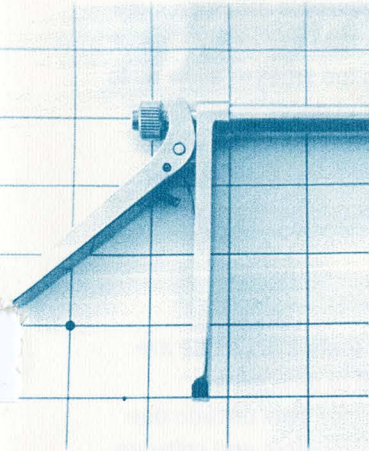


Design – The Key Technology

Michael Hunt



A manufacturing industry competitive in export markets needs to secure the ownership of its designs and brand names. This is the central message of a paper presented by Dr Michael Hunt at the centenary conference of the SA Institution of Mechanical Engineers in September 1993.

Having realised that the national economy can no longer rely on the profits earned by the gold mining sector, South Africa is gearing itself to the idea that the local manufacturing sector must be developed to become the mainstay of the country's future prosperity.

The problem is that there are radically differing views on how this development can be achieved. The local manufacturing industries have grown used to being sustained by protective government policies and few of them have learnt to survive in a competitive free market situation. Nevertheless it is certain that real development and growth can only take place in such a situation, and it is the competitive route which offers the only hope of success.

In South Africa it has not yet been fully appreciated that the only way in which a competitive edge can be obtained on world markets is through a sound design and marketing policy. Many top politicians and industrialists believe that the country's manufacturing facilities can be used and developed through the help of international companies, and that this will happen as soon as sanctions are removed, heralding a new wave of prosperity. This is a naive and ill-informed belief which, even if it were true, would lead at the very best to our products being sold at their lowest value. At the worst it could lead to further industrial decline due to lack of competitiveness.

MANUFACTURING OBJECTIVES

There are various reasons for the establishment of a manufacturing industry. They include:

- 1 Creation of wealth for the owner(s)/ shareholders
- 2 Reduction of outflow of forex from the country
- 3 Distribution of wealth through the provision of employment
- 4 Strategic purposes
- 5 Earning an inflow of forex for the country.

In the old South Africa the reasons were combinations of the first four objectives and as long as there was some other way of earning forex (i.e. from the mining sector) it didn't matter too much how efficiently the manufacturing industries performed.

We now find ourselves in the position where the fifth objective, namely earning forex, is paramount. The fact that it has previously been largely ignored by our manufacturing sector has meant that we now have to completely revise our thinking.

We tend to think that the situation is unique to South Africa. It is not. Pedro Belli (1991), Senior Economist at the World Bank, made the following observation:

... the absence of trade growth in the nations of Latin America and Africa is due to their failure to adapt to changing world economic realities. Most governments in these regions pursued economic growth and industrialisation through import substitution, protecting their domestic economies from international competition. As a result they priced their own exports out of world markets and stunted the growth of new, internationally competitive business.

The devices of protectionism weren't the only tools that stunted the growth of their economies. Another contributor was statism - the ill conceived notion that bureaucrats would make successful business managers.

The message is clear. Unless one sets out to develop internationally competitive industries one will not get them.

The answer to the question 'how does one develop an internationally competitive business?' must also be fairly clear. One must manufacture products which are competitive on world markets.

Tariff protection removes the need for international competitiveness and has a strong influence on how a given industry performs, but this is not the only cause of the dilemma facing South Africa at the present. The real problem is that, by the terms of the typical license agreements, the products manufactured locally as part of the import replacement policy would not normally be allowed to be exported competitively even if they could be manufactured at a competitive price. In any case the products are invariably obsolescent and without design ownership we cannot update them.

The crux of the issue is the ownership of the design and the brand name.

DESIGN OWNERSHIP

International trade agreements come in all shapes and sizes. The Taiwanese manufacturing industry built itself up largely by the simple process of manufacturing other countries' products at a better price than they could be made in their land of origin. These products have been exported all over the world and have undoubtedly benefited the Taiwanese national economy.

Many influential people in South Africa are hoping that we might follow the same route with similar success, and that 'made in South Africa' would become a term recognised world wide. This is a dangerously short-sighted policy.

What is not generally realised is that the Taiwanese are now frantically trying to live down the 'made in Taiwan' cachet in favour of a policy

in which they create their own brand names through dynamic programmes of design and development. Every effort is now being directed at a 'designed in Taiwan' campaign.

The reason is simple. The money earned by the manufacturing process is often only a fraction of what the product sells for under its brand name. The bulk of the profit goes to the owner of the brand name.

