ANNEXES

ANNEX 1: Technological and Management Issues relating to Metalworking Subsector and Plastic Molding Subsector

1 Press Working

1.1 General Assessment of Production Management Capabilities and Major Issues for Upgrading

Management capabilities of manufacturing industries are primarily composed of the abilities and resources to control the quantity of production and its delivery schedule, to plan and execute appropriate inventory control, to perform quality control required to maintain product quality within specification requirements, and to maintain, operate and manage production equipment and tools (including dies) which govern productivity and quality of a specific product, together with safety and environment management. They should therefore be viewed as the comprehensive ability of a manufacturing establishment or factory to make products that meet specific quality and other requirements on a continuous basis. The study team's evaluation indicates that the press work industry in KwaZulu-Natal, except for SMEs, has better production management capabilities than other comparable industries (general metalworking and plastics molding). Nevertheless, they are far lagged behind management capabilities found in industrialized countries. To supply products that meet the requirements of assembly manufacturers, the press work industry needs to upgrade their production management capabilities by introducing latest technology and know-how.

1.1.1 Production management

1.1.1.1 Progress management (progress control)

Most companies do not display their production plans and records on the shop floor in a "comprehensive" manner. Many companies have their workers record daily production data by reading the counter on the press and entering the readings on a work report, which is then summated by the personnel in charge of production management in an overall production schedule and record. Production data, while known by the production management personnel, are not made known to individual workshops and workers in a "comprehensive" manner, i.e., a graph or other visual display, rather than figures alone. This way, accurate production information including the production plan and schedule is effectively communicated to the entire field organization, enabling individual workers to share responsibility and satisfaction for achieving production targets including schedule.

1.1.1.2 Productivity management indices

Most companies record production data on the quantity of production and time required for production, but they fail to record detailed data on idle hours (loss time). They use idling hours to calculate the operating rate for presses. However, idle time data alone are not sufficient to analyze factors for impeding productivity improvement and the role and responsibility of each worker for productivity improvement efforts cannot be defined clearly. Idle time data should therefore be recorded according to the type, e.g., loss time, setup time, downtime, and time wasted for defect, allowing accurate analysis and identification of factors for impeding productivity improvement. Based on the analysis, productivity improvement goals (target figures and deadlines) should be established together with the appointment of personnel who is responsible for pursuing each goal. For instance, a production manager may be responsible for improvement of the overall equipment productivity that is represented by the ratio of actual production hours to total available hours, while a supervisor seeks to maximize the equipment efficiency that is equivalent to the ratio of actual production hours to actual operating hours. Making efforts to improve productivity on the basis of different indices according to responsibility are proven to help produce good results.

1.1.1.3 Setup time

The press work industry in KwaZulu-Natal mostly produces parts and components for products that are shipped to the domestic market, which is fairly small. Thus, the industry cannot expect to enjoy economies of scale by increasing production to a critical mass level. Furthermore, their customers – assembly manufacturers – are expected to shift their production style to the JIT system and will demand suppliers to deliver parts and components in a smaller lot. Accordingly, suppliers are required to improve productivity by minimizing idle hours (loss time) in response to an increasing number of changeovers to meet small-lot orders for a variety of products. In particular, reduction of setup time is a major challenge for the press work industry. At present, most companies require over 20 minutes for changeover of work pieces or dies in the case of a small press below 100 tons and over 40 minutes for 200-ton or larger presses, constituting a major factor adversely affecting productivity. There are several reasons for such long setup time. Use of movable, portal cranes and forklifts, instead of an overhead traveling crane that requires relatively large investment, is one reason. More importantly, however, poor layout of dies and work pieces appears to be a major factor. In particular, most companies keep dies in stacks randomly and workers often spend considerable time to find a die to be used in the subsequent setup process.

Setup time can be and should be reduced significantly by applying various field-proven solutions. First of all, strict application of the 5S rules for good housekeeping is highly effective, particularly to identify each die by attaching a name plate containing the name and the reference number and to store it in a designated place of a clearly marked stack. Secondly, the rearrangement of internal setup (setup conducted by stopping a machine) to external setup (one conducted without stopping a machine) is considered as an effective solution, together with reduction of internal setup time through the use of a special jig or die modification.

1.1.2 Equipment maintenance

Many presses used by local manufacturers are relatively old, and if poorly maintained, they have a larger "combined gap" (a gap between the slide and guide parts and that between the crank shaft and the bearing) that creates a higher risk of poor product quality. Many companies hire full-time maintenance personnel to perform preventive maintenance, such as periodical inspection, which is conducted relatively well. However, these maintenance persons are generally unable to perform daily maintenance work on every equipment, including cleaning and lubrication before and after daily operation. As a result, most presses receive less maintenance service than daily maintenance made by operators.

It is therefore desirable to make the press operator perform daily maintenance work, including cleaning and lubrication. To support their work, check sheets should be provided near each machine according to the type of maintenance (e.g., daily, periodical), while the name of the person in charge of equipment operation should be posted on the machine. And these daily maintenance procedures should be documented as formal rules. Furthermore, equipment maintenance should be linked to company-wide productivity improvement activities – referred to as total productive maintenance (TPM), which is effective in reducing idle hours and raising workers' morale.

1.1.3 Die management

1.1.3.1 Maintenance

For press work that involves the shearing of metals, proper management of punches and dies - particularly their cutting edges - is a very important task. Many press work shops in the country, however, rely on breakdown maintenance (BM) and grind cutting edges only when a large burr occurs in products, resulting in significant costs related to waste materials, quality control and maintenance. Moreover, as burrs can be removed by

means of belt grinding after press working, therefore incurring no direct cost, most companies do not consider them as a serious defect and some even perform the deflashing work as if it were an essential part of the press working process.

Clearly, dies should be subject to preventive maintenance as done for presses. Preventive maintenance will eliminate or minimize the quality control costs related to selection of work pieces and deflashing, usually accompanied by a less total maintenance cost compared to BM. Even if an additional maintenance cost is incurred by PM, it will create much greater cost savings due to significant reduction of waste materials and products as well as quality control requirements including the screening of stamped products. The end result is a significant reduction of the total production cost.

1.1.3.2 Storage

Press work shops in the country use a variety of dies to meet diverse orders that generally consist of small lots. These dies are usually kept in stacks that are reserved for the purpose. While they are relatively well arranged, the storing method needs to be improved as the present method seems to require unduly long time until a new die for changeover is found and requisitioned from a stack. An effective solution is to assign the address to each stack according to a specific code system (e.g., from A.1.1 to G.4.4) and to each die that should bear a nameplate containing the corresponding address and the name of the die. Furthermore, dies should be color coded according to the status of use, i.e., those available for service (repaired), those waiting for repair, and those not scheduled for use, by attaching the corresponding label. This way, dies can be stored in clearly designated places and can be identified and retrieved quickly to reduce setup time required for changeover.

1.1.4 Safety management / working environment control

1.1.4.1 Safety management

Generally, most press work companies in the country lack clear safety awareness, ranging from management to field workers. It was observed that many workers neglected general safety rules during the press work that involves a high safety risk, e.g., they put their hands and fingers in a die. While some companies provide safety guards for presses and use safety shoes, the majority of companies do not use safety helmets nor other safety and protective devices that are generally essential for press work. On the other hand, some companies seem to partially adopt safety rules by modeling after labor safety laws in the U.K. and other countries, e.g., use of earplugs in some press work shops. Nevertheless, a general lack of safety practice and precaution is apparent. Many shops

post a slogan "Safety First" and safety posters and seem to be content with them as the relatively costly safety campaign. Managers are apparently reluctant to spend costs related to safety measures because they believe that these costs cannot be recovered. It is therefore important to change their mindset in work safety and its benefits, constituting the first step of promoting safety practice and compliance in the press work industry.

1.1.4.2 Shop floor management / 5S activities

Assessment of shop floor based on the 5S criteria indicates that press work shops in the country are rated below those in Japan and other industrialized countries and the same level as those in Thailand and Malaysia, while slightly better than those in the Philippines and the PRC. Nevertheless, arrangement of raw materials, parts and products needs to be improved significantly if work efficiency and quality is to be upgraded.

In addition, there are many aspects of the working environment that require improvement, as pointed out in the area of safety management. Most factories are generally dark and fail to provide sufficient lighting. Work chairs are of fixed type and their level cannot be adjusted according to the type of work, forcing some workers to take an unnatural position. As most press lines are not automated and largely rely on manual labor, it is important to design and maintain the working environment that takes into account the principles of ergonomics (i.e., to adopt the working environment, equipment and tools to human capacity, not the other way around). The good working environment is an essential element of achieving not only good work efficiency, but product quality and workers' morale as well.

1.1.5 Quality control

1.1.5.1 Data analysis

Most factories collect quality control data but do not analyze them in detail. Data are collected but not fully utilized for quality improvement purposes. Few companies conduct statistical quality management using the QC tools, such as characteristic diagrams, Pareto diagrams, and histograms used for data analysis, and the monitoring method for key control dimensions using the process capacity index (Cp value).

In Japan and other industrialized countries, many manufacturers have adopted statistical quality management systems. In fact, their statistical quality management systems have been steadily evolving in an attempt to pursue an increasingly higher quality goal. They started from quality management based on the acceptable quality level (AQL), which was successfully upgraded to a PPM (parts per mission) level. Now, they go beyond the quality management concept based on "minimization of defects" to elimination

of defects, generally referred to as the "zero defect (ZD)" principle, and furthermore "customer satisfaction (CS)" activities to satisfy the customer – the subsequent process or process step within a factory or an entire supply chain – by achieving zero defect and other goals. Clearly, press work companies in the country are far below the highest level of quality management practiced in industrialized countries, which should be an ultimate goal for them to achieve in the future. Their efforts should start from company-wide introduction of statistical quality management methods and techniques, including the seven key QC tools, which should be taught to supervisors of production departments in an attempt to raise their awareness of quality and its improvement needs. In particular, the monitoring of the key control dimensions using the process capacity index (Cp value) is highly effective in identifying any sign of defect to allow preventive measures, unlike other tools that analyze data after the occurrence of a defect.

1.1.5.2 In-process quality improvement

Total inspection does not necessarily ensure that every defect is discovered by shipment inspection because some defects escape human eyes. So far as a defect occurs in the process, therefore, it is practically impossible to prevent it from being accidentally shipped to the market. Elimination of in-process defects requires the designing, development and operation of a production system that has a built-in mechanism to prevent any defect from occurring in the process, while ensuring compliance with standard work procedures and practices that constitute the production system by teaching the DIRFT (do it right the first time) philosophy to all workers. The buildup of the zero-defect production system should start from analysis of the current conditions using the statistical quality management tools, and based on the results of the analysis, specific measures to upgrade process capability should be devised and implemented. To upgrade process capability for press work shops, modification of dies is required in most cases. This means that the upgrading of die making techniques and skills is essential, accompanied by related production techniques. To ensure bottom-up improvement of quality of parts shaped by the stamping process, the industry needs to attain production techniques and skills, including the problem-solving ability to analyze a defect and devise an effective solution, as well as the upgrading of die making techniques and skills that should be developed in the long run.

1.2 Assessment of Process Technology Capabilities and Major Issues for Improvement

Process technology capabilities required for press work are comprised of resources, techniques and skills related to machinery, equipment, dies, and raw materials, all of which are essential in performing the world level of press work. In addition to die making techniques, which importance has been emphasized earlier, press work shops in the country must overcome the problems related to old equipment and raw materials of poor quality (locally available). Equally important is software technology required to operate and use presses and other production equipment, dies and raw materials in an efficient and effective manner. Again, press work companies in the country lack the ability (know-how) to make best use of production hardware in the optimum ways to maximize productivity.

