

Tier	Description	Descriptors
	ATE Bombardier Smiths	
Three (Minor sub-system)	A defined assembly of components indivisible into other systems. Examples Aerodynamic control surfaces (flaps) Gearboxes Navigation systems Weapons and ordnances Computer systems Players Denel (Aviation, Kentron and Eloptro) Aerosud	Medium value added products Sub-contractor Medium volumes Medium level human resources Production skills Manufacturing Assembly intensive
Four (Components)	A device with a clear function that is of no use unless integrated into a tier 3 system. Examples Electrical circuit boards Machined engine parts Valves and pumps Players Turbomeca Africa	Medium value added products Sub-contractor High volumes Medium level human resources Production skills Predominantly manufacturing Assembly intensive
Five (Part)	A unit that can be defined as a single monolithic part. In some cases the part has not had any value added to it through for instance assembly or machining processes. Examples Un-machined castings Shafts Rivets Electrical components such as resistors capacitors...etc Players Snecma foundry Denel foundry Westland	Low value added products Sub-contractor Highest volumes Medium level human resources No integration Solely manufacturing No assembly

Source: Blueprint International © 2005

The international aerospace industry is fully globalized and is made up of a few extremely large companies, which dominate. These offer fully packaged systems to both the commercial and military markets as tier one suppliers. These tier one companies then sell the equipment and also support it during its lifetime through maintenance, upgrade/improvement, conversion and repair, and are referred to as the large-scale business and system integrators. The firms in this industry undertake business integration by marketing the products, setting up the sales and fulfilling their contractual obligation to supply a certain number of aircraft by a contractually specified date. They also provide life cycle support on the systems for their clients.

The tier one suppliers are also the design authority and being responsible for the system integration, are ultimately responsible for the sale of the complete aircraft. They hence have full rights to the aircraft type take responsibility for the manufacturing contract and management of their supply chain but they do not undertake the actual manufacturing itself. They are the original wealth creators and the tiered supply system filters wealth back down the supply chain. If one considers the value chain, as backward movement to the lower tiers occurs, there is increasingly, higher volume and lower value production. However, this is still higher value added manufacturing than in most other industries even at the tier five level.

The high-tech nature of aerospace equipment, the stringent quality and safety standards and high R&D spend is found in all of the five tiers, and is higher than in most other industry sectors. Also the value added component even when defined as being low, is still significantly higher than in other industries as a rule. It is clear that the development of an aerospace sector in South Africa would require support from an advanced and capable tooling sector if it were to be successful even at the lower tier level.

Table Twenty-Three: Industry Statistics

US\$	Aerospace and Defense	2001	2002 (estimated)	2003 (projected)
1	Total market size	2,150	2,200	3,240
2	Total local production	780	850	950
3	Total Exports	650	750	810
4	Total Imports	2,020	2,100	2,100
5	Imports from the US	650	400	430

Source: CSIR (2003)

Medical Equipment

The medical equipment and devices market is estimated at \$ 418.25 million (Table 1 below). This represents approximately 7.5% to 10% of healthcare expenditure. Industry analysts estimate an annual growth rate of 13% over the next three years. There is very little local manufacture of medical equipment and information is therefore very scarce.

Table Twenty-Four - 2002 Figures

SUB-SECTOR	ESTIMATED MARKET VALUE
Medical Devices	266.16
Magnetic Imaging Devices	95.06
Dental Supply Industry	47.53
Ophthalmic Supply Industry	9.50
TOTAL MARKET	418.25

Source: South African Medical Device Industry Association.

Syringes are manufactured in SA and basic hospital products of steel and stainless steel like beds, bowls tables, trolleys etc. A important point on the syringe manufacture side is that plastic injection moulds have traditionally been imported but the survey indicates that these are very expensive and local converters are considering try-outs on local moulds for the future purchases.

White Goods

The white goods industry is classified by the Department of Trade and Industry as part of the electrical and electronic industries. These industries include the manufacturing of:

- electrical goods, such as electric motors, transformers, distribution equipment, and solar power units;
- electronic goods, such as telephones, radios, digital satellite TV, auto electronics, and security control equipment;
- information technology, such as computer hardware, software and terminals;
- household electrical appliances, including small appliances (toasters, irons, hotplates),
- brown goods (TV sets, hi-fi's, etc.), and white goods.

White goods generally refer to household appliances such as refrigerators, stoves, freezers, washing machines, tumble dryers and dishwashers. Traditionally, South Africa imported white goods mainly from Germany, Italy and the USA. However, recent evidence shows that imports from countries such as Korea and China have also increased dramatically. Whilst export volumes of white goods increased by 30% per annum during the 1990s, still only 6.4% of white goods manufactured in South Africa were exported in 1998. These exports were mainly destined for Zimbabwe, the CIS and Mozambique.

A major importer of white goods is a Korean company, LG Electronics. In March 1997, LG launched an rebranding programme in South Africa as part of a broader programme to change the GoldStar label to LG. Barlows Appliances had acted as local agents for GoldStar products since 1991, but in 1996, LG Electronics took direct control. An initial R18 million was invested to upgrade local personnel, information technology, and service and delivery systems. A further R5 million was spent on advertising campaigns. According to a report in the *Business Day*, ALG electronics had no immediate plans to manufacture any of its products locally, and all products would be imported from Korea, but a manufacturing plant could be established in the near future if demand warranted it.

