

Methyl-methacrylate shortage Facing the new reality



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Methyl-methacrylate (MMA), one of the key raw materials used in paints & coatings, has lately witnessed price escalation due to shutting down of some of the plants, and high demand from Asian countries. From the end-users' perspective, the paints & coatings industry will have to compete for MMA with other sectors like LCDs, electronic equipment and automotive, which are experiencing high growth.

■ Dr Mosongo Moukwa

Since May 2010, the world has been experiencing a shortage of MMA. This is because of shutting down of production facilities for economic reasons in Western countries and strong demand in Asia, particularly in Liquid Crystal Displays (LCDs) & other electronic equipment, automotive and mobile phone industries. The global capacity utilisation was 75 per cent in 2009, down from 81 per cent in 2008. MMA consumption is estimated to have decreased by 6 per cent in 2009 from 2008.

A worldwide growth in demand of 4 per cent/year during the past few years, combined with ongoing tight global supply and a rise in feedstock costs have prompted a bullish response from MMA suppliers. Downstream, this has affected the paints & coatings industry. Scarcity has bolstered prices. The demand is rising with global utilisation rates expected to gradually increase to at least 80 per cent by 2019. A growth rate of 5.1 per cent/year is predicted till 2014. However, some of the main engines of this recovery are also LCDs and electronic equipment in Asia. The paints & coatings industry will be competing with these industries for MMA.

Prices increased from levels of \$ 2,250-2,300/tonne Cost and Freight (CFR) South-East (SE) Asia during mid-May in iso-tanks to around \$ 2,430-2,480/tonne CFR SE Asia in mid-August for iso-tank cargos. Bulk MMA prices jumped from \$ 2,130-2,180/tonne CFR SE Asia to \$ 2,300-2,350/tonne CFR SE Asia during the same period. Downstream MMA derivatives, such as emulsions and acrylic cast sheet are facing huge difficulty passing on their costs.

Major applications

MMA is a key intermediate chemical, due to its ability to undergo polymerisation and co-polymerisation. Polyacrylates, a family of clear and relatively durable thermoplastics, are the major source for the consumption of MMA. Today global consumption of MMA exceeds 3.7 million metric tonne (MT) per year, of which more than two million tonne is for MMA polymers. The other primary product of this industry is crude methacrylic acid (crude MAA), which is produced by similar technology but often in separate plant units. Production of crude MAA (for usages other than MMA) is around 20 per cent of the total production of MMA.

Most applications of MMA monomers are through pure or almost pure homopolymers

(PMMA), a clear thermoplastic, which offers outstanding transparency and weather resistance. Within the PMMA consumption categories, the largest is for cast and extruded transparent acrylic sheet (PMMA sheet). Acrylic sheet is used for glazing, lighting, signage, displays, sanitary ware and miscellaneous applications. Its largest markets are in optical components of LCDs, mobile phone screens, outdoor sign boards. Over 80 per cent of MMA consumption is accounted for construction and automotive industries and by original equipment manufacturers. As shown in Figure 1, the global consumption of MMA in 2009 was estimated to be distributed as follows: acrylic sheets (35 per cent), moulding & extrusion (19 per cent), surface coatings (20 per cent), and others (26 per cent).

By far, the largest emerging application of acrylics has been in LCDs and the enormous current & projected growth of large LCD screens for home theatre has been a major driver for MMA expansions, especially in Asia, where all the LCD manufacturing market now concentrates. The anticipated demand has been responsible for a spate of recent announcements for planned capacity addition by Lucite-Mitsubishi Rayon, Sumitomo, Degussa, etc. If this demand is not realised, there could be a risk of an MMA over-supply for years to come. The current trend, however, shows that LCD home theatre is replacing conventional CRT TVs at a much faster rate than anticipated.