1.2.1 Machinery and equipment

1.2.1.1 Precision and performance of presses

Most companies use old presses with relatively low precision and/or performance (mechanical, power or eccentric presses), which are limited in quality and productivity of press work that they can achieve. The advanced press work shops in Japan and other industrialized countries widely use automatic press lines of progressive or transfer type. On the other hand, some factories in the country use press lines of progressive type, which have essentially a simple strip layout (work prices not including dies), and none uses an automatic line of transfer type. Progressive press lines in most cases use only uncoilers to feed coil materials and do not use levelers (strainers), often unable to unfold a coil end completely and result in poor quality of products, such as a warp or distortion. In the county where wages are relatively low, ranging between 13 and 15 rand (195 – 225 yen), automation can be a feasible solution from the viewpoint of maintaining stable product quality in addition to cost consideration.

1.2.1.2 Safety

Press work shops in Japan and other industrialized countries use presses equipped with friction – pneumatic – clutches and brakes that provide high levels of safety. These presses have an emergency button to disconnect a clutch and stop the movement of the slide instantly. Most presses used in the country, however, are equipped with old, mechanical clutches (rolling keys or sliding pins) that cannot be disconnected until the slide completes its stroke. To ensure safe operation of the mechanical clutch press, it

must be equipped with a two hand-operated button switch and a safety device (hand pull or sweep type). However, no press work shops the study team visited use the safety device. Many presses are equipped with two hand-operated button or lever switches, but workers do not receive instruction or training for their use. Furthermore, although foot switches are used for hand-operated blanking because of their workability, safe guards for dies to protect hands and fingers are rarely used.

1.2.1.3 Factory layout

Some press or plate work shops in the country seem to have expanded their facilities without an elaborate plan. As a result, their layout does not take into account the flow line of materials and products as well as the entire production process, and it impedes the improvement of productivity. It is therefore desirable to modify facility layout for work efficiency if it does not entail significant investment.

It should be noted that modification of facility layout should be made on the basis of detailed process design and method, including materials handling and physical movement of materials and products. It should be started from classification of production facilities and equipment according to the need for proximity, i.e., some machines and equipment should be grouped together if they need to be arranged within a short distance to each other in consideration of productivity, working environment and safety. Based on this classification, a diagram should be produced to show the relationship between machines in terms of proximity, which is then translated to a factory layout using the CAD system or by manual work (cutting out a piece of paper to represent each equipment to be arranged and placing it on a factory plan for simulation). This way, a rational layout can be produced to reflect actual production activities.

1.2.2 Dies

1.2.2.1 Workability / safety of presses

As pointed out earlier, press work in the country is mostly carried out manually by the single feed method (mostly progressive type) and few automated lines are operated. While press dies must meet the various requirements for achieving specific quality of press shaped products, they also have to provide sufficient workability and safety if press work is to be performed manually. In fact, press work shops must make continuous efforts to improve workability and safety through process modification and redesigning, even if a die satisfies quality requirements. However, most factories in the country fail to make such efforts, as judged from the field survey and analysis. It seems to stem from the lack of concern about safety and workability within the organization, from managers to field

workers. As a result, safety and workability factors are not considered seriously in die design. It is important to realize that safety and workability should be incorporated into dies, not only in the die design process, but the production process as well; the production department is mandated to check safety and workability factors continuously and modify die designs accordingly.

1.2.2.2 Press capacity

Press work companies which do not have their own die design capability seem to select a press for a specific job on the basis of empirical judgment, rather than accurate estimation of force required to shape a specific product. As a result, some presses are used for a job that may exceed their capacity, often resulting in quality variation and shorter service life of dies and presses. Similarly, some presses cannot provide sufficient force for the blank holder and the stripper to adversely affect quality and productivity, such as deformation of final products or sticking into the upper die.

1.2.2.3 Progressive dies

The most important factor in preliminary consideration of press work planning is the optimization of process design, i.e., how should the process be designed and implemented to make a final product according to specifications and in the most efficient way. If a single impression die is used, process design can be modified by trial and error. On the other hand, it is not practical to change process design in the case of progressive dies. Optimum process design using progressive dies means the optimum strip layout design. At present, however, only a handful of die manufacturers are capable of designing a strip layout for a relatively simple process. The low level of progressive die design capability reflects small demand for progressive dies, which comes from two reasons. First of all, the small market for the press work industry means small production volumes that prohibit use of relatively expensive progressive dies. Secondly, the industry can hire workers at low wages and therefore can benefit from labor-intensive operations using a low cost simple impression die, which more than compensate for the lower productivity compared to use of progressive dies.

1.2.3 Materials

1.2.3.1 Type of material

As most press works are carried out manually using a single impression die, with few automated lines using a progressive die, most materials are of sheet type (3-6 sheet), rather than coils (hoops). They purchase and store large sheet materials and cut them into

specific sizes at their own shops using a shearing machine ("guillotine"). While the present study did not cover sheet metal suppliers (coil centers) that cut coils, it found from the survey of selected press work companies that they purchased sheet materials of standard width or hoop materials form suppliers and cut them into specific width within their own shops if they are to be used for small production. As standard-sized materials often produce wastes at their ends - depending on blanking dimensions – and lead to a lower press cycle, it is desirable to adopt the blanking method using manual-feed, progressive dies and hoop materials, starting from products in large quantities. Then, as design capability for progressive dies improves, the blanking process may be automated. Upgrading die design and process capabilities gradually is conducive to significant productivity improvement.

1.2.3.2 Thickness of the steel material

While blanking operation is less affected by variation of thickness of the material, bending operations such as U and L - where clearance between the punch and the die significantly affects the bending angle – require strict control of thickness if a high level of shaping accuracy is to be maintained. In Japan, quality of cold rolled steel sheets, their mechanical properties and dimensional tolerances are specified in JIS, whereas thickness of commercial products is controlled within a smaller range of tolerance than that in JIS, allowing precision shaping. On the other hand, steel materials made in South Africa do not have a high level of accuracy in thickness as seen in Japanese products. Nevertheless, most pressed products are automotive inner parts, which are mainly made through the molding process, including drawing, while there is little demand for parts and components for household appliances, which require precision bending. As a result, variation of thickness rarely leads directly to poor product quality. Besides, parts and components that require high quality are specified (i.e., imported materials) or furnished by assembly manufacturers.

1.2.4 Press work

1.2.4.1 Manual feed blanking operation

In blanking a long, standard-sized material by manual feeding, workability or quality (planarity) is adversely affected due to the lack of support for the material or the skeleton (the remaining material of which a specific shape has been blanked out). The problem can be overcome by providing a support that is at level with the feeding line. In addition, various innovative efforts should be made to improve workability and quality.

1.2.4.2 Insertion of the material / semi-finished product

Manual press work starts from the insertion and setup of a material or a semi-finished product into a die. At many shops in the country, however, materials and semi-finished products are not in proximity to dies for work efficiency and considerable time is wasted to set up them for press work. For instance, a factory keeps materials and semi-finished products on floor and workers pick them up one by one and insert it to a die. Again, it is important to make continuous and innovative efforts to improve work efficiency and productivity. A small table may be provided near the die to keep materials and semi-finished products within easy reach of the worker. Or use of a magnetic separator to prevent blank materials from sticking together due to oil. These small but effective improvements lead to quick and efficient insertion of work pieces into the die with less physical fatigue on the worker.

1.2.4.3 Removal of products / semi-finished products from the die

In addition to insertion of materials or semi-finished products into a die, removal of pressed products or semi-finished products from the die often takes much longer time than expected. This is partly because of inadequate die design or finish, which prevents smooth removal of a product or a semi-finished product. Also, it is often the case that containers to keep products or semi-finished products are kept far from the die to require additional (wasteful) time. This can be solved by providing a chute from the die and a small belt conveyor to the container.

Furthermore, so far as die design permits, removal of products and semi-finished products should be automated by using an air blow or knock-out to eliminate manual work. This way, the worker can concentrate on insertion and setup of a material or a semi-finished product into a die, leading to a significant increase in productivity.

1.3 Assessment of overall production technology and major issues for improvement

1.3.1 Product quality

At present, press work products made in the country are generally poor in quality and cannot compete in the international market. It is said that quality of molded products (press, injection molding, etc.) is primarily governed by quality of the die or mold. This means that low quality of press wok products in the country represents low levels of die designing and manufacturing capabilities (techniques and skills), which have not reached an internationally competitive level. If die designing and manufacturing capabilities are

upgraded, therefore, quality of press work products will be improved, eventually to an international level.

Needless to say, press work requires total production management capabilities to obtain, maintain and utilize equipment, dies and materials, as discussed in the section on process capacity, and quality control to prevent the manufacture and shipment of a defective product constitutes a critical element. And die designing and manufacturing capabilities (techniques and skills) are the most determinant factor for quality of press work products, and their improvement is the prerequisite to higher product quality, while production management capabilities should be concurrently upgraded to make best use of upgraded die designing and manufacturing capabilities.

1.3.2 Materials for press work products

1.3.2.1 Steel materials

Most press work shops use cold rolled steel sheets made in the country, which are mostly before surface treatment (to be nickel plated or subject to other surface treatment after press work). In addition, they use surface treated materials (e.g., electro-galvanizing) that are imported from Japan, Germany, Belgium and other industrialized countries. Electro-galvanized steel sheets are made locally, but because of poor quality, they are mainly shipped to the domestic market for various products. On the other hand, relatively large amounts of locally made stainless steel sheets are used, and imported ones are mostly used for high end applications, such as those furnished or specified by assembly companies for high grade products.

1.3.2.2 Aluminum materials

There is a large aluminum smelting company in KwaZulu-Natal, together with associated manufacturers to produce a variety of products. For this reason, more locally made aluminum materials are used for press work in comparison to steel materials, while some assembly manufacturers furnish imported materials (e.g., made in Germany). On the other hand, extruded aluminum materials for pipes and other products are mostly procured from local sources.

2 Other Metalwork

2.1 General Assessment of Production Management Capabilities and Major Issues for Upgrading

2.1.1 Production management

2.1.1.1 Progress control

For manufacturing establishments, it is important to communicate their daily production plan, in a document form, to the shop floor, to collect accurate production data every day, and to compare and analyze the planned and actual figures in order to take corrective measures or other actions as required. Also, key production data should be compiled into a graph and/or a chart, which should then be posted in the shop so that field workers understand how well they perform their work and are motivated to work harder and better.

Most metalwork shops in the country, however, do not use a document (e.g., instruction) to communicate their production plan to the shop floor. Instead, information is communicated orally or in a memo from the manager in charge of production to foremen.

Daily production data are collected and compiled. However, if a production target is not met, no analysis is made to identify a cause and no action is taken to correct it. Furthermore, there is no activity to motivate workers by posting production data in the shop floor.

Few companies make production plans (annual, monthly, weekly and daily) because they make a variety of products in small quantities and on a contract basis as they receive orders from customers. (Note that automakers provide order information to suppliers in advance, allowing them to establish production plans, while other industries rarely supply such information to suppliers).

For instance, an electroplating shop processes a variety of parts and components on a contrast basis, which are ordered by customers in short notice. The manager explains that, under these circumstances, it is very difficult for the company to establish a production plan. Without any production plan, however, the company cannot set its business targets including profits and is not managed in a planned manner, just like a ship drifting without a chart. It is therefore critical to make annual, monthly, weekly and daily production plans. They may be based on rough estimates, but it is the first step for modern corporate management.

Production plans serve as a guideline for sales activities; if an annual or monthly production plan is not achieved, sales efforts should be intensified to win additional orders.

For most companies in the country, however, the absence of the production plan prohibits them from keeping abreast of whether they achieve production targets, they collect daily production data but do not utilize them for decision-making and other sophisticated purposes.