According to the report, the company regarded South Africa as a springboard to the rest of Africa. However, sales of washing machines to markets north of the South African borders had proved to be disappointing. LG products include washing machines, refrigerators, and ovens. In 1996, the company announced that it would invest \$77 million in a plant in China to manufacture refrigerators and refrigerator compressors in partnership with the Chinese company Chunlan Group.

According to the IDC, there are an increasing number of foreign distributors of well-known and cheaper international brands present in South Africa. Also, South Africa does not have a significant white goods component industry. Components are generally imported, and this makes the industry vulnerable to currency fluctuations.

The manufacturing of white goods links upstream to the steel, plastics, and electrical components. Steel products account for 32% of inputs for household refrigerators and freezers, 29% of inputs for household laundry equipment, and 19% of the inputs for household cooking equipment. Between 1991 and 1998, the white goods industry consumed 105 267 tonnes of steel on average per annum. Its share of total domestic primary steel sales is 3%. Downstream it links mainly to transport and retail.

The output of white goods production has not significantly increased during the 1990s or the early 2000s. The value of exports has increased slightly in volume, but also because of a depreciation of the rand. According to the IDC, the industry also has extremely low levels of capacity utilisation. However, since the publication of the IDC's report, there has been a concentration of the industry, with several factories closing down, while remaining factories have increased output. At these remaining factories, output is increased through the use of additional shifts, mechanising production, and through machine-paced production. There has been some foreign investment in the industry, particularly from Whirlpool, who bought a locally owned loss-making firm. Mostly, relationships with major multinationals are structured through licensing agreements.

Competitive Analysis – South African TDM Industry

Competitiveness for the South African Tooling Industry platform includes consideration of its ability to produce competitively for its local customer base, the ability to compete with growing importation of tooling and the ability to export. Consideration needs to be given to both the macroeconomic and microeconomic factors which impact on competitiveness of the tooling industry and its comparative competitiveness with other major tool producing and exporting countries.

Competitive advantages

Material supply and cost

Material supply of specialised tool grade and mould steels is undertaken by a limited number of local distributors of international producers (e.g. Germany) and there are no local producers of the steels needed. Prices for South Africans are approximately the same as those paid by all major tool producing and exporting countries. Consequently South Africa enjoys no advantage in terms of material supply or cost, and in fact, may be at a disadvantage given the lead times for ordering of materials.

Labour costs

South Africa's average Toolmaker wage of R85/hr (2003) compared with leading tool export countries puts it higher than Korea (Eu5/h) but in the same range as Portugal (Eu11/hr). The gap has closed on major export markets since 2001 where South Africa's average toolmaker wage was about 25% of USA's (Eu24/hr), and less than 50% of that of Germany (Eu 14/hr) to a position where it is 70% of Germany's wage and 60% of the USA's rate which dropped to Eu 17/hr from 2001 to 2003 (*ISTMA 2003*). The current average wage is R100/h and expected to rise to R110/h. It is rising more rapidly than competitors or export markets.

Although South Africa still enjoys a competitive advantage against US and EU producers, the skilled wage rate advantage has been largely neutralised against lower cost producers and at the present rate of increase will become negative over the next three years. This increase is largely skills shortage driven.

Labour costs still represent the highest single component of production costs of South African and global producers with the exception perhaps of low wage producers like Korea. In SA the average is 55%, the ISTMA (2003) average stands at 40.2% with Korea the lowest 21.3%, China Taipei 24.2% the USA 50%, Germany 46.5% and the UK 38.2%. Finland is the highest with 61%.

Skilled labour costs (combined with labour regulations) are the main factor driving direct foreign investment in tool, die and mould-making (*United States International Trade Commission, Investigation No 332-435 Oct/2002*).

Tool-making Expertise and Export Competitiveness

Tool, dies and moulds in SA are produced mainly from imported tool grade steels and mainly by small to medium sized firms, however the level of tool-making capability and competitiveness of some of these companies is such that they are able to export to countries such as Germany, the UK and USA. These are the most consistent export markets for SA tooling. This is an indication of South African capability and the potential for competitive advantage which can be expanded. There is potential for growth which could be developed if the tooling-manufacturing platform is strengthened.

Local Market Size

Trade statistics for tooling (*Comtrade 2004*) indicate that R1,236 Million of tools, dies and moulds were imported against exports of R406 Million. The local production of tooling is approximately R2,500 Million, which gives a local market size estimate of R3330 Million in 2004. This is a sizeable platform from which to build a growing tooling industry sector. It also presents significant import replacement potential with imports of R1,236 Million against a total market size of R3,330 Million, which provides opportunity for import replacement of almost R2,100 Million in South Africa. This is the equivalent of increasing present local tooling production capacity by 84%, almost double the present production value, and also the levels of skilled employment.

Preferential International Market Access

The preferential market access treaty signed with the USA (AGOA) and the Free Trade Agreement signed with the European Union (1999) makes SA a more attractive location for Foreign Direct Investment (FDI). This should also be understood in the context of USA and EU markets representing more than 60% of the global import market for tooling.

Infrastructure

Electricity costs in SA are amongst the lowest globally. TDM manufacture is relatively energy intensive and therefore this will confer some level of advantage. However, South Africa is running out of capacity and the cost of electricity is likely to increase in the medium term (5 years) and this advantage may fall away.

