

# President's Award Breakfast Keynote Address

Malay Mukherjee, Chief Operating Officer  
Mittal Steel Co.  
Wednesday, May 11, 2005

AIST President Tom Graham Jr. presented Malay Mukherjee with the 2005 AIST William T. Hogan S.J. Lecture Award in appreciation for his keynote lecture presented before a sold-out crowd in excess of 800 people at AISTech 2005 in Charlotte, N.C., USA.

## Steel in the 21st Century: Creating an Attractive and Sustainable Industry

Steel producers have the opportunity to create an attractive and sustainable industry in the 21st century. The fundamentals for the future are positive. It is up to us to ensure these fundamentals realize an attractive industry. An attractive industry will create a virtuous cycle that will drive sustainability.

### THE FUNDAMENTALS FOR THE FUTURE ARE POSITIVE

**Demand** — Economic growth in the twentieth century was intertwined with a dramatic increase in the use of steel. As each of the so-called “developed economies”



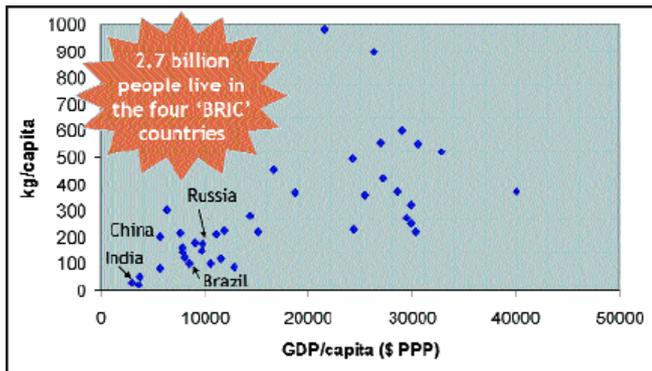
— beginning with Western Europe and North America — went through their phases of rapid economic growth, the consumption of steel rose dramatically, before flattening off to the modest growth levels witnessed today. As Figure 1 shows, on a per capita basis there is a strong relation between steel consumption and GDP. Looking forward, it is clear that as similar conditions play out in

the “developing world,” these countries, too, will increase their per capita consumption of steel. Given the large populations in these countries, the absolute level of steel demand will rise considerably. The so-called BRIC countries (Brazil, Russia, India and China), with a combined population of 2.7 billion and fast-growing economies, represent a large source of GDP-driven growth in steel demand. China is already well on its way to being a steel-intensive country. As it and other countries in the developing world develop, we will witness the kind of demand growth seen in North America and Europe in the three decades after

World War II. Under plausible scenarios of GDP and population growth, the new demand likely to arise from the BRIC countries alone over the next 40–50 years will double the global consumption of steel (see Figure 2).

As such, the long-term synopsis of the demand-side of the steel industry is attractive. Just how attractive, however, depends a lot upon how much our industry makes of the opportunity presented. Notwithstanding the positive correlation between steel consumption and GDP per capita observed in Figure 1, there is a wide range of steel consumption at the higher levels of per-capita GDP. This reflects differing practices in the use of steel, especially in the construction sector. In residential housing, for example, there is a very wide range of steel use. Countries like Australia, South Africa and Finland have very high use of steel in housing, while in other countries the penetration is an order of magnitude or more lower. According to the Living Steel Consortium, an IISI working group, best practice residential construction is around 3 tonnes per household unit. With new housing starts running at about 25 million per year, increasing the average use of steel in new houses by an average of just 1 tonne per unit would entail an additional 25 million tonnes of demand per annum.

The implication is that, while increased consumption of steel in the developing world will happen, the extent to which it happens depends upon a number of factors, including, for example, the rate and extent of urbanization, as well as the industry’s ability to make steel the material of choice. There is a window of opportunity to influence key decision makers, including consumers, architects, builders, government planners and so on. As experience in the western world shows, once the window is missed, it is a much harder task to displace substitute materials from their incumbent position. Figure 3 illustrates the fact that hundreds of millions of tonnes of annual demand are at stake here. Depending upon the level of per capita steel consumption reached at the forecast GDP levels, total annual consumption in the BRIC countries by 2030 could range anywhere between 800 and 1,200 million tonnes. The “size of the prize” from influencing higher adoption rates of steel in



**Figure 1**

Steel consumption versus GDP per capita (2004). Sources: IISI, Economist Intelligence Unit and Mittal Steel analysis.

