

AUTOMOTIVE SECTOR

Prepared by:

The Automotive Industry Development Centre in collaboration with:

Industry (both assemblers and component manufacturers – through the AIDC Advisory Board and Technical Actions Groups). Representatives of the automotive industry on the AIDC Advisory Board include: Mr C Köpke, Immediate Past President, NAAMSA and CEO: Daimler Chrysler, Mr I Robertson, President, NAAMSA and CEO: BMW SA, Mr W van Wyk, Vice President, NAAMSA and CEO: Delta Motor Corporation, Mr N Vermeulen, Director NAAMSA, Mr B Cooper, President, NAACAM and CEO: Dorbyl Limited, Mr S Wynne, Vice President, NAACAM and Past Director: Dorbyl Automotive Technologies, Mr D Coffey, Vice President, NAACAM and MD: Shatterprufe, Mr C Williams, Executive Director, NAACAM.

Unions and labour - through the AIDC Advisory Board and Technical Action Groups, and direct meetings with the unions. Ms A. Moeng, Deputy President of NUMSA, represents the unions on the AIDC Advisory Board.

Government - through the AIDC Advisory Board and through the AIDC participation in Government Programmes. Both the DST and dti are represented on the AIDC Advisory Board in the persons of Dr J Matjila and Mr S Moodliar.

Science and technology councils, both locally and internationally - through the AIDC Advisory Board and the AIDC network. Representatives on the AIDC Advisory Board include Dr H Maree, CSIR, and Prof. E Westkämper, Fraunhofer-Gesellschaft.

Tertiary education institutions, through several AIDC projects.

1. Current Industry Position

- South Africa represents 80% of Africa's vehicle output, but only 0,73% of the world market. Global production increased by 3,8% in 2000, and South Africa's production expanded by 9,6% - placing the country in 19th place in the international vehicle-production ranking.
- The industry is regulated by the Motor Industry Development Programme (MIDP), which has been extended to 2007 and is currently under review for a further extension to 2012.
- The automotive industry contributes 5,7% of GDP and is the third largest sector in the South African economy, accounting for 28,5% of the country's manufacturing output.
- It employs 290 000 people directly and many more indirectly.
- Vehicle imports have grown from 18 000 units in 1995 to approximately 57 500 units in 2000, and are expected to account for 25% of vehicle sales by 2007.
- Vehicle exports have increased at an average annual rate of 37% since 1995, exceeding 100 000 units in 2001, from only 18 000 in 1997.
- There has been a corresponding increase in component exports over the same period, reaching a value of R18 billion in 2001 and an estimated R24 billion in 2002.
- Since 1995, average labour productivity has increased by 4,9% per annum whilst direct labour costs per vehicle were reduced by 30% over the past five years.
- Investment has been of the order of R2,1 billion in 2001, and is estimated to be R3,3 billion in 2002.

Relative to its market size (approximately 360 000 units per annum), South Africa has a strong automotive industry. This is due in large part to programmes such as the Motor Industry Development Programme (MIDP), which has promoted the rationalisation of models and growth in exports. It remains, however, essentially a

manufacturing and assembly industry, with much or all of the research, development and design, and, to a lesser extent, testing work, being done abroad (Europe, Japan and the USA).

Participation of local assemblers in the export market has integrated the local industry into global supply chains. Whilst this has resulted in significant technology transfer and the attainment of economies of scale that have resulted in increased productivity and reduced costs, it has restricted or eliminated the possibility of integrating upstream activities such as research, design and development. Once integrated into the global supply chain, a vehicle, component or sub-assembly manufactured in South Africa and the process by which it is manufactured is no different from, and cannot be any different from, that manufactured elsewhere in the world. This restriction applies to not only vehicle assemblers, but also cascades down throughout the supply chain.

Short to medium-term developments in the industry will be guided solely by short-term economic considerations and the effect of the MIDP on these. Movement of the industry into upstream activities such as research, development and design will be possible only if these activities are incentivised in the same way as value-added, volume production has been promoted by the MIDP. Incentives for upstream activities exist elsewhere in both developed and developing automotive manufacturing countries, and have resulted in the transfer of significant R&D capacity and competence to countries not previously active in the field, e.g. the transfer of all R&D activities of Bosch to Australia. Furthermore, participation of South Africa in such activities will require substantial local investment in fundamental R&D without the immediate prospect of industry participation or practical application. In this regard, South Africa still has to develop the knowledge base, the credibility and the network to be seriously active in R&D.