Land and Buildings

The cost of industrial land and business premises in South Africa, whether owned or rented, is comparatively low and even amongst the lowest when compared to global competitors of tooling and FDI, and therefore confers some level of competitive advantage.

Technology absorption and application

The technologies employed by South African tooling companies (with certain exception) are not at the level of global competitors. The ability to acquire, absorb and utilise the required tooling technologies however is good, especially through technology transfer from capable institutions of technology and international partners.

Incentives

The Motor Industries Development Programme (MIDP) is a South African incentive programme for automotive sector companies exporting components and products. It includes tooling required to produce automotive products in its incentive scope and is therefore indirectly supportive of the tooling industry due to demand for tooling created by development and production of automotive components.

The SMEDP Programme is beneficial for start-ups and a single expansion thereafter and provides an advantage in these circumstances. It is not, however supportive of or suited to the continual technology renewal capitalisation required by tooling companies for machinery and equipment upgrades (CAD, CAM, CNC and Metrology).

Incentives for competitiveness improvement and capacity building and training can be beneficial to the tooling industry if delivered effectively. These include the learnership incentives through MERSETA and the various DTI funding programmes such as the Sector Participation Fund (*Refer Appendices for detail*). These incentives may also become a powerful overall support mechanism if combined in a practical package for the TDM manufacturers.

Training Institutions

Good technological training institutions do exist and if supported with industry relevant curricula and learnerships are a potential base for a nationally coordinated skills development intervention.

Competitive disadvantages

Transport & Logistics

Domestic transport costs are high and efficiencies low by global standards and undermine competitiveness. This especially impacts on imported material and component transportation and

tooling exports from Gauteng, which is far from the nearest port. However, it affects all TDM clusters in South Africa to a greater or lesser degree.

Communications

The cost of telecommunications in South Africa is still very high by global standards, mainly as a result of monopolistic pricing behaviour by the only service provider and a relatively closed regulatory environment. This is expected to improve as Government increases competition in the sector through the introduction of the Second National Operator (SNO). From a technological operations perspective communications technical requirements meet global standards.

Import parity pricing

Local steel manufacturers and producers of other conversion process input materials such as aluminium and polymers practice import parity pricing (IPP). As a result, countries such as China, South Korea, Taiwan and Japan have an approximate 25% advantage over South Africa in raw materials cost in the conversion processes. This detracts from FDI being attracted to the conversion industries, which will inhibit growth in the tooling industry.

Skills

South Africa's skills base is low by international standards and does not constitute a competitive advantage over its global counterparts. There exists a shortage of skilled workers in the area of TDM manufacturing, quality, project management, and design at all levels. Even basic training and skills development infrastructure do not exist or are below standard.

Production Costs

South Africa's production costs are higher due to a lack of modern capital equipment and less than optimum capacity usage (South African industry invests less than 5% of sales in new machines compared to Korea (7.6%), Portugal (8.5%) and Italy (13%) (*ISTMA 2003*).

South Africa has a progressive labour law system that is intended to regulate the workplace. The labour regulatory environment includes progressive labour law and structures such as the CCMA whose mandate is to provide labour and employers with a platform for negotiation and an independent view on unresolved labour issues.

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SMME's, by the nature of their structure and relative shortage of resources, do not always have the expertise and resources needed to interpret South African labour law and hence can sometimes perceive them to be cumbersome and restrictive in nature. In the Tool and Die sector, the relevant industry governing body should consider assisting its members with relevant information around labour regulations and interpretation thereof.

Additionally, this sector is not labour intensive thus will not necessarily directly develop large numbers of jobs - it is a skills intensive sector. The sector contributes extensively however to back stream (metals and plastics) and downstream (automotive, capital equipment and the like) sectors.

Regulatory obstacles

At present, of most significance is South Africa's restrictive immigration law, which is coupled to the imperatives of affirmative action and Black Economic Empowerment. However, this is not conducive to attracting high-level core skills/expertise, which do not exist in South Africa and are required to staff tooling enterprises and transfer capacity and technical capability.

South African Skills in TDMs

South African labour profile has been characterized by high unemployment, negligible job creation, low use of technology as an abler to improve efficiency and productivity, poor forward planning and development of future skills. The globalisation and opening up of the South African economy has exposed the shortfalls of the skills profile of the current labour force.

Table Twenty-Four: Trends in South African Employment

Trends in employment, 1991 - 2000

Sector	1991-1995 (percentage change)	1996-2000 (percentage change)	1991-2000 (percentage change)
Primary	-2.5	-5.2	-3.5
Manufacturing	-1.2	-3	-1.5
Services	0.3	-0.7	0.1
Total	-0.5	-1.9	-0.9

Source: Trade and Industry policies and Strategies (TIPS Standard Database 2002)

The data starkly illustrate the 'jobless growth' that has characterised the South African economy in the post-1994. In a context of buoyant export growth averaging 5.5 per cent per annum in aggregate and 11.2 per cent per annum in the manufacturing sector, the absence of employment growth appears to be a perverse outcome

Table Twenty-Five: Sectoral employment totals, 1995 and 2001

Sector	1995	2001	2001 as % of 1995
Agriculture	1184712	1051000	89
Mining	432857	487000	113
Manufacturing	1420956	1605000	113
Utilities	84041	95000	113
Construction	433492	594000	137
Trade	1650017	2397000	145
Transport	469200	543000	116
Financial	582897	975000	167
Community services	2151382	1988000	92
Domestic	800887	1055000	132
Unspecified	186601	43000	23
Total	9397042	10833000	115