Weekly and daily production plans help the factory to compare its actual production against the plan, to analyze a cause for any difference (increase or decrease), and to plan and implement corrective action if necessary.

2.1.1.2 Productivity management

Generally, metalworking factories in the country do not have much concern about productivity improvement. As competition is expected to intensify under the market that is increasingly liberalized, however, they have to attain competitiveness by raising productivity. Productivity improvement can create surplus time and labor, which may be used for activities conducive to the company's future development or the strengthening of the corporate infrastructure, such as employee education and training and promotion of improvement initiatives such as the 3S (good housekeeping) activities.

At present, most companies collect daily production data and labor hours, but a relatively small number of companies calculate productivity indices that are usually used for production management, such as production volume per hour and time required per unit production. Few companies compare such indices with a standard production volume or time in order to analyze a cause for difference and take corrective measures as required.

Some companies hired outside consultants to collect data required for measurement of productivity or determine standard work time, but these data are not fully utilized because there is no staff with data processing capabilities. Some want to renew the standard work time that has become obsolete.

2.1.1.3 Inventory control

Excess inventory should be avoided because it consumes unnecessary operating funds and runs a risk of creating a dead stock. Inventory control should start from the establishment of an adequate inventory level from past record and experience, and procurement should be made in a planned manner to keep the actual inventory at the adequate level. Also, inventory control includes an adequate storage method that takes into account workability and safety.

At present, most companies seem to hold larger inventories of materials, semi-finished products and products compared to their actual production volumes. Few companies carry out inventory control by establishing an adequate inventory level. Many tend to make a surplus quantity of products in anticipation of future orders in order to compensate

for relatively small customer orders and to meet the delivery schedule.

Inventory is not properly stored. Materials, semi-finished products and products are often kept in hazardous conditions. Scraps used for melting are piled in a jumble outside the factory. Chemicals used for electroplating are kept disorderly in a warehouse which is unlocked. Pallets are stacked high in a warehouse and do not indicate its content (semi-finished products), clearly presenting a problem related to workability and safety.

2.1.2 Quality control

2.1.2.1 Quality control equipment

Most companies maintain a necessary set of inspection equipment, which is calibrated periodically. For instance, foundries and die casting shops have thermometers and spectrometers required for management of molten metals, tensile testers, hardness gauges and metallurgical microscopes for inspection on material quality. Electroplating and galvanizing shops own thickness gauges to measure the metal layer and instruments to check concentration in a solution tank.

Machining shops also have a standard set of measuring instruments required for dimensional check, including three-dimensional measuring instruments, vernier calipers, micrometers, and gauges. Some shops keep necessary instruments near each machine and the operator checks all work pieces after machining.

2.1.2.2 Quality management system

To make automotive parts that meet the needs of assembly manufacturers, systematic quality control, i.e., quality management, is required. Quality management should include a mechanism to prevent a defect, i.e., elaborate process control and effective measures to prevent recurrence of a defect when it occurs.

Few companies post work instructions or procedures, in a written form, within their shops. Workers receive oral instructions from foremen or supervisors and attain skills and knowledge through the OJT. Few shops keep "boundary samples" for appearance inspection that is highly affected by subjective judgment.

As a result, work is often carried out according to the procedures and methods that vary among workers, making it difficult to maintain consistent quality. Clearly, work standards should be established to specify work procedures and key parameters required for quality control, such as temperature and time. They should be documented and posted in the shop floor. Workers are required to read and comply with the instructions. To facilitate the understanding of workers, work instructions posted in the shop should include photos, charts, diagrams and illustrations as far as possible, while minimizing a written text

and focusing on important points.

In addition, boundary samples should be provided for sections where appearance inspection or other check subject to personal judgment is made, in order to ensure consistency in quality of inspection.

A machining shop that supplies parts to Toyota adopts the latest quality management techniques such as the "QC progress schedule" and the "travel card" – as they call the "control plan" and the "route card." However, this is an exceptional case. Most companies have still to introduce systematic quality control that aims to incorporate quality throughout the process. Instead, they assure quality for customers by conducting 100% inspection on finished products. Shipment inspection is important, but it is not sufficient. More important is the establishment of a total quality management system to prevent each shop from making a defective product in the first place, including promotion of grass-root quality control activities using the QC progress schedule.

Furthermore, many companies have little knowledge on the incidence of defects that actually occurs within their shops. Some collect defect data but few analyze a cause for defect and take corrective measures.

Some companies have quality control organizations and make and distribute quality assurance manuals to related departments. They use full-time inspection personnel who wears a white uniform and can be distinguished from other workers (usually wearing a blue uniform). These companies record quality-related data, but they do not adopt statistical techniques to analyze data for quality management purposes, e.g., statistical analysis, calculation of process capability indices, and use of control charts. Generally, owners and managers do not have knowledge on the "QC tools." The collected data are kept by managers and are not made known to field workers.

Finally, many companies have ISO9000 certification but few of them have effective systems for quality assurance.

2.1.2.3 Percent defective

Generally, automotive parts suppliers do not have much concern about the percent defective (rejection rate). In particular, defective products that can be regenerated or reused are not considered as defect. It is important to realize that a defect, no matter how small it is, wastes considerable time and effort to discover and correct it. It is therefore a hidden and unrecoverable cost item that should be avoided as far as possible.

The industry generally indicates the percent defective by "ppm," which refers to defects found after shipment to customers. For instance, a die casting company does not collect or record data on "work done wrong" that occurs in the production process.

It is said that the percent defect ranges between 5% and 6% for foundries, 1% - 8% for

die casting shops, and 0.4% - 0.9% for machining shops. However, the results of the field survey suggest that the actual figures can be much higher. For instance, a machining shop that shape castings into various parts reports the rejection rate of around 3% upon acceptance inspection. At a die casting shop, the study team observed 10 shots of casting operation. 120 castings were made and 33 were returned to a retaining furnace with a sprue gate for re-melting. This means the percent defective of 27.5%.

Electroplating and galvanizing shops visited by the study team record data on work done wrong but ship the defective products after remaking. As a result, they do not consider them as defective. A sheet metal and welding shop does not record data on work done wrong because it can be reused for smaller products.

2.1.3 Equipment management

Few companies conduct preventive maintenance, including periodical inspection and cleaning of equipment. Field workers do not have knowledge on maintenance work, but they can be trained. As discussed earlier, efforts should be made to raise labor productivity and surplus time should be allocated to education and training of workers, including equipment maintenance.

No company indicates the name of the person in charge of each equipment, e.g., on the nameplate or has a standard checklist.

As production equipment is a critical factor to determine productivity and product quality, its maintenance should constitute an integral part of manufacturing activities. To this end, the persons in charge of equipment (maintenance and inspection) should be appointed and posted, while daily and periodical inspection items should be clearly defined and enforced. This way, organizational efforts can be mobilized to enforce total productive maintenance (TPM) – to preserve production equipment under full participation of field workers. TPM is founded on the fact that workers who operate production equipment know most about the equipment's conditions and notice first when it goes wrong.

2.1.4 Safety management/shop floor management

2.1.4.1 Safety management

Most companies seem to strictly enforce and check compliance with labor safety regulations and workers wear protective glasses, safety shoes, earplugs and other protective devices as required.

2.1.4.2 Shop floor management/ 5S activities

Generally, managers are not aware of the need for 5S activities in the shop floor and the good working environment. Many do not understand why they need to promote 5S activities. They should understand that 5S activities should be promoted as small group activities, which enable group members (workers) to create the better working environment through cleaning and arrangement of their workplace, i.e., they can work more efficiently (with less wasteful movement) and safely, while raising their morale.

The results of the field survey indicate that most shops are poorly maintained in terms of housekeeping and their working environment is deteriorated and often hazardous for workers. A foundry leaves metal frames and sand on the floor and does not reserve service path for workers to walk safely. A die casting shop is filled with smoke that is produced from a die casting machine. At a galvanizing shop, work pieces are not well dried before being placed in a zinc tank, and the molten zinc splashes after work prices are put in the tank and the fumes remain in the air.

On the other hand, companies that belong to the benchmark club keep their factories clean and tidy and their workers are well trained for housekeeping and other practices to maintain the good working environment. This suggests that safety and shop floor management goes beyond the ability and efforts of individual workers. Rather it should be led by management; the good working environment is developed and maintained by the manager who realizes that efficient and safe manufacturing operation starts from the clean and tidy shop floor.

2.2 Assessment of Process Technology Capabilities and Major Issues for Improvement

2.2.1 Production process and equipment

Casting: In KwaZulu-Natal, no company manufacturers castings for engine components, such as cylinder heads and blocks, and other iron castings for automotive parts, such as brake drums and discs. These products are mostly manufactured in Port Elizabeth. In and around Durban, there are a very small number of foundries which make castings for local industries, such as parts and components for sugar refining equipment.

These foundries are still using CO_2 castings which are obsolete in terms of process technology and equipment. Clearly, they are not qualified to manufacture castings for automotive parts.

To manufacture castings for automotive parts in a large lot, modern production

facilities and equipment are required, such as a high pressure, green sand molding line and a shell core molding machine, which need large investment to build and install. Most foundries in the area have no intention to make automotive parts and are specialized in production of castings used by local industries.

Die casting: Compared to foundries, more establishments are making brass or aluminum die castings, including automotive parts. Originally, they made door knobs, handles or grips for furniture, hinges and ornaments and have recently started production of aluminum die castings for automobiles, including engine mountings, air intake slot bodies and handles. Many of them intend to expand production of automotive parts and are enthusiastic about modernizing their operations, e.g., introduction of a squeeze molding machine for production of aluminum die castings, and modification of die casting machines in Germany for automation.

Heat treatment: In the area, there is no manufacturer specialized in heat treatment on a contract basis. Manufacturers of springs and other products that require heat treatment have their own heat treatment shops and do not require service of job shops.

As for metal parts other than automotive ones, a company making metal fillings for high heels has built its own nitriding plant, which appears not to be sufficient for heat treatment of automotive parts in terms of work space and equipment.

Electroplating/surface treatment: A handful of companies in the area are specialized in electroplating and surface treatment.

The largest electroplating shop in KwaZulu-Natal has been gradually expanding its facility by purchasing second-hand rectifiers. It is capable of performing eight types of electroplating zinc (Zn), chrome (Cr), nickel (Ni), tin (Sn), copper (Cu), gold (Au), and silver (Ag) and has 31 plating tanks in total. However, its present facilities and equipment are not sufficient to handle demand for automotive parts. Reconstruction of factory buildings and modification of equipment layout will be required.

As for galvanizing, a company has a large tank for molten zinc (14m long x 1.2m wide x 2.5m deep, capable of storing 250 tons of molten zinc) and receives orders from manufacturers in other states. It operates in three shifts of eight hours. The company offers a major advantage in large equipment to handle steel structural members and other large work pieces, which go beyond the ability of most companies. It plans to install a larger molten zinc tank.

Machining: There are manufacturers specialized in machining, which purchase materials upon the customer's order and process them into parts according to drawings, specifications and samples furnished by the customer.

These manufacturers, including microenterprises employing 5-6 workers, have CHC and NC machines, seemingly in consideration of less skilled workers. NC machines are mostly made in Taiwan.

In terms of production capacity and production management capability, however, manufacturers which can make automotive parts are limited to mid-sized or larger companies. Some of these companies that process automotive parts are enhancing their production lines.

Sheet metal working/welding: Manufacturers specialized in sheet metal working and welding make relatively thin and/or small parts, such as automobile mufflers for the aftermarket, set frames, distribution and control panels, and steel brackets. Many have small shearing machines, bending machines, cutting grinders, MG welding machines, and spot welders. Some use welding robots for mass production of brackets.