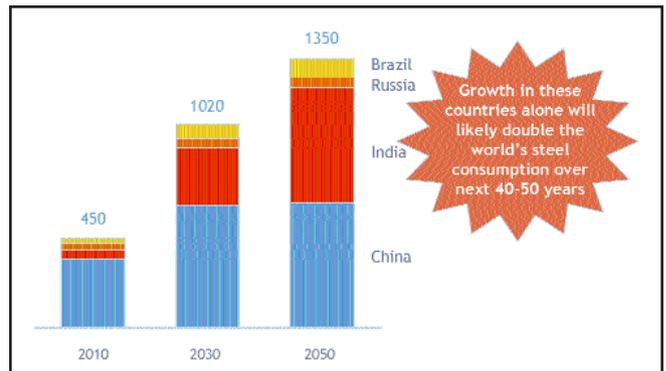
the various end-use segments in emerging economies is therefore very high.

**Supply** — Decisions around new capacity in capital-intensive industries hinge upon beliefs about prices in the medium if not long term. As such, there is always a lag in meeting unforeseen increases in demand. The industry as a whole was largely caught off-guard by the rapid, sustained growth in Chinese demand. Looking ahead, increased utilization of existing capacity, plus the impact of greenfield plants, will meet the foreseeable increases in demand.

As such, the tightness of supply witnessed in 2004 was an anomaly. There is no reason to believe that there will be any sustained shortage of supply of steel going forward. Large amounts of additional steel supply will come on stream in the BRIC countries, where the large growth in demand will take place. In addition, there will be a shift within the more “mature” geographic areas. In Europe, the shift from Western to Central and Eastern Europe has already begun. The drivers are twofold: growth of intrinsically local demand, and the shift of users of steel (e.g., automotive and appliance manufacturers) to lower-cost regions.

On the raw materials side, planned expansions in both iron ore and coal production will ensure, again, that the temporary tightness of supply will ease considerably. It is true that the mining industry will need to comply with increased environmental constraints, and, as such, development and cleanup costs will be higher than in the past. Nevertheless, we believe that in the medium to long term, supply of raw materials will not be an issue. Expansions already announced for iron ore and coal will likely close the gap within a short period. For iron ore, for example, about 200 million tonnes of additional capacity will be in place before the end of the decade.

More generally, it is helpful to remember two basic facts, one of nature and one of history. The fact of nature is that iron is the most abundant element in the earth’s crust (5.6 percent) after oxygen and silicon (the two elements in sand!) and aluminium. Even at today’s consumption rate, there is at least a 100-year supply of economically viable sources of iron ore. A similar story holds for coal. And that is with current technology, which brings me to the second fact. It is a historical fact that the real prices of raw materials have always declined. There have been, and always will be, people



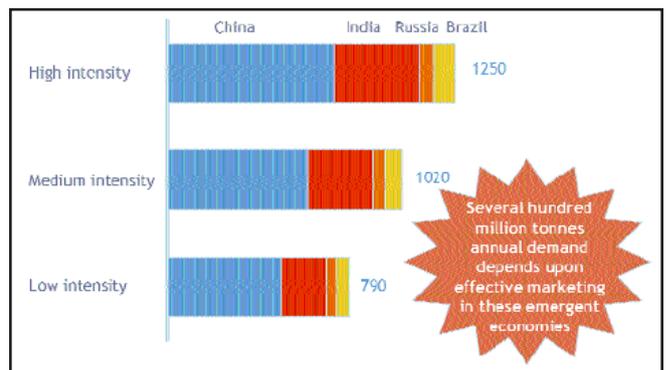
**Figure 2**

Steel consumption in the BRIC countries, in millions of tonnes, estimated using forecast population and GDP growth and likely steel consumption per capita. Sources: Economist Intelligence Unit, U.S. Census Bureau and Mittal Steel analysis.