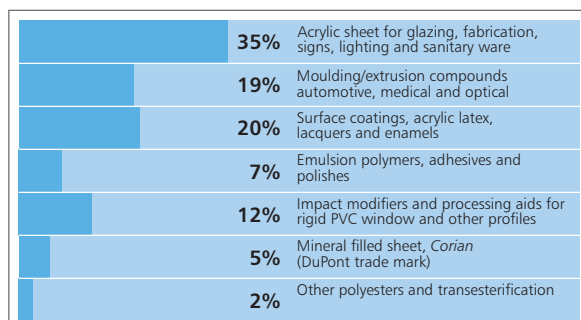


Figure 1: Key application areas for MMA

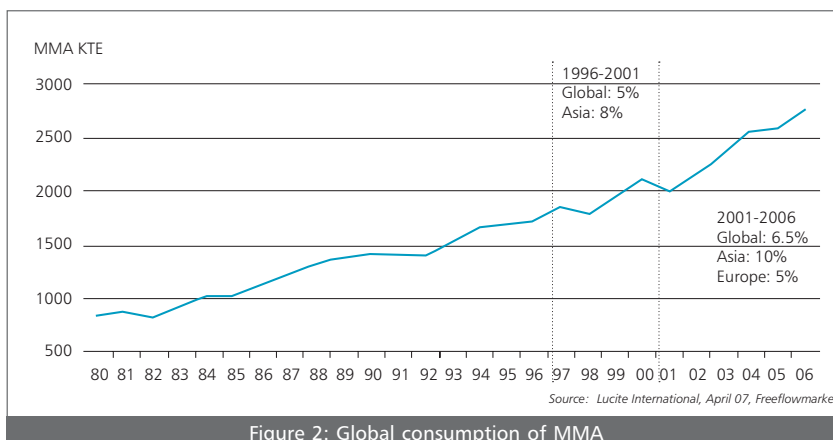


Figure 2: Global consumption of MMA

MMA in paints

Surface coatings are the next largest consumer of MMA, for industrial solvent-based systems and increasingly, for water-based acrylic dispersions for domestic & industrial use. MMA provides a hard, glossy component in paint resins, where it is often combined with other acrylate and methacrylate monomers to form copolymers with appropriate properties, both for aqueous dispersion (latex) and solvent-based (acrylic lacquers & enamels) surface coatings. Non-acrylic co-monomers with MMA are also important in surface coatings, like the acrylic urethanes. Solvent-based systems were developed first, but the aqueous dispersions are now much more important, accounting for 75-80 per cent of MMA used in surface coatings.

MMA is used in water-based acrylic dispersions for exterior masonry and wood coatings & semi-gloss emulsions for interior decorative coatings. These resins are essentially co-polymers of MMA, other methacrylates & acrylates, and comparatively low levels of acrylic acid &/or MAA to provide hydrophilic components. Vinyl resins compete in these areas but do not match acrylics for gloss and weatherability. Demand growth for water-based acrylic paints depends to some extent on new

building activity, but it is also sustained by maintenance usage & by increasing reluctance to apply solvent-based surface coatings on environmental grounds.

The use of MMA in industrial coatings (trade paint) is primarily in the form of solvent-based acrylic resins. There is a growing usage of acrylic water-based industrial coatings. The total consumption of MMA for industrial surface coatings has been falling with the move towards high-solids and powder coatings, where polyesters are the preferred resin type. Original and refinishing acrylic topcoats for automobiles are still slow-growing markets for MMA.

Growth in Asia

Global consumption of MMA has risen at 4.75 per cent CAGR between 1980 and 2006. However, rapid growth has been witnessed in the recent past. In 2008, Asia accounted for more than 50 per cent of global consumption of MMA. Its share is projected to rise further. It is estimated that the current capacity in Asia totals 1.8 million MT, expected to increase by 2,60,000 MT in 2011 (Figure 2). Demand in the US and Europe is expected to remain stable. In the long term, consumption of MMA polymers will be more in Asia with an expected growth of 5 per cent CAGR. The key drivers for the strong MMA demands are: LCD TVs and other electronic equipment, automobiles and mobile phones.