Source: Trade and Industry policies and Strategies (TIPS Standard Database 2002)

According to Lockwood (2002), the changes in the structure of the economy has meant a shift in the productivity base of the economy, shift in the type of labour demand and consequently reduced the demand for unskilled labour. The figure below indicates the main sectoral shifts during the period 1995 – 2001

Table Twenty-Six: Dominant employment sectors by percentage share of total employment, 1995 and 2001

Dominant Employment Sectors	% of total employment 1995	% of total employment 2001	Change in share 1995-2001
Community Services	22.89	18.35	-4.54
Trade	17.56	22.13	4.57
Manufacturing	15.12	14.82	-0.3
Agriculture	12.61	9.7	-2.91
Financial and Business Services	6.2	9	2.8

Source: Trade and Industry policies and Strategies (TIPS Standard Database 2002)

Table Twenty-Seven: Private and public sector employment growth, 1995 – 2001

Sector	1995 employment	2001 employment	2001 as % of 1995
Private Sector			
Mining	432857	487000	113
Manufacturing	1420956	1605000	113
Construction	433492	594000	137
Trade	1650017	2397000	145
Transport	469200	543000	116
Financial	582897	975000	167
Total	4989419	6601000	132

The TDM Industry has been experiencing the same skills challenges as those in the broader manufacturing sector. In addition the tooling industry has its own unique problems/challenges to face. There is a skills deficit at the higher levels, with increased skills erosion within the sector either through emigration or retirement. The retired persons have a great deal of experience in tooling, while the young emigrants are qualified in design, engineering, ICT, Metrology, Project Management and the like, which are some of the key skills required in the modern tooling industry. The industry is seen as unable to attract young qualified tool makers within the country and elsewhere.

The preliminary research suggests that there is a lack of a comprehensive human resource development strategy for this industry, hence the proposed National Tooling Initiative. There is no comprehensive human resource strategy that is sector based and is meant to deal with all the facets of skills development in both the short/medium and long term.

There is very poor data on skills deficits and skills availability in the Tool and Die industry and this represents one of the major gaps identified in the gap analysis when identifying data requirements. According to research conducted, for the 800-1000 companies associated with the SA Tooling Industry, there is no comprehensive and complete data on the levels of employment, productivity, wage levels, and skills base and needs. The Merseta says it is in the process of compiling a comprehensive skills profile within the sector.

The Tooling Industry is predominantly SMME driven, and some believe it can be defined as survivalist with tool rooms still use old /traditional approaches as opposed to modern technologies. Skills Development within the industry has focussed on surviving as opposed to bringing in new entrants and developing staff. Due to the economic down turn many companies either reduced or completely stopped taking on learner toolmakers altogether to reduce costs. In addition very little in-house skills development has occurred within the sector either due to the survival mode or too little guidance and commitment to people development. Machine operator training and skills levels are perceived to be of very low quality, limited to small pockets of excellence. Equipment is generally under-utilised or used inefficiently. Old fashion tool making methodologies are used that may not be cost effective, and there is poor application of technology.

Although there is no data to support this as yet, it is believed that there are low numbers of black and female South Africans in the sector. A major factor limiting the numbers of people entering the occupation is that many young people who have the educational and personal qualifications necessary to learn tool and die making may prefer to attend college or may not wish to enter production-related occupations or simply are not made aware of this Industry. There is little information provided on tool making as a career and the perception of a toolmaker is an unsophisticated greasy type of occupation. The average age of a toolmaker is currently 48 –55 yrs.

The FET institutions appear to be inadequately equipped to train young people to the standards required for the future of the industry. In a SWOT analysis undertaken previously (AIDC and CSIR,) one of the strengths identified in the industry is the existence of the various FET colleges within the provinces. The problem appears therefore to be less the availability of the institutions and more the type of training that is offered and its relevance to the industry.

Some believe that there is a need for a closer alliance between the industry and FET institutions to ensure that the type of products they produce are more inline with industry needs. The current training of artisans such as millers and turners is viewed by some members of the industry as being of an inferior standard which will not prepare the learners for the new technology competencies required in modern tool rooms. Artisan training in the country used to be a major initiative driven by both the private sector and department of manpower pre-apartheid. Post apartheid very little effort has been given to artisan training. There is no skills development programme for grinding in South Africa.

TDM Skills Position

For various reasons, such as emigration and retirement and poor industry image, there has been an ongoing and significant skills loss from the TDMs over the last years. In 1984, there were 120,000 registered apprentices, while in 2001 only 1,200 apprentices were registered. Today, the average age of a qualified tool maker is 50, but the replacement numbers coming through the system are completely inadequate to meet the industry's needs.

The Tool and Die sector in South Africa is plagued by several challenges that threaten its survival. The first major challenge is to increase the human resource within the sector. Specifically, the challenges are to increase the skilled human resource that will be able to take the industry into the new millennium. Secondly the industry has to constantly renew itself and take on new ways of doing work. This means the use of technology driven solutions both at the production line and at the design stage. Thirdly, the industry has to deal with post apartheid globalisation trends that have increased the number of competitors who either bring into the country products that are cheap but may have inadequate quality. There are sub-challenges: for instance, the way people are currently deployed in the sector has increased the cost of labour and thus in some instance has made some tool rooms uncompetitive.