2. Short-term Challenges Facing the Automotive Industry¹

The current challenges facing the industry are therefore those that will promote competitiveness in manufacturing and assembly. In particular the following:

2.1. Manufacturing Support

The focus in manufacturing support must be on improving quality, cost and delivery across the entire supply chain. The type of interventions required here are as follows:

- Introduction of appropriate and modern technologies. This is particularly important as new vehicle models, with significantly different and advanced technology requirements, are introduced (e.g. one of the new models being introduced in 2005 has 70% new technologies apparently not currently available in SA).
- Improved manufacturing systems. Cost pressures and flexibility in the industry require manufacturers to move towards agile and lean manufacturing where delivery can take place on a just-in-time and just-in-sequence basis.
- Quality, and consistency in quality, is a prerequisite for supply to the industry. Although the industry has come a long way in this respect, peripheral support is required for continued progress to be made in the area. One of the supports identified as necessary is the establishment of an Automotive Metrology Laboratory, in partnership with the National Metrology Laboratory.

The rollout of this initiative should be as follows:

- Support and strengthening of existing initiatives and their expansion to a national basis.
- Focus on improving quality, cost and delivery across the entire supply chain. This includes:
 - introduction of appropriate and modern technologies
 - improved manufacturing systems
 - achieving quality and consistency in quality

¹ These challenges have been identified through interaction with industry, government and the unions at the AIDC Advisory Board Meetings and several other industry forums that the AIDC has been contracted to run on behalf of **the dti**.

This is a short to medium-term initiative that will need to link closely with the Production Technology focus area.

2.2. Logistics

Logistics poses perhaps the biggest short-term challenge for the industry because of the following:

- South Africa's distance from both its source markets (imports) and sales market (exports) – in-bound and out-bound logistics.
- The distances between automotive production hubs within the country. This offers opportunities for intra- and inter-sector optimisation and consolidation of transport.
- Inefficiencies that exist within the transport sector locally (road, rail and air).

The interventions required are, however, very practical and applied, and are more of a generic manufacturing problem than a specific automotive industry issue. Several organisations are already active in addressing some of these problems, but a broader support base to address generic issues affecting the entire economic sector is required.

Within the automotive industry itself, logistics challenges arise because of the relatively small industry (in world terms) and the consequent fragmentation of the sector. For the size of the industry, there are a remarkable number of suppliers and assemblers, each operating manufacturing systems that are aligned with their worldwide operations. The integration of these systems locally has been problematic and is currently being addressed through smart ICT applications.

This is a medium to long-term initiative that will collaborate closely with the Logistics focus area.

2.3. Tooling

The strong international demand for tooling capacity creates opportunities for the provision of capacity from South Africa. The local tooling industry is weak because of fragmentation and although good expertise can be found in the small companies making up the industry, these companies tend to take on complete projects on which they perform a large proportion of low value-added machining, thereby reducing their capacity to provide the highly skilled and high value-added

element of tool assembly. An initiative called the National Tooling Initiative has been launched in collaboration with the AIDC, the National Product Development Centre (NPDC), industry and a number of other players to coordinate the utilisation of high-level skills for efficient use. This is designed to provide capacity, quality and delivery schedules that would meet the requirements of international tendering by South African OEMs.

The rollout of this initiative should be as follows:

- Support and strengthening of existing initiatives and their expansion to a national basis.
- Focus on coordinating national tooling capacity in the following areas:
 - HRD and skills development programmes
 - establishment of a Joint Stakeholders Forum
 - establishment of a National Tooling Network
- Partners:
 - AIDC; CSIR; tool rooms; other service providers: software vendors, engineering design and development houses; TEIs: Pretoria Technikon, Technikon Northern Gauteng, University of Pretoria, Technikon Free State, Cape Technikon, etc.; Government (**dti**, DST, DoL); auto suppliers; OEMS.

This is a short to medium-term initiative that will collaborate closely with the Metals Sector and Product Technology focus areas.

2.4. Niche Volume Production

The size of our market and the level of production taking place locally creates opportunities for niche volume products that often cannot be economically integrated into the much larger production facilities available abroad. Such niche products can include right-hand drive vehicles, niche models, etc.

Furthermore, the low production volumes create opportunities for the development of appropriate production equipment suitable for shorter production runs, more frequent product changes, etc. Existing equipment being used in the automotive industry worldwide is typically designed for considerably larger production runs, and is often not economically integrated into local operations.

Initiatives in this area are captured in the discussion on Manufacturing Support in Section 2.1.