who yield to the temptation to forecast shortages (remember the Club of Rome in the 1970s?), but the common thread in all commodity sectors has been the ability of technology to overcome the barriers and extract hitherto unrealizable sources of raw materials. To illustrate this fact, consider the experience of the oil industry. Drilling for oil in the harsh conditions of the North Sea is something those in the United Kingdom take for granted today but which was, at the time of its inception, quite revolutionary. A more recent example, of more relevance for this audience perhaps, is deep-water drilling in the Gulf of Mexico. Both of these examples illustrate the impact of technology on recovering raw materials that were, in the past, unrecoverable.

**China** — China is currently the biggest driver of both steel demand and steel supply. Nevertheless, its role in shaping the future of the supply side of the industry should not be overexaggerated.

Growth in Chinese steel capacity has been driven by the rapid growth in domestic demand. The concern naturally arises that, as this domestic growth ultimately begins to slow, China could drive a new era of overcapacity. In addition, given the increasing role of China in the shaping of markets in a number of industries, there



**Figure 3**

The importance of marketing: forecast steel consumption, in millions of tonnes, for 2030, estimated using forecast population and GDP growth and varying levels of steel consumption per capita. Sources: Economist Intelligence Unit, U.S. Census Bureau and Mittal Steel analysis.

is a perception among many that China could significantly reshape the structure of the steel industry on the supply side.

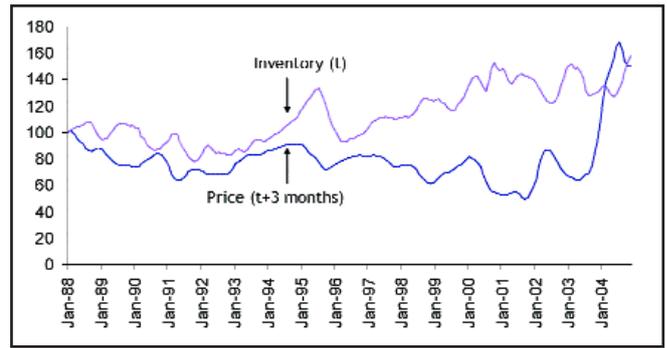
On these issues there are a number of things to consider, but let us consider just two. First, the Chinese government is showing increasing signs that they will enforce regulation of the industry to both slow down the growth of new capacity as well as cull the industry of subscale, long-term inefficient plants. The recent decision to abolish export tax rebates on semifinished products is an example. This should ease the risk of a large “overshoot” of Chinese production relative to domestic demand.

Second, and of more importance, it is difficult to make the case for a long-term structural competitive advantage of Chinese steel producers. The only real source of competitive advantage currently is labor cost. At around \$25 per tonne, Chinese labor costs today are well below those in Western Europe and North America, but comparable to those in Russia and Eastern Europe, for example. For virtually all other major cost drivers (e.g., coal, iron ore, freight), Chinese producers have no structural advantage and in many cases a structural disadvantage (on freight, for example, given the fact that many production facilities are inland). This can be seen very clearly in Figure 4, which shows that, while enjoying a labor cost advantage as high as \$100/tonne in 2004, hot metal costs in Chinese plants averaged just \$55/tonne lower than North America and Europe. Since labor cost advantages will ultimately erode away, one could therefore argue that the strategic impact of China on the steel industry in the long term will be no greater than that of Japan or Korea: a major producer to be sure, but ultimately one for which economics will substantially dampen volume growth.

As such, one cannot generalize the role of China too much. There is no such thing as a steel plant called “China.” Rather, there are a large number of plants, in various geographic locations, with varying levels of structural advantage and disadvantage and varying levels of management competency, each of which will ultimately need to identify and execute successful strategies for competing on the domestic and global stage. Given the fact that China will not be the location of long-term, lowest-cost producers, it follows that China will be neither the driver of a structural change in the cost base for the industry, nor, if each of the Chinese producers behaves in an economically rational way, the source of long-term overcapacity.