The very limited availability of information on human resource development within the TDMs required Blueprint to undertake a survey. The focus of the skills research aspect of this survey included the following key areas:

- Type of skills required

- Type of skills being developed currently
- Ability of the industry to source the required skills.
- Skills loss
- Investment in skills /people development
- Skills /Labour Cost
- How skills/human capital is deployed (Way of Work)

The Tool and Die sector is dominated by single owner or family owned businesses. Typically, the owners are either persons who have learned the trade either from their own parents or mentors who have been in the industry for a long time and have been taught by a mentor. Most of the toolmakers are white males over the age of 55 (*source MERSETA*). Traditionally, toolmakers have learned their trade via apprenticeship within South Africa or overseas.

There are tool rooms that focus only on TDM, and tool rooms, which form an integral part of production, which occurs within the company (in-house tool room). This is a significant point for the skills development process.

The organisational structure of a typical tool room indicates an organisational structure that is both centralist and hierarchical. This means that they are organised where at the top of the hierarchy, there is a boffin/guru/ senior tool maker who will indicate how things are done and in essence set the tone and culture of the tool room. In South Africa, this usually is the owner of the tool room.

The tool rooms are unionised even though there is no centralised bargaining chamber. The tool room owners and management cannot easily source appropriate human resource management and development information including labour relations acts and other relevant compliance legislation. The current skills development strategy of the government that has replaced the old Industry Training Boards etc has caught this industry unprepared and has placed some compliance requirements that the tool rooms are not geared to deal with, as they have no resources.

Tool rooms are task/project driven - this means the tool room organisation, is dictated by the type of projects that need to be undertaken. Thus the operational structure is fluid essentially as project or task driven. Tool making cuts across so many sectors from plastics, aviation to pharmaceutical, it is not easy to coordinate. There are many stakeholders with often-divergent agendas. Developing training unit standards proves to be difficult.

Education and Training Limitations

Training for TDM skills is inappropriate and often non-existent at FET level and there is virtually no awareness at secondary education level of tool making as a career option. There is no standardised training curriculum process underway. The quality of teachers within tertiary institutions pertaining to this skills set is poor and insufficient in numbers. The teachers who teach have no industry experience and in addition learners use old machines for experiential learning which have no current application in the workplace.

There are some initiatives under way to attempt to address these issues. Initiatives under way include:

- The Tool making Association of South Africa has been established. The association is focusing on several initiatives including human resource development

- The tooling upliftment initiatives in the Western Cape- Wingfield College; KZN -Umbumbulu College; Free State; PE Border technikon; Gauteng - Soshanguve College.
- The focus of the tooling upliftment initiatives is to develop young learner toolmakers with the view of having a pool of toolmakers for the industry.
- National Tooling Initiative driven by TASA (Toolmaking Association of South Africa)
- Proposed National Tool Technology Transfer and Development Centre and CoE.

When the industry is viewed as a series of potential linkages to enhance productivity and co-operative arrangements (and which may be essential in an industry which is said to comprise over 90% SMMEs) this is one way of factoring in skills development, given that many experts note that it can take up to 15 years to train a fully competent tool and die maker for today's industry.

Within the South African tooling industry many believe that to develop the requisite skills to be a toolmaker and designer it must be an incremental process with clear milestones at each level, and that it must be a multi-pronged process. By multi-pronged it is meant that there would be different interventions at different levels:

- **School Level:** Focus on Introduction of the Importance of Tool making. Emphasis on Mathematics and Science.
- **Tertiary Institutions:** Focus on Tool making and Tool Design as a career choice.
- **Current Employees:** Up-skilling and Learning to use new technology to increase efficiency and effectiveness.

This would mean from entry level to expert level the whole process should take at least seven to ten years. The incremental approach is in line with the NQF framework and allows learners at each level to be qualified. Each level has an exit option with a recognized qualification (from basic to advanced) and all levels have clear articulation and credit transfer for vertical mobility and career pathing. Clear considerations for links from general education through to further education to higher education are apparent in this model as is alignment with the unit standards generated through the Merseta.

Key Survey Findings

The information in this section is both quantitative and qualitative and based on 65 TDM industry interviews undertaken nationwide. (Refer CD for respondent lists)

Regional Spread- Interviews

Table Twenty-Eight: TDM Skills Interviews

Province	Number of Interviews
East London	8
Gauteng	20
KZN	10
Port Elizabeth	13
Western Cape	10

In addition seven high-level interviews were conducted with TDM CEOs and 20 customer interviews in the automotive, plastic, metal and glass packaging, electric fittings, medical and household appliances sectors within Gauteng, Kwa Zulu Natal and the Eastern Cape. Furthermore, another 25 telephonic interviews were conducted with TDM's and customers in all the regions. A total of 113 interviews were conducted.

There is a shortage of certain critical skills. The majority of respondents indicated that whilst in general there was a general shortage of skills in the tool and die sector, in certain areas the shortage is having a negative impact on the productivity of the tool rooms. The table below highlights the critical skills shortage stated in order of importance by respondents.