LCDs and other electronic equipment: Growth in MMA

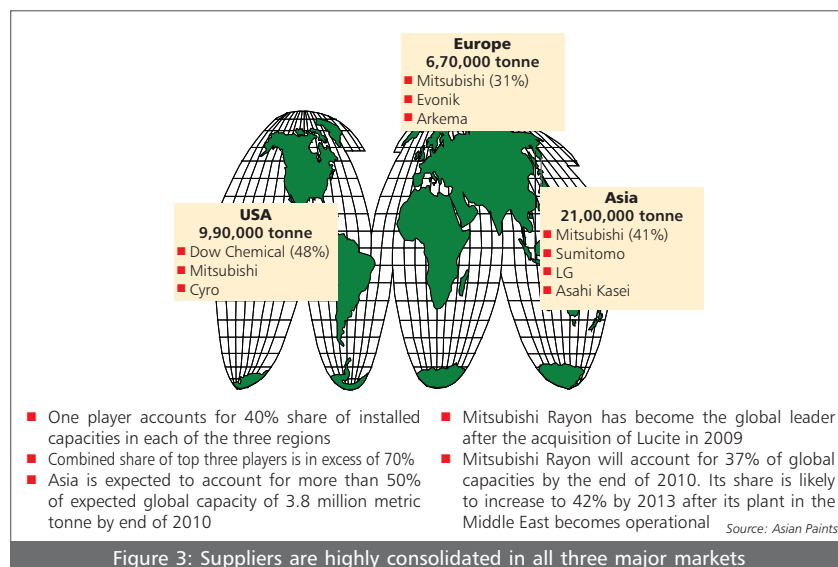


Figure 3: Suppliers are highly consolidated in all three major markets

consumption due to LCD TVs is mostly enjoyed by Asia, with Japan, South Korea & Taiwan being major manufacturing hubs for LCDs. LG targets approximately 22.5 million units in 2010, an increase of around 6 million units (about 40 per cent) over 2009. Most of the demand for LCD TVs is emanating from emerging economies. Estimates suggest that demand for MMA is currently only 75-80 per cent of potential demand because of the economic downturn. If true, this can lead to fast-paced growth in the consumption of MMA.

Automotive: The automobile industry in Europe is going through tough times as production is expected to drop by 25 per cent, because of the economic downturn and credit crunch. Overall in 2008, 18.4 million vehicles were produced, down 7 per cent in 2007. It is estimated that the overall vehicle production in 2009 has dropped drastically. In Asia, auto sales is expected to grow at more than 10 per cent CAGR till 2012. This may compensate for subdued growth in other regions.

Most of the growth in volumes has been coming from developing countries. PMMA-led exports from South Korea surged 174 per cent year-on-year, as flat screen monitors for television and computers grew in popularity aided by

strong demand from China and a slight recovery in global consumption.

Demand for PMMA for automotive applications has also been on an uptrend, led by China, where car production and sales have remained buoyant despite the global economic slump.

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Consolidation of suppliers

Suppliers are highly consolidated in all three major markets (Figure 3). Asia is the largest consumer of MMA, with its current installed capacity of 1.8 million metric tonne and an expected increase of 5,00,000 MT by 2014. Mitsubishi Rayon accounts for around 40 per cent share of installed capacities in each of the three regions. It has become the global leader after the acquisition of Lucite in 2009, accounting for 37 per cent of global capacities by the end of 2010. The combined share of the top three players, Mitsubishi, Dow and Evonik, is in excess of 70 per cent.

The world's largest MMA plant (2,50,000 MT) is planned by SABIC along with Mitsubishi Rayon. The plant will be a part of a much larger chemical project, which with its low input & energy costs, will change the market dynamics. SABIC and Mitsubishi Rayon have agreed to set up a joint venture (JV) to manufacture materials used for cars, in a bid to compete with the US and European rivals including BASF. SABIC added a network of factories, manufacturing resins and thermoplastic sheets used in cars, roofs and lighting when it bought General Electric's plastics unit in 2007 for \$ 11.6 billion. The JV aims to produce specialty chemicals at a low cost and then selling the products in Asia.

Demand on the rise

The availability of MMA in the paints & coatings industry is dictated by the demand of LCDs & electronic equipment, automotive & mobile phones industries, and this growth is taking place in Asia. The rules of supply and demand are dictated by the growth in these industries, as consumption of MMA outside paints and coatings has been growing at a rapid rate.

Given the status of various growth drivers, suppliers in the Asian region may soon run out of capacity. Asian demand-supply situation is likely to remain tight despite over-capacity in the US, as hardly any supplier from this country has entered Asia. In India, domestic capacities of MMA & PMMA are limited, thus for many companies, there is a need to import to satisfy their demands. ■



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