## IT IS UP TO US TO ENSURE THESE FUNDAMENTALS REALIZE AN ATTRACTIVE INDUSTRY

**Balancing Supply and Demand** — Cyclicality will never go away. It is a direct consequence of the dynamics of supply lagging demand and vice-versa. Nevertheless, it can and should be managed. As a first step and in the absence of data to the contrary, it is important to recognize that, at any point in time, tightness of supply does not imply a “new paradigm” or such. In mature industries, new paradigms are largely driven from the supply (not demand) side, and almost always by dramatic shifts in technology. (As examples, consider the development of digital photography or, closer to home, minimills.) If, without any sound basis



**Figure 5**

*Hot rolled coil inventory and prices, U.S. (Jan. 1998 = 100). Prices are plotted in the chart lagging inventory by three months. Sources: CRU, Metals Service Center Institute and Mittal Steel analysis.*

in fact, we yield to the temptation of inflated beliefs about long-term prices, then the result will be large-scale expansions that ultimately lead to overcapacity and price collapse.

China is the 800-pound gorilla in the market. We have seen the impact of Chinese domestic supply failing to grow as fast as domestic demand. We do not want to see the reverse! There is always a risk that Chinese overproduction could disrupt the global market. If over the next few years the government or the Chinese producers themselves fail to pull back expansion sufficiently, then, rational or not, overproduction will result. Given the sheer scale of Chinese steel output, the impact of such a production overshoot would be large. This risk needs to be managed. As discussed earlier, the Chinese government has already taken several actions to control overexpansion and has the capacity to tighten the situation even further if necessary.

More generally, what is needed from the industry is a disciplined approach to bringing on supply and managing capacity. A better collective understanding of the microeconomics of our industry — meaning the cost structure and other aspects of the supply side, the likely scenarios for demand growth and what these imply

**Table 1**

### Observations

- Historically, inventory increases led to price decreases eventually.
- Roughly, an x% increase in inventory between two quarters led to an x% decrease in price in the next quarter.
- So a 10 percent increase in inventory of HRC across the U.S. (approx. 750,000 tonnes over one quarter) typically led to about a \$30 decline in price.

### Implications

- Failing to balance flow of material through the supply chain has been the key driver of price volatility.
- An expectation of price rises/falls with inventory became the norm.
- The impact has been very costly: the \$35 margin damage of a 10 percent “overshoot” of inventory is huge.
- Investors perceived an industry with highly volatile cash flows and interpreted this as underlying uncertainty of demand and supply.

for fair, long-run prices — will help ensure that we achieve a better match of supply with demand, more stable price levels and a financially healthier industry overall.

### Industry Conduct and the Truth About Cycles

An important fact that is not well understood is that much of the volatility of steel prices is driven by the behavior of the buyers and sellers themselves, not by an underlying mismatch of supply and demand.

This is easiest to see by taking more than a cursory look at the behavior of steel prices over time. In doing so, one observes that the time scale of the cycle has become very short — on the order of 1–2 years — in the last decade or two. The “cycle” as such is not coupled to the long time scale changes in demand and supply. Analysis shows only a very weak correlation of prices with proxies for demand growth — for example, automotive production, or industrial production more generally. What this means is that, while the need to manage supply to meet demand, as discussed earlier, is important, failing to do so is not the only, or even the main, driver of price volatility.

In contrast, inventory levels (and changes in them) exhibit a very good leading and lagging correlation with the evolution of spot prices (see Figure 5). What this means is that (over the past 15 years at least) price volatility has been driven by *failure to balance the flow of material through the supply chain* and not by changes in the underlying drivers of demand or supply. Failing to understand this can have major consequences. Rising inventory levels (which can be driven by a number of things unrelated to demand) can lead to a perception of slowed demand, the “need” to lower prices, a rush to push product out before the price declines further, causing inventories to rise further, increasing the perception that prices “must” fall and so on, down the slippery slope. Similarly, when prices rise in the short term, we all need to realize that almost always this is driven by inventory shifts and not confuse these movements with underlying changes in the supply or demand side of the market.