Table Twenty-Nine: Critical Skills Shortages

Identified Skills	Priority (number of respondents)
Tool makers	1 (49)
CNC Programmers	2 (38)
Tool designers	3 (35)
Plastic Mould Makers	4 (10)
Fitter and Turner Fitter and Turner	5 (9)
Vertical machine Operators	6 (2)
Metrologists	Priority high
Project Engineering Managers	Priority high

Machinists are seen as being available in the market but the industry indicated that there is no pool with qualified skilled personnel that can easily be deployed. The process is more labourious in that most of the people they source still require training on the job and this means for at least six to twelve months the tool room will not get its return on investment on the skills acquired. This is due to a multiplicity of factors but most prominent is inadequate formal training and the small pool of available qualified toolmakers and tool designers.

The majority of the respondents indicated that existing skills lost to South Africa arise primarily from young white males who leave the country to seek better opportunities overseas as there is a worldwide shortage of tool makers and tool designers. Most leave for Canada, the UK and Australia-essentially, English speaking countries where opportunities exist.

Over 65% of the TDM industry spends 1% or less of its total HR budget on skills development. This is in part due to the difficulty for SMMEs of accessing the often cumbersome programmes offered

The focus of skills development in the industry over the last five years has been primarily on “on the job” training (65%). TDMs also focused on apprenticeships (20%) , Quality Control (QC) training (10%) and Machine Operating (20%). As a result of limited record keeping and the nature of this training, it is difficult to accredit the learners for progress as per the National Qualifications Framework (NQF). This would suggest a need to a strong system of prior learning recognition, as well as the implementation of trade and competency tests that are recognised.

Most TDMs believe that it takes 5-6 years to develop a competent tool maker (70%) with 22% indicating that over 6 years is required and 8% indicating that 3-4 years is sufficient. Sub contracting of overseas personnel is generally not undertaken (92%) although a small percentage use overseas skills occasionally- the main reason for such limited use of overseas skills is the cost. Other barriers to the use of offshore skills cited were language, relocation costs, lack of ability to recruit and inability to test competency.

Respondents indicated that technology shifts in the industry have increased the need in South Africa for higher order skills (outlined in the international section of this interim report) such as CNC operators and estimators. The most outsourced skill at the moment in the South African TDM industry is tool design. This is consistent with international trends- designers are often outsourced due to cost. In South Africa, availability is also an issue. Finally, temporary labour is used during periods of high production activity, and some tool rooms share labour. The majority of employees (60%) have skills in more than one area, according to respondents and are able to multi-task to some degree- essential since there are skills shortages.

From the skills development process perspective, respondents want personnel to enter the industry with at least the following:

Basic Feeder Skills

- Technical Acumen
- Theoretical information on TDM
- Practical/applied maths
- Science
- Solid understanding of the basic fundamentals of tool making

In addition the respondents unanimously indicated that there is a need to start people at primary school in technical thinking and orientation. This was viewed by all as essential to increase the numbers of toolmakers and tool designers in the country. Higher order skills noted by respondents were computer skills (28%), technical drawing (43%).

When asked to highlight what kind of support they felt the industry requires to re-invent itself, the following comments were received:

- Government should centralise tool making training, improve on the curricula, enhance quality of the teachers and do both theoretical and practical training (43%)

- Respondents were angry about the introduction of the skills development act and in particular the MERSETA. They felt the SETA was not assisting them and was not providing them with requisite information on skills development levy, possible training rebates and the new skills development structure. (32%)
- 18% did not know what exactly the government could do to assist or support.
- 8% indicated that there was no sufficient government incentive for tool rooms to train young apprentices
- 8% reported that they have not met any of the apprentice inspectors who are supposed to assess the quality of the apprentice training they offer.
- 3% believed the current tool making apprentice training process and structure is racist and favours black South Africans, and is responsible for lowering industry standards.

Implications of Findings

Based on the survey findings and desk research it is clear that there at least four areas that require attention in the formulation of a skills development and retention strategy for the TDMs.

The first area is *the configuration of the structure of the tool rooms and the way they work*. Tool rooms are still run using old technology that promotes use of old machinery and old methods of doing work. Whilst this may have worked in the last decade, it will not be appropriate to ensure the industry survives in the future. The challenge is to start increasing the training of using computer driven technology for solutions. This does not mean the old traditional methods must be abandoned but rather adapted. Collaboration and scarce skills sharing will be important and this has implications for the spatial characteristics of the TDM industry.

Tool rooms don't have the capacity to do their own training nor do they have the resources to permit their own staff to be absent for a long period of time. Additionally, tool rooms are project driven (jobbing shops) and there is little room for formal skills transfer. The younger or new entrants with theory will need to do a lot of repetitive work to master some of the skills with minimum supervision. This is most probably easier in tool rooms that have a production line than in tool rooms where the focus is on tool making. This means that a mentoring system is likely to be the most efficient system of fast tracking skills development.

Finally, tool rooms have limited or no tool designers who are permanent staff. This means tool design skill is lost and resides in a few consultants who are currently charging between R100 – R150, 00 per hour (and often more). Whilst tool making is currently regarded as the most critical skill, in the next five years tool design skills will be wiped out of South Africa. Metrologist skills are also very scarce and at risk.