The differences in earnings can be very considerable. An American brand of tennis racquet made in a Taiwanese factory is sold throughout the world at five times the price that the identical racquet from the same factory sells for without that particular brand name on it. One South African designed and developed product which has been sold in thirty countries around the world, has a selling price on the market which was fixed at more than a hundred times the price which the local manufacturing contractor was happy to receive for merely making it. The local ownership of the design ensured that in this case the added value came to South Africa. Had this not been the case the amount earned by South Africa would have been less than one per cent of the potential.

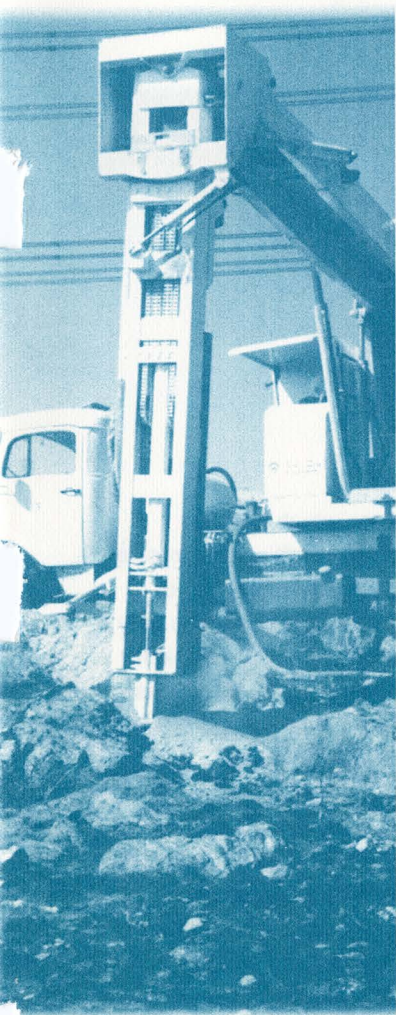
Ownership of the brand name is the main factor in the value-adding process. If we forget this we condemn ourselves to a fate where our best possible achievement will be to become the frugally paid artisans for the more enterprising countries.

DESIGN IN SOUTH AFRICA

It is not uncommon to hear local industrialists bemoan the fact that 'we' could never expect to design and develop world competitive products in South Africa. Seemingly plausible arguments are even advanced to substantiate this claim. One of these is that our market is too small to allow us to cover the cost of design and development. This has often been quoted as an excuse for lack of entre-preneurship. It has little relevance when talking about designing products which can be exported.

The other important point that most people are unaware of is that the cost of design has decreased considerably in the past decade due to the arrival of low cost computers and software. In point of fact South Africa happens to be one of the most cost effective countries for design in the world, as some major overseas companies have discovered to their profit. A local firm which does industrial design for major overseas companies has reported that it has a cost advantage of more than eight to one over its European counterparts. This is a very powerful competitive edge, largely due to the favourable exchange rate. The full benefit, however, goes to their overseas clients who are getting a very good deal. Ironically enough, one of the clients (a well known German motor company) sells the product back to us at a greatly enhanced price for our manufacture under license!

Where local firms have taken to designing their own products for both the local and export markets their success has been phenomenal. The key to the striking success of Bell Equipment is openly acknowledged by Mr Gary Bell, their



managing director, to be the fact that they design their own products and do not manufacture anything under license.

Incidentally, it does not really matter who does the design work, it is the ownership of the design which counts. By all means hire the services of an Italian or a Japanese designer if it will help to give the product a competitive edge. Japanese companies, for example, use the services of many European designers under contract.

A product does not need to be a high technology one either, it only has to meet a market need.

DESIGN AND TECHNOLOGY

In the past most of the world's products were produced by a small number of major industrial countries. Thanks to relatively recent technological progress, smaller countries like South Africa can enter world markets for manufactured products. The availability of advanced technology is as good in this country as it is in many of the first world countries.

The mistake is to see technology as an end in itself.

The possession of high powered technology is not in itself a prescription for prosperity. What counts is what one does with it. This is where South Africa, a technologically advanced country, falls sadly short. Expensive computer aided design systems costing millions of rands can be found in our manufacturing industries where they do little more than act as filing systems for drawings piped from overseas source companies.

Technology must be used as a means to an end. It is not good enough to be proud of what one has bought, one must be proud of what one has done with it.

Affordable computer aided design systems have levelled the playing field for us. They put us in the race which many of us never thought we could join, but we are discovering this fact too slowly.

Some hope that South Africa can earn its future prosperity by making a major technological breakthrough. Although this is not impossible one cannot afford to gamble on such a hope. Technological breakthroughs are relatively few and far between and are mostly made by countries with vast research budgets (by our standards). Furthermore history has shown that the best rewards do not always go to the discoverers of the technology. The greatest rewards go to the product designing enterprises who make use of new technology.