2.5. Raw Materials

In the sourcing of steel, aluminium, leather and plastics, automotive component manufacturers experience a disadvantage in that they have to buy at international market prices. Given the disadvantage of transport costs and delivery lead time of finished product, South African component manufacturers have a serious disadvantage rather than enjoy the supposed benefits derived from the fact that South Africa is the source of the most important portion of the value of each of these raw materials. In the case of aluminium, this is aggravated by the export of scrap aluminium, which is a high-value material on the international market because the cost of recycling it to a full-value product is an order of magnitude less than producing primary aluminium. This has led to many countries introducing protective measures to restrain or prohibit the export of scrap aluminium. Given the dangers of introducing unforeseen and often undesired effects, government is reluctant to intervene in the market. The automotive manufacturing industry is faced with the challenge of building a case for government intervention, or at least self-regulation by the suppliers involved. In doing so, the automotive manufacturing industry will have to quantify the benefits in terms of potential net job creation and net wealth creation in the economy. It will also need to quantify the negative effects on material suppliers and their suppliers, and propose measures to alleviate such effects, e.g. by dedicated government support programmes.

There is no specific initiative proposed to address the issues raised in this section, but it is proposed that government should take note of the challenges in this respect. These are fundamental policy issues that need to be addressed.

3. Medium-term Challenges facing the Automotive Industry²

The structure of the MIDP is such that it promotes high local content in locally manufactured and assembled vehicles. Largely, none of the local assemblers has achieved their targeted local content figures, and opportunities therefore exist in this area. The greatest potential for increasing local content exists in those areas where South Africa already has some competitive position, whether it be the availability of raw materials, the price of another required commodity (such as electricity) or some core technical competence.

3.1. Light Metals Development

Light metal (aluminium and magnesium) usage in automotive manufacturing is growing rapidly, albeit from a low base. Its use is largely driven by its weight advantage and consequent beneficial effects on fuel consumption. In the short term, assemblers face the challenge of marketing the components to be manufactured locally to their source companies where the design authority resides. Component manufacturers face the challenge of supplying to an oversupplied market by competing on cost (while maintaining quality). Alternatively, they need to seek out new and riskier manufacturing opportunities and beat competitors from other countries in being the providers of new technology production capacity. In the longer term, the challenge is to achieve design authority, and compete on the basis of products' capabilities.

Aluminium production is already a significant activity in South Africa, although the amount of downstream beneficiation is minimal. Furthermore, Mintek has developed a promising technology for magnesium production in partnership with Anglo American, Eskom Enterprises and the Department of Science and Technology (DST). They have also identified suitable sources of the required raw material and energy. The **dti** is interested in providing support.

The primary activity required for the development of light metals in the short to medium term will be the promotion of value-adding downstream activities in the South African supply chain. This requires expertise, amongst others, in the areas of enterprise development and incubation and product development. In time, the

² As in the case of the short-term challenges, these challenges have been identified through interaction with industry, government and the unions at the AIDC Advisory Board Meetings and several other industry forums that the AIDC has been contracted to run on behalf of **the dti**.

issue of new technologies and even new light-metal-based materials and metallurgical R&D will also have to be addressed.

Similar challenges also exist in some of the other metal groups, such as stainless steel and carbon steels.

The rollout of this initiative should be as follows:

- Support and strengthening of an existing initiative.
- Focus on:
 - technical support
 - manufacturing support
 - industry development
- HRD human resources development.
- Partners
 - AIDC; CSIR – M&MTek; NECSA; National Laser Centre; Mintek; AFSA; Department of Science and Technology; Department of Trade and Industry; MERSETA; tertiary education institutions (University of Pretoria, University of the North, University of the Witwatersrand, University of Natal, Technikon Witwatersrand and Technikon Orange Free State); international partners (Glashen Enterprises, CSIRO, Cooperative Research Centre for Cast Metals Manufacturing, Ismans and Queensland Manufacturing Institute).

This is a short to medium-term initiative that will collaborate closely with the metals sector.

3.2. Automotive Vehicle and Component Testing

It has been established that there is a need and a market for an internationally accredited automotive testing facility. The following areas in particular were identified as critical to the local automotive industry:

- Test and release of components for export markets, e.g. seatbelts, brakes, mechanical endurance, dynamometer testing, etc.
- Vehicle performance and durability testing.
- Engineering and design facilities linked with testing facilities.
- Full international accreditation, e.g. TUV accreditation.