2.2.2 Layout

For volume production or productivity improvement, shop layout should ensure smooth movement of materials and products in one direction and over the shortest possible distance. Apparently, many companies need to modify their shop layout.

For foundries, die casting, heat treatment and galvanizing shops, the present equipment layout does not present a large problem.

A typical case requiring layout modification is seen in an electroplating shop. As it has gradually expanded in the present site, small buildings are crowded in a small site. This presents various problems if the company is to perform electroplating of mass produced products such as automotive parts. The flow of goods in the site is confusing as work pieces from customers are received at the same location where plated products are stored and shipped, together with fitting of galvanized work pieces. Acceptance of work pieces should be carried out in a separate location from product shipment, and different storage locations should be provided for work pieces and those after plating. Also, the factory layout should be redesigned according to the function, e.g., relocation of the fitting of plated work pieces to the plating shop. This will facilitate housekeeping operation and improve work efficiency.

Also, many machining and sheet metal plating/welding shops fail to design their layout by taking into account the movement of goods. As a result, work pieces need to be transported over an undue long distance, resulting in wasteful work.

2.2.3 Dies, jigs and tools

Foundries and die casting manufacturers have their own die making shops. They design, manufacture and repair patterns and dies. They use CAD systems and NC machines for designing and machining purposes. Thus, they have necessary equipment and skills.

Jigs and tools used for machining operations are mostly made internally.

However, patterns, dies, jigs and tools are not stored properly to allow quick requisition when required. Color coding or assignment of control numbers to each tool and stack should be introduced to reduce time required to search a required tool, which leads to significant improvement of productivity.

2.3 Major Issues for Cost Reduction

Cost reduction is one of the most important issues facing potential suppliers for automobile assemblers. However, most managers do not realize the needs for improvement activities that are conducive to cost reduction, such as the improvement of productivity, reduction of percent defect, and yield improvement.

Cost reduction efforts should start from productivity improvement. Surplus time and labor created by higher productivity should then be used to provide employee education and training that is required for the strengthening of the corporate base, including the teaching of engineering technology, quality control techniques, TPM, or to promote the 5S activities and create the better working environment.

Quality improvement in terms of percent defective and yield is a critical factor for promoting cost reduction. As discussed in the section on quality control, most companies do not record data on defects that occur in the production process. It is imperative to collect and analyze defect data accurately, followed by corrective measures. This should constitute the first step of effective quality control activity.

3 Plastics Molding

Plastics molding companies in KwaZulu-Natal are divided into two distinctive groups, large factories (e.g., Toyota's molding shop for automotive parts, Smiths Manufacturing, and Behr Plastics) and small- and medium-sized molding shops which are described below. And there is a large gap between these two groups in terms of size, technology and other aspects.

Among smaller companies, those making automotive parts have relatively high levels of production techniques and production management capabilities. On the other hand, there is little difference between plastics molding shops making electric appliance parts and those making household goods).

Generally, success of any company depends on the manager, particularly his philosophy and execution power. Small- and medium-sized plastics molding companies in the region are often controlled by second-generation managers, who have inherited or will inherit from founders. However, the results of the interview survey suggest that these managers are not fully capable of directing their companies in a right direction as they lack alertness to competition and other abilities that are required to survive in the increasingly competitive environment. This seems to originate from the fact that companies are generally unconcerned about competition with each other or companies in other countries. It is therefore important to raise concern of managers of small- and medium-sized plastic molding companies about competition they have to face.

In fact, manufacturers of buttons and other products are increasingly competing with imports from various countries, especially China. While no direct competition has occurred for shoe parts, such as soles and heels, intensive competition with Chinese and other imports is seen for shoes themselves. Clearly it is the matter of time before manufacturers of shoe parts are involved in fierce competition.

3.1 Overall Issues

Generally, plastics molding companies making automotive parts face two important issues, quality assurance and cost reduction.

First of all, automobile manufacturers require their suppliers to deliver 100% acceptable parts and components and rank them according to the result of the acceptance test that is carried out upon delivery. On the other hand, suppliers make efforts to meet

such requirements by performing shipment inspection. This means, they focus on selection of acceptable products by inspection personnel and have still to reach an advanced level of quality management where quality is automatically incorporated into each stage of the production process.

Quality control relying on shipment inspection, no matter how carefully it is conducted, does not form quality assurance that is demanded by assembly manufacturers, and at the same time, it does not generate profits for suppliers. Plastics molding companies cannot attain international competitiveness unless they have production techniques and production management capabilities that assure the manufacture of acceptable parts throughout the production process. It is therefore important for assembly manufacturers (including those of automotive parts and components) to encourage suppliers that design and operate the production line that can build quality into products, rather than those that select acceptable products at the end of the production process that churns out both good and defective products. To deal with suppliers that can provide genuine quality assurance allows assemblers to provide quality assurance to their customers.

In addition to the lack of quality assurance, most suppliers use second-hand molding machines that are poorly maintained and rely on manual labor. In light of the fact that industrial workers in the country show a very high turnover rate, it is imperative to introduce the automated molding line to assure regular movement, rather than manual work which quality varies greatly among workers, in order to achieve the ultimate goal of incorporating quality into products throughout the production process.

Secondly, cost reduction is also a very important and difficult issue facing local suppliers and will be discussed in detail later.

3.2 Assessment of Production Management Capabilities and Major Issues for Upgrading

In an attempt to improve their competitiveness, automobile assemblers regard the just-in-time or kanban system as the most important tool. To introduce and operate such system with optimum results, the establishment of a flexible production system capable of making a variety of products in small lots is the prerequisite. For plastics molding operation, in particular, work efficiency should be maximized for changeover of molds and molding materials (Details in a later section).

Generally, leading manufacturers of molded plastics automotive parts fail to implement the true JIT and/or kanban system because they increase inventories to operate the system. Smaller plastics molding companies do not even recognize the concept of the JIT and/or kanban system. To ensure that the automobile and automotive parts industries

in the area successfully introduce the JIT and/or kanban system, there is again a prerequisite, namely to eliminate or minimize loss time in the changeover of molds and waste of molding materials. It should be noted, however, that effective reduction of loss time and waste should not be a sole responsibility of suppliers. Assembly manufacturers should work together with suppliers and assist them in improving work methods and developing an effective method to use waste materials by making financial and other contributions. For instance, for the mixing of different molding materials as a result of a changeover, a method to use the mixed material should be developed. Or if the same material, but in different colors, is used, the material can be continuously molded and painted in a new color.

3.3 Assessment of Process Technology Capabilities and Major Issues for Improvement

At present, few SMEs engaged in plastics molding manufacture automotive parts and components. Naturally, most of them do not feel the need for the JIT and/or kanban system. As pointed out earlier, if they are to introduce the JIT and/or kanban system, they must establish the flexible production system capable of producing a variety of products in small lots. To do so, the streamlining of the production process is essential, including reduction of time required for the changeover of molds and molding materials, reduction of materials consumption, and reduction of time required for startup after molding operation commences. Technical innovation in these areas should benefit SMEs as it becomes their production know-how.

Again, these efforts should be initiated under the leadership of management and their priority for improvement should be given to the following areas.

(1) Reduction of changeover time for molds: In Japan and other industrialized countries, single setup is carried out for up to 300-ton molding machines. It should be practiced by SMEs in the area as there is not much difficulty to be involved.

(2) Changeover of molding materials: This consumes considerable time and produces materials loss. These losses are not recoverable and should be minimized through process improvement. Actual solutions depend upon various factors, such as the type of material and the construction of the molder screws. In developing and implementing a solution, however, it is important for the manager to assume leadership and establish a clear goal for improvement. A well-designed solution, if implemented properly and vigorously, would produce much better results than an ill-

conceived one, e.g., the former could reduce changeover time or materials loss more than twice that for the latter. Another important point is the establishment of optimum purging conditions that should be different from molding conditions. Molding conditions are optimized to produce a good product using a specific material. Purging conditions are optimized to give a sufficient impact to remove materials from screws and cylinders, thereby to ensure the quick and effective changeover of materials.

(3) Wear and tear of second-hand molding machines, especially heating cylinders and screw check valves: Proper maintenance, including repair and replacement, is required.

3.4 Assessment of Overall Production Technology and Major Issues for Improvement

Among plastics molding companies in KwaZulu-Natal, some companies – manufacturers of shoe soles and buttons – have proprietary production techniques and skills, which may constitute a certain degree of entry barrier for other industries to make competing products. On the other hand, other molding companies do not have enough proprietary production techniques or know-how to secure their existing markets.

Therefore, it is necessary for plastic molding companies to develop special production technologies and highly value-added products.

Generally, different products require different strategies. Production of large components (bumpers and inner panels) and mass produced products (food containers, PET bottles, etc.) requires large capital investment, and their production costs are governed by scale of production.

On the other hand, conversion of molding materials usually requires a variety of tests to check durability and other requirements for new products, and thus it can only be accomplished under close cooperation of customers, materials suppliers and testing organizations. As a result, the plastics molding manufacturer cannot keep new production techniques and skills as their own and proprietary assets.

For SMEs in the state, design-intensive, small lot and/or niche products provide the best opportunity. At the first stage, they have to develop production capabilities to make good products efficiently and at competitive costs by using molding machines, molds and materials that they are using now. Then, they will be able to win confidence of customers and contracts. By establishing the good relationship with customers, they will have opportunities to upgrade their production capabilities to develop and deliver products that

meet the changing needs of customers.

3.5 Major Issues for Improvement of Cost Structure

All the companies surveyed by the study team have ample opportunities to improve their cost structure. However, it entails continuous efforts and should be started when the company can afford to do so, because, once competition becomes fierce, companies are limited in choice of solution and method.

Major issues commonly seen among most plastics molding companies are summarized as follows.

(1) Improvement of yield
   1) Reduction of defective products
   2) Immediate recycling and reuse of spools and runners, and effective measures to prevent inclusion of foreign matters and dust
   3) Reduction of materials wasted during the changeover and use of less costly replacement materials
   4) Weight management to control product weight
   5) Improvement of machine setup and adjustment for quick startup of molding operation

(2) Reduction of percent defective
   1) Self quality check by molding companies and on-site check by customers
   2) Preparation and use of molding condition tables, quality standard charts, boundary samples, and color samples
   3) Continuous operation of the molding machine under the same molding cycle and prevention of interruption of operation
   4) Repairing of defective molds that cause burs and other product defects
   5) Education to operators and improvement of their quality consciousness

(3) Improvement of operating efficiency
   1) Reduction of time required for changeover of molds or materials
   2) Reduction of startup time for molding operation
   3) Prevention of machine failure through daily inspection of the molding machine, auxiliary equipment and molds
   4) Prevention of interruption of machine operation due to the shortage of molding materials and other consumables
   5) Prevention of interruption of machine operation due to absenteeism

(4) Improvement of efficiency

1) Improvement of factory layout, work methods and procedures
2) Streamlining of the molding cycle (improvement of the mold cooling circuit)
3) Multiple machine operation by a single operator
4) Multiple stage operation by a single worker
5) Reduction of deflashing work by mold repair

3.6 Major Issues for Reinforcement of Marketing Activity

This effort should start from increased sales activity to existing customers to boost orders. This can be accomplished by reinforcing after-sales service and introducing consultation sales. Sales persons should not be content with traditional sales activities. They should try to act as a consultant and a partner for their customers. This way, they can obtain important information such as the future production plan and schedule. At the same time, they should inform customers of their companies, including marketing policy and differentiating factors so that they can establish a mutually beneficial and partner-like relationship with customers, not remaining as one of many suppliers that wait for orders.

ANNEX 2: Current State of the Metalworking and Plastics Molding Industries

(Based on the Results of Interview and Questionnaire Surveys)

SUMMARY

1 Metal Press Working Industry

(1) General profiles

In terms of ownership, 23 metal press working companies surveyed are dominated by local companies (96%), far exceeding foreign-affiliated companies (4%).