QUALITY AND PRODUCTIVITY

Both quality and productivity are important parameters in the process of manufacturing competitive products. However there are certain indisputable facts concerning these parameters:

- They are both dependent on the design of the product.
- Attention to these parameters alone cannot make a competitive product out of a bad design:

In a healthy manufacturing environment it is essential that there should be a close liaison

between the designers and those responsible for marketing, quality control and productivity. Only in this way can optimum competitiveness be reached.

Failure to have unrestricted ownership of the design is a serious impediment to the control of both the quality of the product and the productivity level.

It is generally admitted that South African productivity is hopelessly uncompetitive in comparison to that of many other industrial nations. This is a direct result of the protectionist measures and management policies with which the country is still encumbered. A good level of productivity is the natural consequence of a successful competitive manufacturing programme. It is not a parameter which can easily be pushed on its own and it is wrong to deplore poor productivity in isolation. If there is a big enough demand for the product, the productivity will rise to meet the demand.

This still leaves us with the fact that we have a poor productivity record, and we have to start somewhere. The obvious conclusion is that we must not in the first place try to compete on the basis of productivity alone. To get a successful manufacturing business going with our current handicap we must go for products which have high value-added content (from design ownership) and where the sensitivity to productivity is much less. The result of any successful development along these lines will be an accompanying improvement in productivity.

Our local productivity level also becomes less important as soon as we become involved in products which are produced in small numbers.

In this field we have a more level playing field in relationship to other industrialised countries. This means that the products must be of high value per item (for example R100 000 upwards) and fall into the category of specialised capital equipment. There is already sufficient evidence that South Africa is highly competitive in the export market in this area.

INTERFACE WITH MARKETING

The pursuit of technological excellence far beyond its point of commercial application is a pitfall which must be avoided. The design must always be appropriate to the intended market.

A full understanding of the market is essential and must precede the design phase. The relationship between marketing and design is of major importance throughout, since market needs change and products must adapt rapidly to meet the changing needs. Furthermore there must be a continual feedback of information from the market to the design in order to maintain a competitive edge.

The Japanese have learnt through experience, and have recently acknowledged that success in the manufacturing industries is attributable to one specific factor before all others, namely the speed at which design changes can be introduced and brought out in the product.

In the Japanese motor industry, implementation of a design change takes six weeks, as against six months in the United States of America. In South Africa much of our manufacturing sector is based on products we are not allowed to redesign, without risking major confrontations

with overseas licensors. The same confrontations would arise if we tried to compete with them in the export markets.

If we are to see growth in the wealth creating manufacturing sector the growth must be made through industries which can be internationally competitive. This means that they must be industries with a strong marketing and design sense.

PRODUCTS FOR LOCAL DESIGN

We need to develop design skills for all the types of product which seem reasonable for us to try to export under our own brand names.

There are undoubtedly many products which could be competitively marketed under South African brand names. Amongst the existing South African products which are already successfully exported one can list items ranging from pool cleaners (consumer products) to heavy machinery (capital equipment).

It is however more useful to highlight some areas which should probably be avoided, such as:

- 1 Highly capital intensive and skilled labour intensive products (such as nuclear power stations and jet airliners) where major overseas companies have built established industries and markets based on years of experience.
- 2 Products which do not leave much room for improvement and where a limited number of companies monopolise world demands with branded products which are frequently

specified in their application. Fuel injectors for diesel engines would be a good example here. We can easily make them in South Africa but we would have difficulty selling them under our own brand name.

- 3 High technology, mass produced consumer products where productivity (rather than added value) is a crucial factor. Later on it should be possible to review this category in the light of improved local productivity.



There are many grey areas which have an element of all these factors, but this still leaves a very wide range of products where we could compete quite well with overseas firms. It is only our lack of both confidence and initiative which holds us back. This situation should change as industry in general becomes more aware of what is already being achieved by the more enterprising firms.

There is also the challenge of marketing to other African countries, which will require special attention. Above all we must not be shy in this direction. Most of the other African countries would welcome being able to source their products in South Africa. Many of them have

been badly ripped off by both the West and the East.

We must always keep the total picture in view and consider all types of products which can sell. If we are to maximise our chances we must create a design culture right across the board.

A DESIGN CULTURE

We have a chicken and egg type of situation in South Africa. We cannot have a healthy growth in export oriented manufacturers without a design culture and we cannot have the design culture without a manufacturing climate which stimulates it.

