

Where is the footwear industry going? This is a conundrum to which we would all like the answer. Major shifts in marketing, production and fashion over the past few years have shaken the industry like nothing else before. Based on his presentation to the 2004 Polyurethane Convention, industry consultant Steve Lee offers some background on the future of polyurethane.

The future of polyurethane soling

China dominates footwear production and exports but how will increased GDP/Capita affect local consumption? Could India strengthen exports on the back of a developing domestic market? Will Vietnam expand further and can Mexico and Brazil also win a larger share of the global market? What are the short- and long-term fashion trends and how will they affect production? How do fashion trends shift regionally and do key factors control them or are they merely random? And, finally, how does all this affect the use of soling materials and, in particular, polyurethane and thermoplastic polyurethane? Such questions are easy to pose but not easy to answer in any convincing detail.

Population and demand

Global population in 1950 was about 2.5 billion. It is now estimated at 6.4 billion and predicted to grow to 6.8 billion by 2010. It grew alarmingly between 1950 and 1990 but is now tailing off. On the other hand, footwear production more than doubled to over 5 billion pairs from 1950 to 1970, 10.7 billion in 1990, an estimated 17.4 billion in 2004 and will possibly reach 20 billion by 2010. These figures indicate roughly 100% extra production every 20 years, more than double the population growth from 1970 to 1990 and over three times that from 1990 to 2010.

This disparity has steadied since the demand for footwear shifted away from simple replacement based on necessity (1950 to 1965) to a demand for a greater variety of style, fashion and type, driven by an increasing level of overall global prosperity. There were times (early '80s to '90s) when the demand slowed, but it was soon back on track. Consumption has shifted from



Rozenburg (Huntsman) MDI plant.

around one pair per capita in 1950 to around two in 1990, two and a half today and looks set to further increase by 2010.

Distribution

Data for 1950 is difficult to locate but it appears local production for local consumption used to be the norm except for a few countries with export trade in high fashion or specialist footwear. By 1970 the pattern had already begun to alter and it is clear that local production in the USA, although still at 810 million pairs, had already peaked. Western Europe was at 1.1 billion pairs and still rising, whilst the three key Asia Pacific countries of China, South Korea

and Taiwan had a combined total of 800 million pairs, of which China comprised 70%.

By 1990 the situation was radically different. US production was down to 290 million pairs, Western Europe's was at 1.2 billion (peak 1.4 in 1985), South Korea's at 535 million (peak 570 in 1988), Taiwan's at 415 million (peak 810 in 1986), while China's output had reached 2.7 billion. Therefore, even by 1990, these three Asia Pacific countries accounted for 34% of total global footwear production. Combined production from Mexico and Latin America was approximately one billion pairs at the time.

Estimates for 2004 indicate a further decline in US production and it is now thought to be no more than 55 million pairs. Western Europe is going the same way and 2004 figures are expected to show around 800 million. The bubble has certainly burst for South Korea (120 million) and even more so for Taiwan (65 million). China, on the other hand, has expanded dramatically and 7.6 billion pairs are predicted for 2004. Mexico and Latin America remain at around a billion despite

fluctuations. Vietnam, however, has gone from under 100 million pairs in 1990 to an anticipated 535 million for 2004.

By 2010, it is thought production in China will have reached 9.1 billion pairs, whilst that of Western Europe will have fallen well below 700 million and the US to 45 million. South Korea and Taiwan combined will stand at 150 million, with Latin America creeping up to around 1.2 billion. Vietnam is predicted to reach 650 million pairs. It is therefore true to say that footwear production has moved dramatically over the last 40 years.

- China continues to increase
- Chinese production is shifting from coastal to inland provinces
- South Korea and Taiwan are no longer major players
- Western Europe is decreasing rapidly
- Mexico and Latin America remain reasonably strong
- Vietnam is growing in stature.

Consumption

For many years Japan, USA and Western Europe were the major drivers pulling in large quantities of imports on top of local production to satisfy the demand for shoes. Due to their highly developed economies and high levels of GDP per capita they dominated the consumption of footwear.

Japan is expected to import 500 million pairs in 2004 and the USA and Western Europe close to two billion pairs each. This is set against consumption levels of around 600 million in Japan and 1.9 billion each for the USA and Western Europe, showing a close balance for the USA where local production is low. The difference in Western Europe is due to a reasonably strong export market. However, they are all dwarfed by China at 3.1 billion and India at 3.8 billion pairs.

India has not been mentioned before, since official data only reports a production level of around 750 million pairs and only refers to closed footwear. There is also a huge demand for locally produced 'Chappal' sandals totalling around 3 billion pairs per year. While part of the overall picture they do not contribute to global trade.

The focus on low technology, low cost sandals for the home market has put India at a disadvantage compared to China as it has been slow to develop the infrastructure required to meet the demands of international specifiers of high quality closed footwear. Vietnam is, in fact, taking a strong position in areas that India might have been expected to occupy and is rapidly increasing its production and export of high quality footwear. Indian exports will, no doubt, increase but it is difficult to see how they can ever catch up with either China or Vietnam.