Furthermore, it has been demonstrated that such a facility would offer the following advantages to the local and international automotive industry:

- World-class engineering skills.
- High-altitude and high-temperature performance testing.
- Identical time zones to those in Europe.
- Affordable engineering rates.

As such, the availability of a world-class automotive testing facility will need to be marketed extensively internationally, where testing facilities are generally over-utilised and under-capacity.

The establishment of a world-class, internationally accredited vehicle and automotive component testing facility in South Africa is therefore proposed. Such a facility would add to the existing basic testing facilities in the country, and would provide both the local and international automotive industry with a one-stop vehicle and component testing service. This facility would also be linked to world-class expertise in the areas of design and engineering, research and development, manufacturing and human resource development. The following core services will be made available to the local and international industry:

- Component and vehicle endurance testing.
- Vehicle characterisation.
- Component and vehicle durability testing.
- Vehicle performance testing.
- Vehicle handling testing.
- High-altitude and high-temperature performance testing.

The proposed testing facility will necessarily be financially self-sustaining in the medium to long term (3 - 5 years) through services rendered to the automotive industry locally and abroad. However, investments will be required for the establishment and development of the facility to the required standards. These investments will be primarily in the following areas:

- Infrastructure development.
- Capital equipment.
- Skills development.
- Market and business development.

4. Long-term Challenges facing the Automotive Industry³

Participation in research, development and design will be possible only if these activities are incentivised in the same way as value-added volume production as done by the MIDP. In the absence of these, substantial investments will have to be made by government to develop fundamental R&D without the immediate prospect of industry participation or practical application. South Africa still has to develop the knowledge base, the credibility and the network to be seriously active in R&D.

Activities which would have long-term objectives, but which would certainly be in support of the automotive industry, are as set out below.

4.1. Design and Engineering

South Africa already has a sound basis for vehicle design and engineering stemming from its military research activities in days gone by. The competence must be maintained, supported and developed to world-class levels. Short-term financial returns may be possible by applying such competencies to special projects, but participation of South Africa in the engineering and design of normal volume production vehicles requires the development of a much stronger competence base, critical mass, and credibility in the industry.

4.2. Advanced Materials and Processes

Recent studies have suggested that a large proportion of innovation in a vehicle in the years to come will be in the application of new advanced materials, particularly electronic materials. Competence in and knowledge of the fundamental sciences of these materials and their processing will be a prerequisite for participation in this field.

³ Once again, these challenges have been identified through interaction with industry, government and the unions at the AIDC Advisory Board meetings and several other industry forums which the AIDC has been contracted to run on behalf of **the dti**.

5. Benefits of Continued Support for the Automotive Industry

There are many benefits of continued support for the automotive industry in South Africa, and include the following:

- Continued export growth, which will have a positive effect on the net forex balance.
- Increased foreign investment in local production capacity.
- Sustainable employment with an opportunity for moderate employment growth.
- Increased opportunities for SME and BEE participation in supply chain activities.
- Empowerment for skills development.

6. Underlying Challenge Facing the Automotive Industry

Whilst the above interventions have been identified as critical to support the automotive industry in South Africa, there are also a number of more generic interventions that have been identified as key elements for the industry.

6.1. Expansion of Existing Support Structures

The need for a support centre for the automotive industry was identified at the National Automotive Manufacturing Technology Workshop held in September 1997 and organised by the CSIR and the Fraunhofer-Gesellschaft, under the auspices of the German-SA Bi-National and the former Department of Arts, Culture, Science and Technology. The business model for such a centre was developed by the CSIR and the Fraunhofer-Gesellschaft after extensive market research. In October 2000, the centre was launched by the Gauteng Provincial Government as the Automotive Industry Development Centre (AIDC). Since its inception, the AIDC has established itself as a credible service provider to, and support structure for, the industry, unions, government and tertiary education institutions. It has secured the support of industry and is currently running several technical action groups for and on behalf of the industry. It has also secured the support of National Government and the concept has been presented to both Ministers Ngubane and Erwin, and to President Mbeki. Furthermore, the AIDC has been contracted to run a number of automotive programmes on behalf of the **dti**.

Whilst already operating at a national level where it can, its development programmes (HRD, SME development, socio-economic programmes, etc.) remain concentrated in Gauteng due to the source of funding received. Expansion of the AIDC model, and especially its development programmes, to a national level is currently being successfully driven through discussions with the Eastern Cape and KwaZulu-Natal Provincial Governments.

Integral to the development of support structures for industry is the concept of partnering, particularly where there exist focused centres of competence. In such cases, the partners must have something to offer which can be more synergistically combined for the benefit of the industry. In this regard, the AIDC has established a number of joint projects, joint ventures, memoranda of association and even joint companies.