As for the number of employees, companies with 99 or less employees account for 96%, one half of which has 30 or less employees.

Companies with annual sales of 5 million rand or less in 2000 represent 46% and those more than 5 million rand and less than 10 million rand 32%.

The rates of automotive parts to total annual sales are rather high. There are ten companies whose automotive parts sales exceed 70%, including three companies with the rate of 100%. The automotive parts they are producing include brake boosters, oil filters, sheet parts, and heming parts.

They are sold mainly in the domestic market. Some of the oil filters, sheet parts, and electronic parts are exported. Besides automotive parts, these companies are producing refrigerator/freezer parts, machinery parts (including cast products), interior accessories, containers (boxes, racks, cases, etc.), and what not.

(2) Problems facing press working companies

The 23 companies were asked to cite causes for customer claims (multiple response allowed). Those that cited "price" and "technology" represent one fourth of total responses each. Those that cited "delivery schedule," "quality" and "production equipment" account for more than 10% each. As for "production equipment," companies that cited "poor efficiency" showed the highest percentage of 28%, followed by "difficulty in maintenance" 16%.

As for problems related to business operation, 44% of respondents cited "shortage of funds" and 16% "lack of customer information". On the other hand, 24% responded "no problem".

As for procurement of raw materials, the highest percentage of respondents (38%) cited "cost," followed by 17% "quality" and 14% "delivery schedule".

In the area of infrastructure, respondents that cited "lack of employee training facility" showed the highest percentage, reaching one third of total. These companies pointed out difficulty in training of foremen and operators.

The second highest percentage (30%) of respondents cited "difficulty in fund raising". They were then asked to cite a reason for the response. The highest percentage (28%) of respondents cited "high interest rate," followed by "strict examination of loan application" (20%) and "complicated procedures" (15%). Then, 10% of companies cited "lack of inspection facility" as the problem related to infrastructure.

In the area of quality control, two thirds of companies provided training for machine operation and defect check in the form of OJT. 57% recorded percent defective data, which ranged between 0.2% and 8%. Product quality check is constantly carried out by operators, under supervision of the production manager.

Table A2-1 shows the results of the questionnaire survey.

2 Metalworking Industry

(1) General profiles

19 metalworking companies surveyed are all local companies and no foreign company is included.

As for working capital, companies with less than 1 million rand show the highest percentage of 29% and those with 10 million rand 81%.

Companies having 30 or less employees account for 62%, those having more than 31 and less than 100 employees 5%, and those with 100 or more employees 33%.

The manufacturers with the annual sales of less than 5 million rand account for 56%. Other manufacturers excluding one company have the annual sales of 5 million to 50 million rand. Their main products are automotive parts including heat exchangers, alternators, muffler boxes, boosters, door handles/hinges, gear locks, door locks, sheet covers, sheet adjusters, aluminum wheels, steering carriers, meter panels, springs, and knuckles/bolts. Almost all products are sold in the domestic after-market. Only four companies have export sales. Their exported products include leather sheet covers, gear locks, and bolts. Besides automotive parts, these companies are producing agricultural machinery parts, sprinkler parts, steel parts, shoe parts, interior accessories, tools, and so on.

(2) Problems facing metalworking companies

As for customer claims, 24% of respondents cited "price (product sales cost)," 18% "delivery schedule" and 16% "production capacity. Only one company cited "quality".

As for problems related to business operation, the highest percentage (26%) of respondents cited "shortage of fund," followed by 19% "lack of customer information".

The metalworking companies surveyed purchase raw materials for local suppliers. Problems related to procurement of raw materials are cost and delivery schedule. 29% of respondents cited "high cost" and 24% "delayed delivery".

As for infrastructure, 29% (highest percentage) of respondents pointed out "shortage of employee training facilities," followed by "difficulty in fund raising" 19%.

In the area of manpower training, one third cited "difficult in training operators". Then, 19% cited "difficulty in training R&D staff" and 16% "difficulty in training foremen".

As for production equipment, 26% cited "poor efficiency" and 16% "difficulty in maintenance". Also, one third of respondents believe that defect is caused by human error.

As for problems related to fund raising, "high interest rate" showed the highest percentage of 31%, followed by "insufficient amount of loan" (12%) and "need for guarantee and collateral" (12%).

Table A2-2 shows the results of the questionnaire survey.

3 Plastics Molding Industry

(1) General profiles

Of 25 plastics molding surveyed, 80% were local companies, 8% foreign-affiliated companies, and 12% joint ventures of local and foreign companies. Foreign companies come from France and Germany.

The average number of employees among the 25 companies is 61. Those having 29 or less employees account for 24%, those with 30 –100 employees 56%, and those with

101 – 230 employees 20%.

As for annual sales, 20% reported 5 million rand or less in 2000, 16% 5 million – 10 million rand, 40% 10 million – 20 million rand, and 24% over 20 million rand. The annual average sales ranged between 10 million and 20 million rand.

Breakdown of sales by product type, containers accounted for the highest percentage (24%), followed by shoes (18%), automotive parts (16%) and accessories (15%). 76% of these products were shipped to the domestic market and the remaining 24% was exported. Most exports were destined to neighboring countries, including Namibia, Botswana, Zimbabwe, and Madagascar, as well as India and Australia.

More than 60% of companies use PE and PP as raw materials, with monthly consumption of 260 tons and 280 tons respectively.

(2) Problems facing plastics molding companies

As for the business status and outlook, 68% of respondents cited "no problem," while 20% pointed out "problems related to quality and cost".

More than 80% of respondents decreased profits due to a continuous rise in production cost, which was caused by the increase in raw material prices due to the depreciation of the rand. Deterioration of profitability is particularly serious among small enterprises with 60 or less employees, which feel the need for government subsidy in order to compete with imports from Asian countries.

As for quality control, only 28% of respondents have full-time QC staff and more than 70% make workers responsible for quality control of individual products.

4 Interest in JICA's Corporate Diagnosis Program

The companies surveyed were asked to express their interest in JICA's Corporate Diagnosis Program. Responses varied and are summarized as follows.

In the metal press working industry, 50% of enterprises showed intent to participate in the corporate diagnosis program and receive professional guidance. In the metalworking sector, 58% expressed interest in the program and asked detailed information. In the plastics molding sector, 44% showed interest and asked detailed

information.

Companies that did not show interest in the program accounted for 12% in the metal press working industry, 12% in the metalworking industry, and 11% in the plastics molding industry.

The results indicate that interest in the program is lower in the plastics molding industry, compared to the metal press working and metalworking industries. Some of plastics molding companies that rejected participation in the program seem to be afraid of possible negative impacts on their own business by providing information. On the other hand, first-tier suppliers of automotive parts, including plastics molding companies, are actively participated in the program for the purpose of improving competitiveness, partly due to information or encouragement from Toyota SA.

Table A2-1 (1): Metal Stamping

Question: Origin of capital

	Count	Percent of responses	Percent of cases
Domestic	22	95.7	95.7
Foreign	1	4.3	4.3
Total responses	23	100.0	100.0

(0 missing cases; 23 valid cases)

Question: Customer's requirements

	Count	Percent of responses	Percent of cases
Quality	6	14.3	26.1
Price	11	26.2	47.8
Delivery timing	7	16.7	30.4
Production capacity	5	11.9	21.7
Technological capabilities of development	10	23.8	43.5
Others	1	2.4	4.3
No problems	2	4.8	8.7
Total responses	42	100.0	182.6

(0 missing cases; 23 valid cases)

Question: Difficulty in business development

	Count	Percent of responses	Percent of cases
Lack of information on the customers	4	16.0	17.4
Contacting procedures	1	4.0	4.3
Lack of fund	11	44.0	47.8
Others	3	12.0	13.0
No problems	6	24.0	26.1
Total responses	25	100.0	108.7

(0 missing cases; 23 valid cases)

Table A2-1 (2): Metal Stamping

Question: Problems on procured parts

	Count	Percent of responses	Percent of cases
Quality	5	17.2	21.7
Cost	11	37.9	47.8
Delivery	4	13.8	17.4
Others	4	13.8	17.4
No problems	5	17.2	21.7
Total responses	29	100.0	126.1

(0 missing cases; 23 valid cases)

Question: Problems in the infrastructure

	Count	Percent of responses	Percent of cases
Testing facility	3	10.0	13.0
Worker training	10	33.3	43.5
Financing	9	30.0	39.1
Others	1	3.3	4.3
No problems	7	23.3	30.4
Total responses	30	100.0	130.4

(0 missing cases; 23 valid cases)

Question: Problems in human resources

	Count	Percent of responses	Percent of cases
Development staff	3	11.1	13.6
Engineers	1	3.7	4.5
Foreman's level	5	18.5	22.7
Worker's level	5	18.5	22.7
Others	3	11.1	13.6
No problems	10	37.0	45.5
Total responses	27	100.0	122.7

(1 missing cases; 22 valid cases)

Table A2-1 (3): Metal Stamping

Question: Problems in machinery

	Count	Percent of responses	Percent of cases
Inefficiency	7	28.0	31.8
Difficulty in maintenance	4	16.0	18.2
Others	1	4.0	4.5
No problems	13	52.0	59.1
Total responses	25	100.0	113.6

(1 missing cases; 22 valid cases)

Question: Problems in financing the business

	Count	Percent of responses	Percent of cases
Obtaining approval	8	20.0	36.4
Application procedure	6	15.0	27.3
Provision of guarantee	3	7.5	13.6
High interest rate	11	27.5	50.0
Repayment period	1	2.5	4.5
Security or guarantor	3	7.5	13.6
Others	1	2.5	4.5
No problems	7	17.5	31.8
Total responses	40	100.0	181.8

(1 missing cases; 22 valid cases)

Table A2-2 (1): Metal Working

Question: Origin of capital

	Count	Percent of responses	Percent of cases
Domestic	19	100.0	100.0
Total responses	19	100.0	100.0

(2 missing cases; 19 valid cases)

Question: Customer's requirements

	Count	Percent of responses	Percent of cases
Quality	1	2.2	5.0
Price	11	24.4	55.0
Delivery timing	8	17.8	40.0
Production capacity	7	15.6	35.0
Technological capabilities of development	4	8.9	20.0
Others	2	4.4	10.0
No problems	12	26.7	60.0
Total responses	45	100.0	225.0

(1 missing cases; 20 valid cases)

Question: Difficulty in business development

	Count	Percent of responses	Percent of cases
Lack of information on the customers	8	19.0	44.4
Contacting procedures	6	14.3	33.3
Lack of fund	11	26.2	61.1
Others	7	16.7	38.9
No problems	10	23.8	55.6
Total responses	42	100.0	233.3

(3 missing cases; 18 valid cases)

Table A2-2 (2): Metal Working

Question: Problems on procured parts and/or raw materials

	Count	Percent of responses	Percent of cases
Quality	4	10.5	22.2
Cost	11	28.9	61.1
Delivery	9	23.7	50.0
Others	3	7.9	16.7
No problems	11	28.9	61.1
Total responses	38	100.0	211.1

(3 missing cases; 18 valid cases)

Question: Problems in the infrastructure

	Count	Percent of responses	Percent of cases
Power supply	1	3.2	6.7
Testing facility	2	6.5	13.3
Calibration	1	3.2	6.7
Worker training	9	29.0	60.0
Financing	6	19.4	40.0
Others	4	12.9	26.7
No problems	8	25.8	53.3
Total responses	31	100.0	206.7

(6 missing cases; 15 valid cases)

Question: Problems in human resources

	Count	Percent of responses	Percent of cases
Development staff	7	18.9	43.8
Engineers	1	2.7	6.3
Foreman's level	6	16.2	37.5
Worker's level	12	32.4	75.0
Others	2	5.4	12.5
No problems	9	24.3	56.3
Total responses	37	100.0	231.3

(5 missing cases; 16 valid cases)

Table A2-2 (3): Metal Working

Question: Problems in machinery and equipment

	Count	Percent of responses	Percent of cases
High defect or rejection	1	5.3	8.3
Inefficiency	5	26.3	41.7
Difficulty in maintenance	3	15.8	25.0
Others	3	15.8	25.0
No problems	7	36.8	58.3
Total responses	19	100.0	158.3

(9 missing cases; 12 valid cases)

Question: Problems in financing the business

	Count	Percent of responses	Percent of cases
Obtaining approval	3	7.1	18.8
Application procedure	2	4.8	12.5
Insufficient amount	5	11.9	31.3
Provision of guarantee	3	7.1	18.8
High interest rate	13	31.0	81.3
Security or guarantor	5	11.9	31.3
Others	1	2.4	6.3
No problems	10	23.8	62.5
Total responses	42	100.0	262.5

(5 missing cases; 16 valid cases)

(Main Part of the Interview/ Questionnaire Survey Report)

1. INTRODUCTION

The manufacturing sector in South Africa is the largest contributor to the country's Gross Domestic Product (GDP) and has the greatest potential to generate employment opportunities and enhance national economic growth. Small manufacturing firms play a vital role in the economic activity of both developed and developing countries and it is now widely accepted that the greatest potential impact on economic growth (and hence job creation) will occur via the manufacturing sector.