As shown in Table 1, the consequences of this have been significant. For hot rolled coil in the United States, analysis of historical data indicates that typically an x% increase in inventory between two quarters led to an x% decrease in price in the next quarter. In other words, inventories rising from one quarter to another by just 10 percent led to approximately a \$35 decline in HRC prices — an enormous impact on margins. To the

**Table 2**

#### What We Need to Do to Obtain an Attractive and Sustainable Industry in the 21st Century

- Embrace growth geographies — they are a major driver of the future.
- Market better — to open up latent demand.
- Manage better — for value, not volume.
- Price better — microeconomics based; minimize volatility.
- Continue consolidation trend.

investor community, the large volatility of cash flows entailed by these large price movements has led to the perception of an industry with, at best, underlying uncertainty in demand and supply and, at worst, incompetent management.

Tellingly, Figure 5 shows that, since the fourth quarter of 2003, prices have not followed inventory movements: greater forces are at work. As discussed earlier, stronger demand growth has already set in and will continue. In addition, there has been an impact from raw material surcharges. These will underpin prices and limit the impact of inventory fluctuations. Nevertheless, the industry should recognize that volatility that is not driven by underlying drivers of demand or supply is damaging and can be better controlled.

The lesson here, in other words, is that the *conduct* of buyers and sellers is a major driver of price evolution. There are many outfits putting out information and forecasts of the market prices. But what we all need to understand is that “the market” is you and I! It is not something external to us. We all know of CEOs who, when their company’s performance improves, are very happy to take the credit for it, but when performance slips are quick to blame “the market.” The market is you and I, not something “out there.” Every time you or I change prices without strong, fact-based reasons to do so, we influence the perception of others and, in turn, the market. This is especially the case for the steel industry, since so much business is of a spot or relatively short-term nature. Adam Smith’s “invisible hand” was a metaphor designed to convey a complex but ultimately causal process. The “invisibility” was never

**Malay Mukherjee** has more than 30 years of experience in a variety of technical and commercial functions in the steel industry, including iron ore mining, project implementation, materials management and steel plant operations. He joined The LNM Group in 1993 from the Steel Authority of India Ltd. (SAIL), where his last position was executive director — works at the Bhilai Steel Plant, the largest integrated steel plant in India, with production capacity of approximately 4 million tons. Mr. Mukherjee has an M.S. degree in mining from the USSR State Commission in Moscow and a B.S. degree from the Indian Institute of Technology in Kharagpur, India. Mr. Mukherjee has completed an advanced management program conducted by the Commonwealth Secretariat in joint association with the University of Ottawa, Canada and the Indian Institute of Management, Ahmedabad. Mr. Mukherjee is also a recipient of the MECON Award from the Indian Institute of Metals. Mr. Mukherjee joined Ispat Karmet in 1996 from Ispat Mexicana, where he was managing director. He joined Ispat Europe as president and chief executive officer in June of 1999 to take higher responsibilities. Formerly the president and chief operating officer of Ispat International N.V., Mr. Malay Mukherjee is now chief operating officer of Mittal Steel Co.

meant to convey an “other-worldliness.” Quite the contrary: the hand is yours and mine.

An important and related issue: we are all interested in producing so-called value-added products. But do we price them correctly? To answer this, we need to ask ourselves: what does value addition mean? Who is the value being added for? It is for the customer, of course. Therefore, to properly price value-added steels, we need to fully understand what value is being created for the customer. People are so used to talking about “the” steel industry and “the” price of steel when we all know that there are multiple steel products made for multiple applications and markets. Each has a different cost structure. So-called value-added products are more costly to make than commodity grade steels. Pricing these products correctly requires a sound understanding of the true cost of production relative to commodity grades. Unfortunately, we believe that as an industry we do not do this well. We are likely not allocating sufficient cost to value-added products relative to commodity grades, and in turn we are subsidizing the latter relative to the former. This is just another example of where, as an industry, we need to raise our game and move from a production- and technical-oriented mind-set to a market-and economic-oriented one.