There is no evidence of effective and formal training programme happening within the tool rooms. At least 80% of the respondent interviewed indicated not to have any formal training. This was confirmed by the interviews with tool and die human resource specialists. Current training structures are not responsive to TDM industry needs. According to the survey results, universities train learners in broad engineering theory with little or no emphasis on tool and die or practical learning. The MERSETA reports that the closest training to industry requirements can be sourced from training

colleges. However the problem experienced at this level is that technical colleges use old technology and have inadequately trained lecturers. Additionally, the current updating of the curriculum process is too cumbersome and too slow. The MERSETA does not seem to have the capacity to monitor and coordinate the current training initiatives either initiated by the individual Tool Room or the Tool Making Association and there is currently poor or no communication between the training authorities like the MERSETA with industry; technical training inspectors have not visited the sites where apprentices are being trained. Specialist skills areas, including Metrology and Project Management, have not been addressed by the Skills development authorities at all.

TDM Skills Development: Recommendations

Industry Level

It is recommended that the training of toolmakers should be the focus of the MERSETA and other related training colleges. Tool rooms should be used for time bound experiential learning within a mentoring system. The skill of tool design should be regarded as one of the critical shortages in the country and a forum that includes MERSETA/Technical Colleges and TASA should be initiated with a focus on tool making, tool design, metrology, project management curriculum development and accreditation. Industry and MERSETA as well as other role players such as the DST, DTI, DOE, DOL and Tertiary Education Institutes should be working more closely on assessing training colleges capacity to train on tool making, design, metrology, project management and develop an aligned national strategy and should invite sector experts locally and internationally to speak on current Tool making and Design, metrology, project management training techniques as part of up-skilling the lecturers and curricula. Clinics should be held for apprentices and an extensive mentoring programme developed. Curriculum overhaul is needed and should be undertaken in a MERSETA /Industry /Training Colleges partnership on curriculum development and the MERSETA should use the National Skills Fund initiative to establish Tool and Die centres of excellence.

National Level

The research indicates that South Africa 's competency strength lies in the lower end of the scale and needs to strengthen our capability in the high value skills. However for this to occur different interventions need to be in place to up skill current staff, introduce international knowledge and skills within the sector. An integrated approach is required to fast track skills development at a high level. This would suggest not only classroom learning but also mentoring and coaching.. In some instances learning may include attracting retirement professionals, importing skills from overseas with a clear skills transference agenda and plan. The current Immigration Act seems to take into cognisance the need to infuse new skills to the country.

This sector has as yet not attracted young talented black and female entrants. In fact those who have ended up in this sector have either heard about it from their parents who are currently working in the tool and die sector or they joined the ranks as unemployed persons. It is clear that an information and image enhancement campaign is needed. The industry via TASA has the ability to market the sector and make it more attractive. However it seems likely that the industry would have more success if it partners with key institutions that are already promoting mathematics and science. Our research indicates that there are a number of NGO's that promote these subjects in most of the major provinces such as Gauteng, Western Cape, Kwa Zulu Natal and Port Elizabeth. In addition TASA could partner with the Science council whose core focus is science and technology and which

has formal programmes to promote mathematics and science at both primary and secondary level. The government department that should lend credence to such programmes must be the Department of Science and Technology. However research indicates that over reliance on the government department may not yield the desired results expeditiously.

South African TDM investment

This section is focused on findings based on investment interviews (survey) conducted with the key investment specialists on the subject of investments in the tool & die industry. The local industry faces a huge task of developing and building capacity in both new and existing tooling companies. The current indication from customers of tooling and market demand trends is that the majority of the tool and die products are imported. This is in line with the trade statistics and provides an opportunity for local investment itself.

The interpretation of the current institutional development scenario indicates that South African Investment institutions have not paid specific attention or focused on the industry as a potential investment sector. In addition, there is a shortage of necessary skills and capacity to allow for major investment and growth in the sector and this will need to be addressed concurrently with new investment.

The investment interviews conducted were with identified institutions such as: GEDA, RMB, Investec, SEDA, ECDC, Durban Investment Promotion Agency, KZN Trade and Investment, Wesgro, NAMAC (and KZN, EC, WC MAC's) which could consider investment in or support of the tooling sector. Generally there is little knowledge or understanding of the tooling sector amongst investment agencies and this exercise could not give us much substance to effectively conclude the subject except to inform the research team that more needs to be done by the tooling sector to promote itself as a sector with investment opportunities to Government and private agencies. This is part of what this research project will try to achieve through its recommendations on Government support. It is also in the context of investment, important to note the underpinning strategic nature of the tooling sector to manufacturing as a whole. More interviews might need to be undertaken with the TDM's with regard to investment specifically, to assist in creating a proper information base to plan the way forward for the industry in relation to investments.

Findings

Most inland provinces do not have extensive manufacturing capacity - Limpopo, Mpumalanga, Free State, Northern Cape and the North West. This is mainly due to lack of access to logistics & transportation infrastructure to dispatch goods for either imports or export. Thus this has a bearing on the existence of supporting industries. Some investment is linked strongly to the location of manufacturing plants logistical location or position.

The coastal provinces currently have established transportation logistics to effectively make business more viable with less cost on transport and freight. The same issue of freight affects the issues of input materials and access to the correct quality of tool steel. These provinces are constantly under development with heavy construction, thus the market is expanded each time there is development and new industries developed. The most critical issue raised was the development of new players or young toolmakers and retaining the old toolmakers within the country through incentives that they could be able to transfers skills to the young toolmakers. This is the one issue that is significantly impacting on the investment patterns, trends and growth of the tool & die industry in South Africa. An international company that was interviewed highlighted that it is being asked by their major customers to be "ISO certified" – an elaborate and costly quality control program that is often beyond the capabilities of the very small shops. Non-ISO certified shops are being told by their customers that they will not get jobs in the future.

