range through most of 2005. In late 2005 and early 2006, the price of silver climbed to more than \$14.00 per troy ounce. One of the factors for the increase is growth in demand of silver due to the trend toward lead free and prominence of 3 percent to 4 percent silver bearing alloys to the electronics assembly industry. A kilogram of SAC 305 solder paste contains approximately 0.85 troy ounces of silver. At \$14.30 per troy ounce, this represents \$12.22 in silver cost per kilogram of solder paste, before including any alloying, powder production costs, etc. This is contrasted to an estimated silver cost of \$6.37⁴ per kg of SAC 305 solder paste in 2005.

The impact of this dramatic increase in the cost of silver is a significant new additional pressure on the soldering materials suppliers. Silver has quickly eclipsed almost all other material costs for suppliers in the last 18 months and now represents the number two raw material cost for the industry, second only to tin.

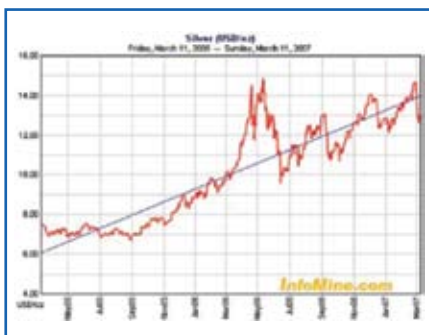


Figure 2. The cost of silver in USD, March 2005 through March 2007.

Overall impact on solder alloy industry

In the intense, cost-competitive assembly electronics marketplace, this new cost increase is yet another market driver that our industry is going to have to learn to manage. A key to our industry's growth will be how we address these dramatic cost increases without driving the assembly electronics supply chain to yet another dangerously low level of profitability. This is imperative as the marketplace continues to demand a pipeline of innovative and enabling technologies to meet the market's requirements. The PCB laminate industry in the early 2000s is an example of a segment that was turned inside out due to the intensity of a cost-driven downward business cycle.

Over this 15 month period, the impact from the cost increase of tin and silver combined in solder paste have increased by \$6.58 (\$12.28 - \$5.70) for tin, and \$4.53 (\$12.22 - \$7.69) for silver, for a total of \$11.11 of increased cost per kg of solder paste. This represents a cost increase equivalent to between 20 to 30

percent of the global average sales price for solder paste sold into the assembly electronics segment. Figure 3 demonstrates a 74 percent increase in the alloy cost of Sn/3.0%Ag/0.5%Cu since March 2007.

Conclusion

The soldering materials supply chain, already stretched thin financially due to the constant downward trend of average sales prices and the increased costs⁵ of doing business with the explosion of lead free solders, is monitoring this issue very closely. Our industry will be significantly challenged to absorb increased costs of these magnitudes. It is the Council's recommendation that electronic assemblers stay in close communication with their soldering material suppliers regarding supply and availability during this unprecedented period of volatility in the market price

References

- [1] The IPC Solder Products Value Council consists of twenty-two soldering materials manufacturers from around the world. The IPC SPVC estimates its membership represents more than 80 percent of the world's supply of soldering materials.
- [2] The International Tin Research Institute is the most prominent association globally representing tin-consuming industries and is based in the United Kingdom.
- [3] The London Metal Exchange is the world's premier non-ferrous metals market and is the market representing the majority of the global tin supply.
- [4] \$6.375 = \$7.5 per troy oz of Ag x .85 troy oz of Ag per kg of SAC 305 solder paste
- [5] See the 'True Costs of Lead Free' IPC SPVC article

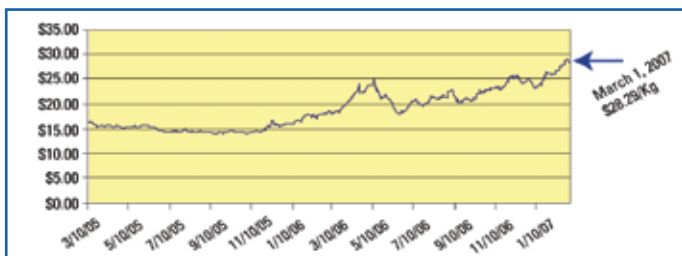


Figure 3. The sharp incline of the cost of SAC305 alloy. [Source data - Metal Bulletin – Tin Cash LME Daily Official \$ per tonne, Silver Spot Settlement Comex daily, prices Cents per troy oz, Copper Cash LME Daily Unofficial \$ per tonne. (NOTE: Unofficial for \$ Currency Conversion)].