In terms of manufacturing competitiveness, South Africa has been characterized as being highly ineffective and inefficient (Joffe, et.al 1995). In South Africa, government and business have attempted to promote growth by encouraging local production of manufactured goods, which were previously imported. This import substitution policy led to the emergence of a significant manufacturing sector in the country and created productive employment opportunities. However, with the

removal of sanctions, the manufacturing sector declined and subsequent manufacturing performance in South Africa has been poor (Joffe et al, 1995).

The South African Industry is described as being product – driven rather than marketing or competition – orientated (Business Africa, 1995:8, DTI, 1997, Small Business Project, 1999). Firms ignore the importance of meeting consumer needs by focusing on price and delivery issues. Further to thus, many companies focus on various product lines thus placing little emphasis on quality (Kotze and Kotze, 1997) , which has stunted the ability of South African manufacturing firms to compete effectively. Therefore, a practical strategy is required for reducing input costs and promoting the implementation and sustainability of a technology transfer initiative aimed at enhancing the competitiveness of small manufacturing enterprises.

It is with this intention in mind the South African Government, especially the Kwa Zulu-Natal provincial government's department of economic development and tourism, has requested the Japanese Government to assist in surveying the manufacturing sectors in KZN. The manufacturing sub sectors targeted were the Plastic Industry, Metal Stamping and Metal Working.

2. AIMS AND OBJECTIVES

The government of South Africa requested the Japanese government to extend technical assistance in the field of SME development, understanding that the SME development will contribute to the activation of the economy and reduction of unemployment. To this end JICA (Japanese International Co –operation Agency)

appointed UNICO international to undertake a preliminary survey of 25 companies in each of the plastic, metal stamping and metal working sectors in KZN. The purpose of the survey was to identify problems (technical, production, labour, raw materials, etc.) faced by the manufacturers so that technical assistance could be provided by JICA to the enterprises interested in participating in the programme. The diagnosis programme is solely for the benefit of the enterprise in assisting them improve their competitiveness.

3. METHODOLOGY

3.1. The survey was conducted amongst small manufacturers in the plastic, metal stamping and metal working sectors in the KZN province. The survey involved a face to face interview with either the manager or senior manager of the selected company, using a structured questionnaire devised by UNICO. The questionnaire consisted of both closed and open ended questions.

3.2. The Interview Process

An appointment was made with the manager of production manager of the company. The appointment involved the following process.

i. A telephone call was made to the company to contact the relevant personnel.

ii. The objective of the study was faxed to that personnel.

iii. A telephone call was made again to set up an appointment.

iv. A confirmation letter was then faxed to the appointed personnel to confirm the appointment.

On the day of the interview the personnel concerned was presented with a copy of the questionnaire so that the interviewee could see what answer were requested. (Some companies did request for the questionnaire before the date of appointment so that they could be fully prepared and this was obligingly done so). The interview process took approximately 1 hour followed by a visit to the plant (which took approximately 1 hour)

3.3. Sampling Technique

The following database were used in selecting the companies to be visited:

- Toyota
- Durban Chamber of Commerce
- Kwazulu Marketing Initiative
- Telkom Yellow Pages
- NAAMSA
- Plastic Federation of SA
- Metal Federation SA
- Smiths Manufacturing
- Rockham Industries
- Dumac
- Technikon Natal

- UNICO
- NAACAM

Telephones calls were made to all the companies listed in the database, especially those that were involved in the manufacture of automotive components and accessories. In the plastic sector telephone calls were made to companies that were also involved in injection moulding. The companies that responded and showed an interested were interviewed. The method of selection of the companies is reflected in the paragraph below.

3.4 Problems encountered in arranging interviews

The selection of the company was difficult since a large majority of companies were not interested in participating in the programme. Telephone calls were made to all the companies derived from the database and the first 10 (ten) companies indicated interest were visited. The problem and frustration faced by the interviewers was that 74 telephone calls were made to plastic manufacturing companies to select 5 companies and over 120 companies were contacted in the metal sector to make 10 appointments. The 10 interviews were completed by 7 June 2001. The balance of the other 15 interviews in all sectors were completed by 12 July 2001. It must be brought to the authories that most of the interviewers had a difficult task arranging the interviews and some involved in the plastic industry were verbally abused by some managers of companies.

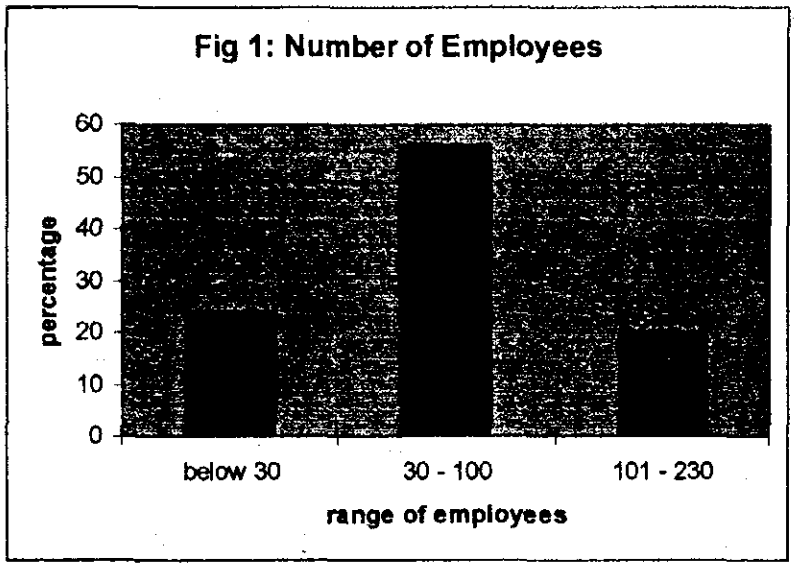
3.5 Problem Encountered in the Interview Process

Initially the objective of the study (in the plastic industry) was to survey companies that manufactured components for the automotive industry. The focus then changed to plastic industries associated with injection moulding. This necessitated a complete change of the questionnaire (see attached as an appendix). The JICA study team did not adhere the questionnaire and asked questions that were not planned for (this has made analysis of the interview quite difficult). Discussion with the interviewers in the metal sector also indicated that the initial objectives of the study were altered. However, in spite of the difficulties / problems faced, an analysis of the findings of the interviews is presented below: -

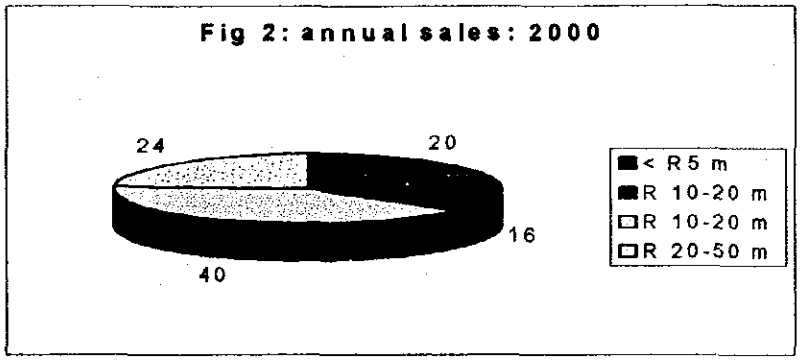
4. ANALYSIS

4.1. Plastic Industry

4.1.1 **Company Profile**: Visit of the enterprises revealed that 45% of them were established between 1980 and 16% prior to 1980. Almost 66% of the enterprises are well established and existing for over 20 years and both these are foreign owned companies. Most of these companies (80%) are wholly S.A. owned with 12% having some equity share with foreign countries and 8% as wholly foreign companies. The foreign countries operating in the plastic industry in KZN are from France and Germany. Seventy six percent of the companies visited had a staff complement of between 30 and 230 (Fig. 1) with the average being 61 employees per enterprise.



Disparities were evident in the cross tabulation between number of employees and annual turnover. It is evident that the company with a staff of 230 (highest of the companies interviewed) had a turnover of R10 to 20 million per year whilst 43% of companies with a staff of between 40 and 72 employees had an annual turnover sale of between R20 and 50m. The average sales of the 25 companies was between R10 and 20 million per year (Fig 2)



The companies manufacture a variety of plastic products (table 1).

Table 1: Products manufactured

Products	Percent
Shoe components	18%
Automotive components	16%
Bottles and containers	24%
Washing machine and Fridge components	9%
Other chemical components	9%
Domestic accessories	15%
Water pipes	3%
Display Components	6%
Total	100%

A vast majority of these products (76%) are sold domestically and 24% are exported – mainly to the neighbouring countries (Namibia, Botswana, Zimbabwe, Madagascar) and India Australia. All the companies have their own in – house quality check on the finished product in addition to the clients having their own quality control. Only 28% of the companies employed a quality controller specifically to check on the quality of the finished products, whilst the others had the operators to check on quality.

A variety of raw materials are used by theses enterprises in the manufacturing of their products (table 2) :

Table 2: Raw Materials

Raw material	No. of companies using this raw material	Total amount used per month (in tons)
PPE	0	0
PS	6	26
ABS	11	34
PE	9	260
PP	15	281
Acrylin	4	
Nylon	10	12
PA	3	36
PVC	6	55
HPP[2]	3	96
Poly carbon	3	26
PU	2	7
TR	1	70
Urathene	1	30
LD	1	12
PVR	1	60
Themo Plastic	1	12
Rubber	1	15
Poly Resin		

The common raw material used by more than 60% of the companies were PE & PP. Approximately 260 tons of PE and 281 tons of PP were used collectively per month by these companies.

4.1.2 Problems encountered by manufacturers

With respect to encountering difficulties in meeting customer's requirements, a large majority (68%) felt that these were no problems whilst 20 % felt that quality and the cost of the products was an issue. However, all the manufacturers feet that the cost of the manufactured products has been escalating over the years and their clients have accepted this considering the fact that the cost of raw materials have been increasing over the years because of the devaluation of the South African Rand (from R4.34 to U $ 1 IN 1994 to R8.27 to U $ 1 in 2001). This is a problem faced by most manufacturers (82%) that inflation has been eroding their profit margins. Most of the smaller manufacturers (with less than 60 employees) feel that the government should subsidize them in order for them to compete with the imported manufactured products, especially those originating from the Eastern (Asian) countries.