- India is the largest consumer in absolute terms
- China is the largest consumer of closed footwear
- USA is still a dominant importer
- Western Europe's imports are the same as the USA's
- USA and Western Europe consume more or less the same volume.

Style Trends

It used to be said that fashion dominated what consumers bought and that there was only one fashion image. Yet this has not been the case for many years now. Fashion shifts do arise and affect markets but never become as dominant as in the past. It is also clear that new fashions never totally die and we now see many different fashion styles existing side by side and every conceivable variant on almost any street.

Furthermore, fashion trends from developed countries take time to filter down to developing markets. These, in turn, have their own preferences which overlay generally perceived global fashions as is the case with certain Middle Eastern countries which like the shiny look produced by PVC for both upper and sole. China prefers wet look imitation leather uppers for formal shoe styles whilst India goes for sandals due to both price and climate.

- No single fashion dominates the whole market
- Developed markets are shifting towards thinner and more refined soles
- Developing markets take time to adopt new fashions
- Some markets have long-term specific likes.

Soling Materials

The first point to make is that the range of soling materials has dramatically increased since the 1950s. Back then, there were only four basic industrially produced soling materials, plus the wide range of traditional products that are still used in some areas today. By the 1970s this had dramatically changed with the introduction of PVC, polyurethane, thermoplastic rubber and thermoplastic polyurethane. By 1990, only EVA and latex rubber had been added, leaving polyolefin elastomer, which has so far not made a significant impact, the only other new candidate.

It is not clear if any new basic soling materials will appear in the next few years but shoemakers today have a choice of eleven primary materials. This already broad diversity has a much wider range of opportunities when blends of different materials are used, or when two, three or four part material

1930	1940	1950	1960	1970	1980	1990	2000	2010
Leather	Leather	Leather	Leather	Leather	Leather	Leather	Leather	Leather
Rubber	Rubber	Rubber	Rubber	Rubber	Rubber	Rubber	Rubber	Rubber
Vulc. Rbr	Vulc. Rbr	Vulc. Rbr	Vulc. Rbr	Vulc. Rbr	Vulc. Rbr	Vulc. Rbr	Vulc. Rbr	Vulc. Rbr
		Res. Rbr	Res. Rbr	Res. Rbr	Res. Rbr	Res. Rbr	Res. Rbr	Res. Rbr
			PVC	PVC	PVC	PVC	PVC	PVC
				PU	PU	PU	PU	PU
				TPR	TPR	TPR	TPR	TPR
				TPU	TPU	TPU	TPU	TPU
					EVA	EVA	EVA	EVA
						LR	LR	LR
							POE	POE

combinations are made. There are probably also five to ten specialist materials that are used for specific niche applications. There is therefore a great deal of competition between different soling materials and combinations. ➔

Polyurethane

The major impact on the use of PU and TPU in footwear will be the continuing shift in production to China and other Asian countries. Historically they have had low utilisation of polyurethane as a soling material, yet this is rapidly changing. If the use of polyurethane in China reached the current global average of around 6%, world demand in the footwear soling market could be well in excess of 700 Ktonnes by 2010 or 49% over the predicted level of 470 Ktonnes for 2004.

Thermoplastic polyurethane has been used for many years in specialist areas of the footwear market but has only recently been developed as a mainstream general soling compound. This has been led by the introduction of softer grades and the ability to reduce density by the use of blowing agents. Now, on top of the use of polyurethane and thermoplastic polyurethane as soling compounds, there is an increasing demand for coated fabrics, inserts, logos, adhesives, foam linings and sock liners.

A potential constraint on the growth of polyurethane and thermoplastic polyurethane for footwear is the supply of pure MDI, the description of which is rather complicated. Production of MDI (methylene diphenyl diisocyanate) results in a mixture of oligomers, which are distilled into polymeric MDI and a mix of 4,4' and 2,4' MDI. The polyurethane and thermoplastic polyurethane used in footwear is predominantly

4,4' with some 2,4'. While production can be adjusted, it is not possible to produce only the di-functional type. Production of pure 4,4' therefore depends on consumption of 2,4' (flexible foams) and polymeric (rigid foam).

A further shortage problem is due to the fact that no new world-scale MDI plants were built between 2000 and 2004. The next will be the BASF/Huntsman/PU China plant due to come on stream in 2006, so there is already a shortage of both polymeric and pure MDI. Some companies have managed to de-bottle-neck their MDI plants in order to increase capacity but this has not been enough to satisfy demand.

- Demand for polyurethane as a soling material could exceed 700 Ktonnes by 2010 if China continues to adopt it
- Thermoplastic polyurethane will increase its position as a main-stream soling material
- Growth could be restricted by a shortage of pure MDI
- The long term position of polymeric versus pure MDI has to be resolved.

Future growth of both polyurethane and thermoplastic polyurethane for footwear looks very good in terms of demand but there are several key factors that could limit its potential. The next few years are likely to bring yet further uncertainty in regard to investment decisions for shoemakers. 

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Proper shock absorption	Protection & comfort
Natural product	Environment friendly
Anti-odor	Freshness



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