The tool and die industry has witnessed rapid technological change in recent times. The ability to use new technologies is increasingly becoming important for competitive advantage in the industry. However, these machines are very expensive and often beyond the reach of very small shops. Some of these shops do not get jobs because they lack new technologies, but, ironically, they cannot purchase these machines because they do not have enough jobs! The competitive advantage of the local shops also seems to be eroding due to rapid technological change. In the past, South African toolmakers used to take pride in their skills and dexterity. However, technological change has resulted in automation and deskilling in the industry. Thus, the Chinese, who now have access to the new technologies, are able to achieve the same or double the level of productivity. Combined with their low wage and overhead costs, the Chinese are now able to gain competitive advantage over South African manufacturers.

Toolmakers have been slammed by a brutal combination of a stronger Rand and the various trade agreement between SA and other well developed countries that leaves consumers and businesses purchasing less and a relentless drive by big, international manufacturers like General Motors Corp. and aerospace companies to slash tooling costs. This highlights the fact that more tooling companies are finding it difficult to compete in the global village and with companies from countries that have subsidies for such industries. Thus it is deemed paramount for trade regulations and import tariffs to be revisited by the government to favourably assist local companies.

Input Material

Input Material industries needs to be developed in South Africa to sustain the supply of raw material for tooling. Explore the possibility with Mittal Steel of local manufacture under license of Tool steels.

Plastic Tooling

The required investments would include the development of markets and purchasing of new equipment by companies and this will improve the company competitive index ranking. This warrants the establishment of an industry focused finance house that will assist the purchasing of latest technology equipment. An evaluation on export readiness and investment attraction must be done to companies in this sub sector, to determine their competitiveness to market specific capabilities for Foreign Direct Investment and mergers or collaborations with international tooling or related companies. Investments Promotion Agencies like Trade & Investment South Africa (TISA) will be fundamental in this exercise

OEM (Automotive, Aerospace, Military, Medical & Mining)

Local tool shops will have to invest in international standards accreditations (ISO, etc) for improved competitiveness and reliability on quality production for the OEMs.

Critical Government Support

It has been explicitly proven that there is a huge shortage of skills training and product research and development. The development of a toolmaker course for the injection of more specialists in the industry to curb skills exportation to developed countries. This should be done closely with institutions of higher learning and Technology based Universities. There has to be the establishment of funding mechanisms that focus on the development of the tooling industry and cooperation on common marketing approach as per the improved value chain. Working with universities will also provide the much needed management development to the tool owners and bring the element of entrepreneurship. Access to industry-focused incentives is critical to attract foreign investment.

South African TDM Summary SWOT Analysis

SWOT Summary- South African TDM Industry

It is clear from the analyses undertaken and described earlier in this report that the South African TDM industry is at a crossroads. On the one hand, the presence of powerful downstream customers, particularly in Packaging, Automotive and Aerospace offers a substantial body of demand into the foreseeable future, if the industry can reinvent itself in technology and quality terms. On the other hand, such a reinvention is a major task- since attempts to rebuild the industry will occur in an ever more competitive environment. The SWOT analysis below summarises the key findings of this study for the South African TDM industry.

Figure Thirty: SWOT Analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Industry leadership through TASA ■ Multi-Stakeholder approach ■ Strategic involvement of Government ■ Electricity – low cost ■ Labour - Cost of skilled labour ■ Empowerment Capital ■ Infrastructure strengths –telecommunications & transport ■ Technology –use new technology ■ Manufacturing capability ■ ICT - availability of ICT technologies ■ Training Institutions – good technological training institutions ■ Markets – Local ■ Automotive ■ Packaging ■ Markets – Export untapped African markets 	<ul style="list-style-type: none"> ■ Material Supply – Tool grade steels imported. ■ Local mild steel IPP ■ Local Transport/ Logistics comparatively expensive ■ Distance to market for exports outside African market ■ Availability and cost of capital ■ No local production of Tool & Die machinery and equipment ■ Tool making equipment imported ■ Lack of Government funds to establish the support platform ■ New technologies – investment in new technology development low ■ Market dominance by customer sectors ■ Skills shortage ■ Skills Development ■ Skills Providers
Opportunities	Threats
<ul style="list-style-type: none"> ■ Raw materials - SA potentially capable to manufacture tool steel grades and move away from import parity pricing. ■ Export Potential – Africa and international markets ■ Import replacement – could increase local industry size by 48% ■ Automotive Industry – local growth in the Automotive Industry ■ MIDP - growth in local content driven by ■ Packaging Industry – growth ■ Aerospace Industry – Announcement of Aerospace program ■ Supporting Industry growth - commensurate with tooling growth ■ New product development - requires tool development and support. ■ Government Support Initiatives 	<ul style="list-style-type: none"> ■ Global industry developments - new entrants China and India ■ International partnering into giant consortia to gain market access ■ Inability to invest sufficiently in new equipment ■ Changes in technology – Keeping up ■ Customers' size relative to TDM's

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