With the exception of the cost factor, none of the companies interviewed encountered any problems with respect to the quality of the raw material or the delivery time of the raw material to the plant. Similarly no problems were encountered with the infrastructural facilities at their plants. It seems that all the companies interviewed had a good working relationship with their staff and no labour problems were encountered.

4.1.3 Training and Quality Control

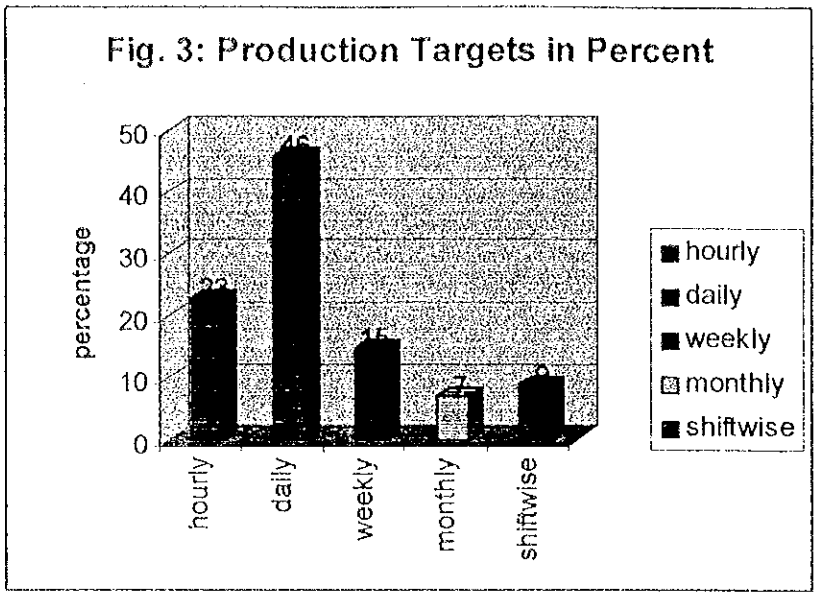
With respect to providing training to the staff, only 15 of the 25 companies visited responded. Of these 33% provided training at least once a month

whilst the balance had no specific training programmes. Most of the companies (67%) provided on the job training (training in operating the machines and checking for defects in the manufacturing process). Approximately 60% of the enterprises kept accurate record of their defective rate and this ranged from 0,1% to 8% of their production. Forty percent of these companies recorded a defective rate of 2% whilst 33 ⅓ % recorded a defective rate of below 1%. Most of the companies (88%) recycled the defective / rejected products in house whilst the other 12% either sold their products as "seconds" or dumped them.

4.1.4. Target for production

All the companies set targets for their production. Twenty three percent checked on targets on an hourly basis whilst 46% did so on a daily basis (Fig 3) .

Please Turn Over ....



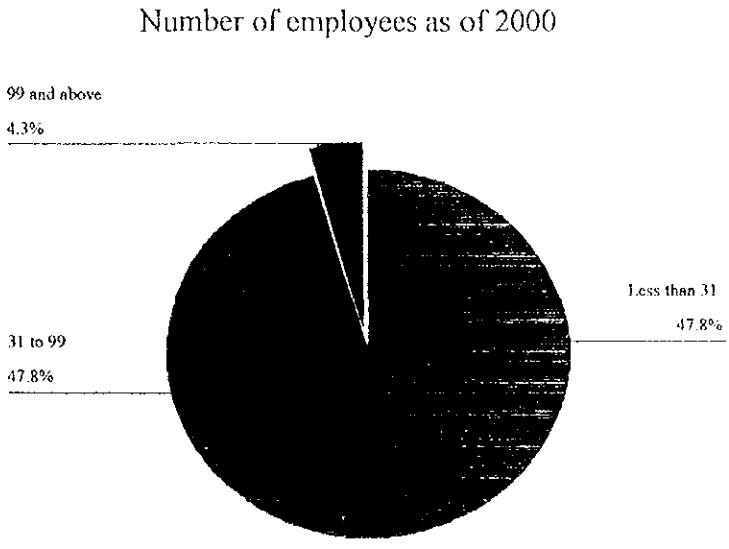
Most companies (76%) operate for 24 hours in order to meet production targets. Of these 53% operate 2 shifts per day and 47% operate 3 shifts per day.

4.2. METALSTAMPING SECTOR

4.2.1. Size of company.

Analysis of the interview findings revealed that a large majority of the firms (47,8%) had between 31 and 99 employees (Figure 4) and a similar proportion had below 30 employees.

Fig. 4 : Number of Employees : Metal Stamping Sector



With respect to annual sales 45,5% of the companies interviewed had sales of less than R5 million in 2000, and 31,8% had sales of between R5 and R10 Million (table3).

Table 3: Annual Sales (2000)

Aproximative sales in 2000

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 million Rands	10	43.5	45.5	45.5
	5 to 10 million Rands	7	30.4	31.8	77.3
	10 to 20 million Rands	3	13.0	13.6	90.9
	20 to 50 million Rands	2	8.7	9.1	100.0
	Total	22	95.7	100.0	
Missing	System	1	4.3		
Total		23	100.0		

Most of the companies (95,7%) are wholly South African owned. Only 4,3% of the companies had some foreign equity shares.

4.2.2 Customer requirements / problems encountered

Approximately one quarter of the companies found in difficult to meet their customer's requirements with respect to pricing and 23,8% with technological capabilities of production. A quarter of the business enterprises had no problems or difficulties in establishing their businesses while 44% felt that lack of funds prevented them from improving on their business (refer to table in appendix 3)

With respect to the procurements of raw material 37,9% of the enterprises emphasized that cost was a major factor followed by quality of the raw material (17,2%). (Refer to table in appendix 3).

With respect to worker training, almost one-third of the companies encountered difficulties and 30% experienced difficulty in raising finance to

improve their business (appendix 3) whilst 28% complained against the high interest rate. Most of the companies encountered no problems in worker relationships and no labour problems were experienced in the recent past.

4.2.3 Training and Quality Control

Most of the companies (67%) provided their staff with in house training (training in the operation of machines and checking for defects in the manufacturing process. Approximately 57%of the enterprises kept accurate records of their defective rate (this ranged from 0,2% to 8% of their production). Quality checks are done by the operators on a continuous basis and these were supervised by the production manager.

4.3. *METALWORKING SECTOR*

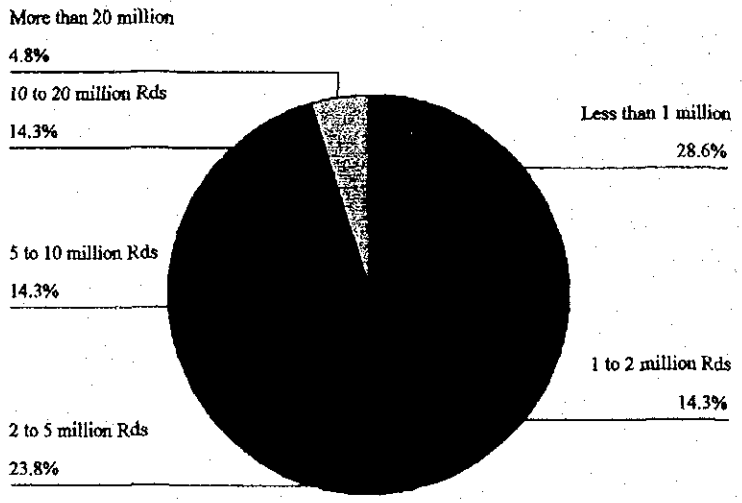
Analysis of the interview findings revealed. that all the enterprises visited were wholly South African owned (table 4) and the greatest percentage (29 %) of paid-up share capital was below R 1 million (fig 5) and almost one-fifth of the companies had a paid-up capital exceeding R 20 million.

Table 4: Origin of paid-up share capital

Dichotomy label	Count	Pct of Responses	Pct of Cases
Domestic	19	100.0	100.0
Foreign	0	0.0	0.0
Total responses	19	100.0	100.0

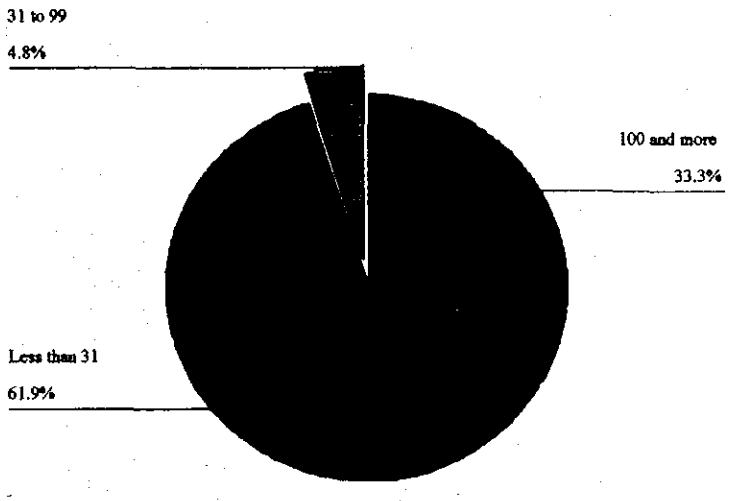
2 missing cases; 19 valid cases

Figure 5: Amount of paid-up share capital



Most of the companies (61,9%) employ below 30 people whilst almost a third employ more than 100 (fig 6).

Fig.6: Number of Employees as at 2000



Approximately a quarter of the companies find it difficult to meet customer's requirements with respect to pricing (sale cost of the product) and one-fifth with the delivery of the products. None of the customers of the enterprises visited had any complaints about the quality of the manufactured product (Refer to appendix 4)

The major problem facing the companies in the development of their business was lack of funds (26%) coupled with high interest rates (31%) followed by a lack of information on their potential clients (19%). Procurement of raw material did not present much problems. The companies visited purchase their raw material from the local suppliers. However, 29% of the companies felt that the cost of raw material was a major problem affecting the smooth functioning of their business. Almost a quarter of the participants experienced problems with the delivery of the raw material to their premises.

Analysis of problems encountered with staff, approximately a third of the companies had problems with human resource development at the worker's level and 16% at the foreman's level. Further 29% of the companies had problems in the training of their workers (see appendix 4).

Defective rate of products in the production process was attributed to inefficient machinery (26%) and difficulty in maintaining the machines (16%). On the other hand almost a third of the companies blamed the defective products on human error (Refer to tables in appendix 4)

Participants were asked whether they would be prepared to participate in the diagnosis programme to be conducted by JICA and this revealed varied responses. Between 10,5% and 12,3% of the enterprises in the plastics and metalworking sectors indicated that they are not interested in the programme. Majority of the participants, ranging from 44,4% in the plastic sector to 57,9% in the metalworking sector , indicated an interest but needed to know more about the programme before they commit themselves. Fifty percent of the personnel interviewed in the metal stamping sector indicated a willingness to participate in the programme and were keen to accept guidance from the experts.

5. CONCLUSION

Development of the small and medium manufacturing enterprises in an integral activity of all developing countries, and the SMEs in Kwa Zulu-Natal

Province are fortunate that free technical guidance and assistance is being offered to them by foreign experts (Japan). However, a number of companies, especially in the plastic sector, refused to accept the offer proposed by JICA. The felt threatened, were not prepared to share information and felt that this was an exercise to undermine their business and establish competitors. It has come to light that these enterprises were not aware of the JICA programme and therefore had a negative attitude. On the other hand, first tier suppliers to the automotive industry were willing to be interviewed because they were informed of this programme (eg. by Toyota) in advance. It is recommended that in future programmes of this nature the department of trade and industry/department of economic development and tourism advertise these programmes and intentions of the surveys well in advance so that the small and medium manufacturing enterprises would be made to realise that it is the genuine intention of the government to improve their competitiveness.