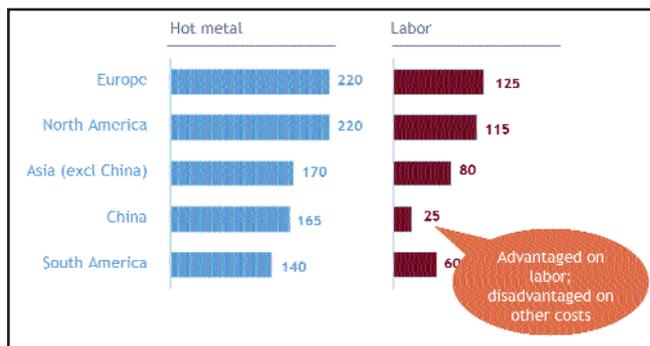
### Consolidation Is Critical

A major trend that will help address the issues of cyclicity, pricing and the general health of the industry in this century is consolidation. A consolidated steel industry will mean better control of the supply/demand balance, which in turn will help to build a sustainable industry. Larger players, having more plants serving more markets, have greater ability to flex production with fluctuations in demand. This is technically and economically more difficult to do in a single plant than across a number of plants.

Consolidation should also make the market less volatile, something that all market participants value. Large companies have more at stake and therefore more to lose from excessive volatility. Larger companies have broader and deeper insights into the market and thus have better information on which to make price and production decisions. Finally, larger companies quickly learn that their decisions affect the market. As a result, “the market” becomes less anonymous and impersonal; they can more easily recognize that the market is “us.”

Consolidation creates companies of a scale that brings greater scrutiny from the capital markets. These markets will demand value creation. Shareholders (e.g., pension funds) will demand it. The result will be better management — managing for value, not production.

A consolidated industry will increase the ability to manage and extract value from knowledge. Merging two steel companies provides an enormous opportunity to exchange operational knowledge and thereby extend best practices across the combined entity very quickly. This is true also for functional areas such as procurement, CAPEX management and product development, where scale also provides enhanced leverage. For example, larger steel companies will permit significant product development efforts at a lower cost per



**Figure 4**

*Relative cost structure of Chinese steel plants, in \$/tonne (2004). Labor is for \$/tonne of shipment. Sources: CRU, ICICI Bank, and Mittal Steel estimates.*

tonne, meaning increased opportunities to expand the market base and provide better products for our customers.

Finally, the industries of our customers are more consolidated than ours. Consolidation in the steel industry will allow us to serve them better with more consistent offerings around the globe and supply chain efficiencies that we both can share.

### AN ATTRACTIVE INDUSTRY WILL CREATE A VIRTUOUS CYCLE THAT WILL DRIVE SUSTAINABILITY

The image of the steel industry for much of the latter half of the twentieth century was that of a dirty, low-growth, poorly managed industry, rife with political interference and bankruptcies.

The opportunity placed before us is to create a more attractive industry. Many of the external, macroeconomic elements are in place. It is up to us to bring these to fruition. Table 2 outlines the key steps the industry needs to take. These include:

- Embracing the growth geographies — this is a global industry, and the various areas are a major driver of its future.
- Marketing better — to open up latent demand.
- Managing better — for value not production volume.
- Pricing better — basing decisions on underlying microeconomics, discerning between supply chain mismatches and true movements in intrinsic supply and demand, not overreacting to information and views supplied by intermediaries for whom volatility is their source of profit.
- Continuing the consolidation trend — for all the reasons discussed earlier.

Delivering on these steps will undoubtedly lead to a more attractive industry. In turn, the image of our industry (our “brand,” if you will) will change to that of a growth industry, managed for value by a set of truly world-class blue chip companies, adding value to our customers and creating wealth for our shareholders and the communities in which we operate. An enhanced image will attract talented managers and engineers into the industry, leading to a virtuous cycle, culminating in a sustainable steel industry for the 21<sup>st</sup> century.