Since the AIDC has established itself as a credible service provider to, and support structure for, the industry, unions, government and tertiary education institutions, it is important that the NACI strategy does not duplicate existing efforts, but in fact adds to existing initiatives. Strengthening of the existing programmes and their expansion nationally is therefore a priority.

The rollout of this initiative should be as follows:

- Support and strengthening of an existing initiative and its expansion nationally.
- Existing programmes (these programmes were approved by the AIDC Advisory Board at a meeting on 11 July 2002)
 - Manufacturing support
 - National Tooling Centre
 - Light Metals Development Centre
 - Automotive Metrology Laboratory
 - Human Resource Development
 - Aids/HIV programmes
 - Chair of Life Cycle Engineering
 - Chair of Automotive Manufacturing
- New Programmes
 - Logistics
 - Automotive Vehicle and Component Testing Facility

This is a short to medium-term initiative.

6.2. Human Resource Development

The significant developments and growth being experienced in the automotive sector need to be supported by the provision of adequately and appropriately trained people. However, industry repeatedly highlights the difficulty of meeting this requirement. Human resource development across all disciplines and all levels of education therefore remains a challenge and priority.

There are HRD programmes that have been successfully established and enjoy the support of industry, the unions, Sector Education Training Authorities (SETAs) and government. This type of programme should be extended to a national level.

The rollout of this initiative should be as follows:

- Support and strengthening of an existing initiative.
- Focus on expansion of existing HRD programmes.
- Partners
 - AIDC; the **dti**, Departments of Labour, Education, Science and Technology; MERSETA; and tertiary education institutions in all provinces.

This is a short to medium-term initiative that will collaborate closely with several existing initiatives.

6.3. Impact of HIV/Aids on the Automotive Industry

Unconfirmed statistics put the loss of human resources from HIV/AIDS-related causes in the automotive industry at 1/6th of the workforce per annum. Besides the significant sociological and psychological impact this has on the workforce, the loss of increasingly better trained and more specialised workers will have a direct impact on the competitiveness and sustainability of the industry.

The implementation of appropriate HIV/AIDS awareness, prevention and support programmes is relatively well advanced in the automotive assemblers and some of the larger component manufacturers. However, in the lower tiers of the automotive industry supply chain, almost no attention is being paid to the issue.

The rollout of this initiative should be as follows:

- Support and strengthening of an existing initiative.
- Focus on the implementation of appropriate HIV/AIDS awareness, prevention and support programmes in all tiers of the automotive industry supply chain.
- Partners
 - AIDC; the **dti**; Departments of Labour and Health; automotive industry.

This is a short-term and urgent initiative that will collaborate closely with existing initiatives.

6.4. Life-Cycle Engineering and Environmentally Conscious Manufacturing

The integration of the industry into global supply chains has started putting demands on the industry that were not previously considered as priority issues. Foremost amongst these is the issue of the environmental impact of the industry throughout the supply chain.

The sustainability of South African products, especially with respect to economic and environmental factors, is of increasing importance in a global market. International product manufacturers and consumers of products are progressively evaluating the environmental burdens of their supplier chains. This requires an understanding of the entire life cycle of a product, termed “cradle-to-grave”. At a national level, assemblers are following global trends and consequently moving towards a comprehensive Environmental Management System (EMS), which includes life-cycle management and product stewardship. These imply ownership of a product in the pre- and post-manufacturing stages.

New South African legislation compels industry to disclose information pertaining to environmental impacts when required. However, in the pre-manufacturing stages, environmental information is either unknown or inaccurate and there is a general reluctance to disclose the information. Local assemblers therefore have a high uncertainty in terms of environmental claims that can be made on South African export models when considering the full automotive manufacturing supply chain. Also, in the post-manufacturing stages, the efficiency of fuel usage and related emissions, and end-of-life disposal scenarios, are important for decision support at assembler level, for example to determine the environmental payback period for incorporating a new technology into a vehicle. However, the multiple

destinations of models in local and international markets complicate the requirements for product stewardship within the South African context.

The rollout of this initiative should be as follows:

- A Chair of Life Cycle Engineering has already been established at the University of Pretoria. This initiative would therefore be aimed at supporting and strengthening the existing Chair.
- Focus on:
 - strengthening networks with industry
 - building local academic networks
 - building international networks

This is a short to long-term initiative that will collaborate closely with existing initiatives, and the Production and Cleaner Production Technology groups.