Education is of key importance. The following extract from an United Kingdom Government White Paper is worth noting:

All school children from the age of five upwards will spend 10 per cent of their timetable throughout their school lives on designing, making, appraising and repairing things. At the same time they should become familiar with computers and information technology (Engineering 1989).

This major change in education policy is no fantasy. It was introduced in the United Kingdom four years ago in an effort to improve Britain's prosperity.

Dr Gordon Sibiya, a prominent South African engineer, has commented that there are three types of national education policy found around the world, namely:

- 1 Those which are aimed at wealth creation, as in North America, Europe and Japan
- 2 Those which are aimed at supporting a given religion, as in the Middle East
- 3 Those which are aimed at supporting given ideological and political thinking as has been the case in South Africa, Russia, and China.

In South Africa we need to change from the third option to the first.

TECHNOLOGICAL ORIENTATION

In our technology culture in South Africa we are inclined to over emphasise pure rather than applied science.

To quote Edward de Bono (1991), one of the world's most innovative modern thinkers:

... our traditions of thinking have always preferred analysis to design ... The traditional concept is that 'knowledge is all' and, once you have knowledge, things like taking action and design are minor intellectual operations. So education and universities are concerned with the knowledge aspect. The skills of making things happen are relegated to technical colleges and business schools, which are held to be of considerably lesser intellectual value ... The two things that have held back our understanding of the importance of design are a belief that analysis will give us all the ideas we need and a belief that evolution will give us all the progress we need.

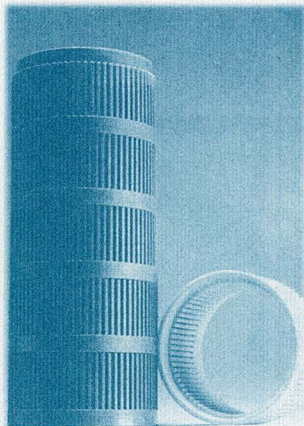
De Bono is exposing defective thinking in the West in general and in the United States in particular. He is explaining why the West is losing out industrially to the Pacific Rim countries.

There is a lesson in this for South Africa, where the pure sciences are emphasised far more strongly than the applied ones.

We also often fail to make proper use of the few practically trained graduates qualified by our universities, in particular our engineers, who, incidentally take a four year degree.

Engineers (in contrast with pure scientists) are invariably taught design as one of their more important subjects. 'Professional Engineer' status is supposed to be conferred only on graduates who have demonstrated some practical experience of design. However, because of the nature of the South African manufacturing sector, with its reliance on overseas designs, qualified engineers are usually prevented from becoming involved in creative design. The well known expression 'we mustn't try to re-invent the wheel' has cost South Africa billions of rands and, incidentally, lowered the status and scope of the engineering profession in South Africa.

The scarcity of genuine entrepreneurs in the manufacturing sector in South Africa is a direct result of these apathetic attitudes fostered by the policies of protectionism, set up to support licensed manufacture. Furthermore the existing tariff barriers are already handicapping those entrepreneurs whose competitive local products contain imported components.



It is the policy of protectionism which has also caused us to develop local industries which are grossly over capitalised for their actual production

levels, which are based essentially on the local market. The whole philosophy of import replacement should be re-examined very carefully in the light of the urgent need to develop industries which are export oriented.

CONCLUSION

It is customary to give considerable attention in South Africa nowadays to the subject of the beneficiation of our raw materials. We should quite obviously not export them at their lowest possible value. We can add substantially to the selling price by beneficiation.

For the manufacturing sector it is equally important that we do not export our products at their lowest value as is the case when we merely play a workshop role, by manufacturing products whose design and brand name is owned by overseas companies. This would be to accept, quite unjustifiably, that we cannot compete for the big prizes. It will wastefully use our manufacturing facilities at a low level of economic efficiency.

Instead we must go for the value added by local ownership of the design and the right to continually introduce design changes which will keep products ahead of the competition.

The higher growth rate which will ensue, will need to be accompanied by a significantly more equitable distribution of opportunities and benefits. The structure of the manufacturing

sector needs to be developed to allow increased entrepreneurial opportunities for the emergent businessmen and small industrialists. Furthermore the local manufacturing sector should be encouraged to produce those goods required by the less well-off sectors of the community which have not previously been adequately served by the market.

However, unless the spirit of design and entrepreneurship is instilled at grass roots level - as is currently our consciousness of environmental problems (for example) - the future economic success and employment prospects for the country and the sub-continent will not be ensured.

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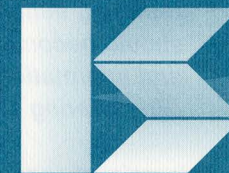
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