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Enterprise Survey Questionnaire

(Applicable to the enterprises in KZN Province, with employees **under 300**.)

Serial No. : ☐ Date interviewed : _____

Interviewee : Name _____ Position _____

Interviewer : Name _____

A. Company Profile

A.1 General (to be filled in with the business card received)

1) Name of Company _____

2) Address _____ PO Box _____

3) Telephone No. _____ e-mail Address _____

4) Facsimile No. _____

A.2 Time of Company Establishment in 19 _____

A.3 *Size of Company*

1) Approx. Sales in 2000

1. ☐ Less than 5 million Rands
2. ☐ 5 to 10 million Rands
3. ☐ 10 to 20 million Rands
4. ☐ 20 to 50 million Rands
5. ☐ 50 to 100 million Rands
6. ☐ More than 100 million Rands

2) Number of Employees as of 2000: _____

3) Paid-up share capital, of which, domestic ____% foreign ____% (Countries:)

1. ☐ *Less than 1 million Rands*
2. ☐ *1 to 2 million Rands*
3. ☐ 2 to 5 million Rands
4. ☐ 5 to 10 million Rands
5. ☐ 10 to 20 million Rands
6. ☐ More than 20 million Rands

JICA has a program of enterprise diagnosis and guidance. Are you interested in the program?

☐ Yes. We want to participate to the program. ☐ Yes. We want to know the detail of the program. ☐ No.

B. Parts procurement/ in-house production

(Approximate %, in terms of value)

	Name of parts	Total production and procurement (100%)			Possibility to increase local *procurement*	Constraints in increasing the local *procurement*
		In-house production	Procured from local sources			
			From specific suppliers	Other suppliers		
1	Engine group:					
2	Transmission group:					
3	Electrical equipments, intake and exhaust, and heater group:					
4	Steering, brake, and suspension group:					
5	Interior and exterior group:					
6	Body, and air conditioner group:					
7	Others					

C. Parts Procurement

Write five(5) names of major parts procured in order of procurement cost in 2000. As for each parts, clarify (C1) where the parts are procured, (C2) for what Product the parts are used, (C3) where the parts are procured, (C4) who are the oversea suppliers, and (C5) the future procurement prospects, using the codes indicated in the separate sheet.

Name of products	C1 Procurement	C2 Use of material	C3 Domestic or foreign	C4 Country name of foreign supplier	C5 Future prospects
1					
2					
3					
4					
5					

D. Production Technology

Characteristics of production technology; define the type of production technology according to the attached sheets.

		Mode 1	Mode 2	Mode 3
1.	Production Management	☐	☐	☐
2.	Quality Control	☐	☐	☐
3.	Technology	☐	☐	☐
4.	Technical Skill	☐	☐	☐
5.	Safety / Environment	☐	☐	☐

E. Difficulties and Constraints

What difficulties or constraints do you feel at present in the Company operation?

E.1 Customer's requirement

Difficulty to meet the requirement of customers, in;

1. ☐ Quality 2. ☐ Price 3. ☐ Delivery timing
4. ☐ Production capacity 5. ☐ Technological capabilities of development
6. ☐ Others (Specify:)

E.2 Business development

Difficulty in business development, because of;

1. ☐ Lack of information on the customers 2. ☐ Contacting procedures
3. ☐ Lack of fund 4. ☐ Others _____.

E.3 Procured parts and/or materials

There are problems on procured parts and/or materials in;

1. ☐ Quality 2. ☐ Cost 3. ☐ Delivery
4. ☐ Others _____.

E.4 Infrastructure

1. ☐ Power supply 2. ☐ Testing facility 3. ☐ Calibration
4. ☐ Worker training 5. ☐ Financing 6. ☐ Others _____.

E.5 Human Resources

1. ☐ Development staff 2. ☐ Engneers 3. ☐ Foreman's level
4. ☐ Worker's level 5. ☐ Others _____.

E.6 Machinery and Equipment

1. ☐ High defect or rejection 2. ☐ Inefficiency 3. ☐ Dificulty in maintenance
4. ☐ Others _____.

E.7 Financing

Difficulty in;

1. ☐ Obtaining approval 2. ☐ Application procedure 3. ☐ Insufficient amout
4. ☐ Provision of guarantee 5. ☐ High interest rate 6. ☐ Repayment period
7. ☐ Security or Guarantor 8. ☐ Others _____.

What is the most urgent or serious matters among the above? Please choose three (3) items from the abov

_____

F. Assistance from outside

Have you ever used any technical, marketing, training and managerial institutions of the listed, universities, private laboratories and so on? If yes, please specify.

Name of institutions / organizations	Type of services received	Your evaluation
1.		1. Excellent 2. Good 3. Fair 4. Poor
2.		1. Excellent 2. Good 3. Fair 4. Poor
3.		1. Excellent 2. Good 3. Fair 4. Poor
4.		1. Excellent 2. Good 3. Fair 4. Poor
5.		1. Excellent 2. Good 3. Fair 4. Poor

Thank you for your cooperation.

Group $CAPITAL Origin of paid-up share capital
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Domestic	CAPITAL1	22	95.7	95.7
Foreign	CAPITAL2	1	4.3	4.3
Total responses		23	100.0	100.0

0 missing cases; 23 valid cases

Group $CUSTOME Difficulty to meet requirements
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Quality	CUSTOM1	6	14.3	26.1
Price	CUSTOM2	11	26.2	47.8
Delivery timing	CUSTOM3	7	16.7	30.4
Production capacity	CUSTOM4	5	11.9	21.7
Technological capabilities of developmen	CUSTOM5	10	23.8	43.5
Others	CUSTOM6	1	2.4	4.3
No problems	CUSTOM7	2	4.8	8.7
Total responses		42	100.0	182.6

0 missing cases; 23 valid cases

Group $BUSINES Difficulty in business development
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Lack of information on the customers	BUSINES1	4	16.0	17.4
Contacting procedures	BUSINES2	1	4.0	4.3
Lack of fund	BUSINES3	11	44.0	47.8
Others	BUSINES4	3	12.0	13.0
No problems	BUSINES5	6	24.0	26.1
Total responses		25	100.0	108.7

0 missing cases; 23 valid cases

Group $PARTS Problems on procured parts
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Quality	PARTS1	5	17.2	21.7
Cost	PARTS2	11	37.9	47.8
Delivery	PARTS3	4	13.8	17.4
Others	PARTS4	4	13.8	17.4
No problems	PARTS5	5	17.2	21.7
Total responses		29	100.0	126.1

0 missing cases; 23 valid cases

Group $INFRAST Problems in the infrastructure
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Testing facility	INFRAST2	3	10.0	13.0
Worker training	INFRAST4	10	33.3	43.5
Financing	INFRAST5	9	30.0	39.1
Others	INFRAST6	1	3.3	4.3
No problems	INFRAST7	7	23.3	30.4
Total responses		30	100.0	130.4

0 missing cases; 23 valid cases

Group $HUMAN Problems in human resources
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Development staff	HUMAN1	3	11.1	13.6
Engineers	HUMAN2	1	3.7	4.5
Foreman's level	HUMAN3	5	18.5	22.7
Worker's level	HUMAN4	5	18.5	22.7
Others	HUMAN5	3	11.1	13.6
No problems	HUMAN6	10	37.0	45.5
Total responses		27	100.0	122.7

1 missing cases; 22 valid cases

Group $EQUIP Problems in machinery
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Inefficiency	EQUIP2	7	28.0	31.8
Difficulty in maintenance	EQUIP3	4	16.0	18.2
Others	EQUIP4	1	4.0	4.5
No problems	EQUIP5	13	52.0	59.1
Total responses		25	100.0	113.6

1 missing cases; 22 valid cases

Group $FINANCE Problems in financing the business
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Obtaining approval	FINANCE1	8	20.0	36.4
Application procedure	FINANCE2	6	15.0	27.3
Provision of guarantee	FINANCE4	3	7.5	13.6
High interest rate	FINANCE5	11	27.5	50.0
Repayment period	FINANCE6	1	2.5	4.5
Security or guarantor	FINANCE7	3	7.5	13.6
Others	FINANCE8	1	2.5	4.5
No problems	FINANCE9	7	17.5	31.8
Total responses		40	100.0	181.8

1 missing cases; 22 valid cases

Multiple Response

Group $CAPITAL Origin of capital
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Domestic	CAPITAL1	19	100.0	100.0
Total responses		19	100.0	100.0

2 missing cases; 19 valid cases

Group $CUSTOM Customer's requirement
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Quality	CUSTOM1	1	2.2	5.0
Price	CUSTOM2	11	24.4	55.0
Delivery timing	CUSTOM3	8	17.8	40.0
Production capacity	CUSTOM4	7	15.6	35.0
Technological capabilities of developmen	CUSTOM5	4	8.9	20.0
Others	CUSTOM6	2	4.4	10.0
No problems	CUSTOM7	12	26.7	60.0
Total responses		45	100.0	225.0

1 missing cases; 20 valid cases

Group $BUSINES Business development
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Lack of information on the customers	BUSINES1	8	19.0	44.4
Contacting procedures	BUSINES2	6	14.3	33.3
Lack of fund	BUSINES3	11	26.2	61.1
Others	BUSINES4	7	16.7	38.9
No problems	BUSINES5	10	23.8	55.6
Total responses		42	100.0	233.3

3 missing cases; 18 valid cases

Group $PARTS Procured parts and/or raw materials
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Quality	PARTS1	4	10.5	22.2
Cost	PARTS2	11	28.9	61.1
Delivery	PARTS3	9	23.7	50.0
Others	PARTS4	3	7.9	16.7
No problems	PARTS5	11	28.9	61.1
Total responses		38	100.0	211.1

3 missing cases; 18 valid cases

Group $INFRAST Infrastructure

(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Power supply	INFRAST1	1	3.2	6.7
Testing facility	INFRAST2	2	6.5	13.3
Calibration	INFRAST3	1	3.2	6.7
Worker training	INFRAST4	9	29.0	60.0
Financing	INFRAST5	6	19.4	40.0
Others	INFRAST6	4	12.9	26.7
No problems	INFRAST7	8	25.8	53.3
Total responses		31	100.0	206.7

6 missing cases; 15 valid cases

Group $HUMAN Human resources
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Development staff	HUMAN1	7	18.9	43.8
Engineers	HUMAN2	1	2.7	6.3
Foreman's level	HUMAN3	6	16.2	37.5
Worker's level	HUMAN4	12	32.4	75.0
Others	HUMAN5	2	5.4	12.5
No problems	HUMAN6	9	24.3	56.3
Total responses		37	100.0	231.3

5 missing cases; 16 valid cases

Group $EQUIP Machinery and equipment
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
High defect or rejection	EQUIP1	1	5.3	8.3
Inefficiency	EQUIP2	5	26.3	41.7
Difficulty in maintenance	EQUIP3	3	15.8	25.0
Others	EQUIP4	3	15.8	25.0
No problems	EQUIP5	7	36.8	58.3
Total responses		19	100.0	158.3

9 missing cases; 12 valid cases

Group $FINANCE Financing
(Value tabulated = 1)

Dichotomy label	Name	Count	Pct of Responses	Pct of Cases
Obtaining approval	FINANCE1	3	7.1	18.8
Application procedure	FINANCE2	2	4.8	12.5
Insufficient amount	FINANCE3	5	11.9	31.3
Provision of guarantee	FINANCE4	3	7.1	18.8
High interest rate	FINANCE5	13	31.0	81.3
Security or guarantor	FINANCE7	5	11.9	31.3
Others	FINANCE8	1	2.4	6.3
No problems	FINANCE9	10	23.8	62.5
Total responses		42	100.0	262.5

5 missing cases; 16 valid cases