

**SOUTH AFRICAN QUALIFICATIONS AUTHORITY (SAQA)**

In accordance with regulation 24(c) of the National Standards Bodies Regulations of 28 March 1998, the Standards Generating Body (SGB) for

Food

Registered by NSB 06, Manufacturing, Engineering and Technology, publishes the following unit standards for public comment.

This notice contains the titles, fields, sub-fields, NQF levels, credits, and purpose of the unit standard. The unit standard can be accessed via the SAQA web-site at www.saqa.org.za. Copies may also be obtained from the Directorate of Standards Setting and Development at the SAQA offices, Hatfield Forum West, 1067 Arcadia Street, Hatfield, Pretoria.

Comment on the unit standards should reach SAQA at the address ***below and no later than 5 April 2004***. All correspondence should be marked **Standards Setting – SGB for Food Manufacturing** and addressed to

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SOUTH AFRICAN QUALIFICATIONS AUTHORITY**National Certificate in Maintenance of High-speed Production Processes
(Fast-moving Consumer Goods): NQF Level 5**

Field: Manufacturing, Engineering and Technology

Sub-field: Engineering and Related Design

Level: 5

Credit: 160

Issue date:

Review date:

Rationale for the qualification:

Engineering is a discipline and profession that serves the needs of society and the economy. The National Certificate In Maintenance of high Speed Production Processes is designed to contribute to developing engineering competence.

There is an increased sophistication in the machinery and equipment used for high-speed production processes. The management of failure in such an environment presents opportunities for qualified artisans to pursue a career in maintenance beyond NQF level 4 or artisan level.

This qualification represents the beginning of a career in the science and technology of maintenance as a discipline. It is a qualification in its own right but it is also designed so that the credits and the exit level outcomes form a part of the National Diploma in Maintenance of High-speed Production Processes (Fast-moving Consumer Goods): NQF Level 5.

This qualification series recognises skills, knowledge and values relevant to the workplace. It is designed for learners who:

- Have attended courses and then apply the knowledge and skills gained to activities in the workplace or
- Are already workers and have acquired the skills and knowledge without attending formal courses or
- Are part of a learnership programme which integrates structured learning and work experience

Skills, knowledge, values and attitudes reflected in the qualification are building blocks for the development of candidate engineers towards becoming competent engineers to ultimately lead sophisticated engineering activities in the Food industry and solve sophisticated engineering problems.

Purpose of the qualification:

Qualified maintenance personnel (artisans) in the past had few options in pursuing formal qualifications in their field. They had a choice between becoming technicians or following a general management route.

The purpose of this qualification is to describe the skills and knowledge required in what is becoming a new discipline: the science and technology of maintenance in the context of sophisticated, high-speed production lines.

The increased sophistication is reflected in:

- greater automation
- integrated lines that combine a range of processing, product handling and packaging operations
- combinations of mechanical, electrical and electronic components
- integration of measurement, control and communication devices
- an in-depth understanding of the production or manufacturing processes and their impact on the maintenance processes.

A failure in any part of the system can have severe implications in terms of reduced output, damage to product, wastage and possible injury. Consequences of such failure can include negative impacts on the health of workers and consumers and on the profitability and reputation of the company.

The process of managing failure has implications for the maintenance of equipment and requires new sets of skills and knowledge, representing a shift away from hand skills to the skills required

to analyse data in records and make recommendations, plan and implement specific maintenance programmes and install new or updated equipment.

This and related qualifications will act as a framework for providers, assessors and learners to plan, implement and measure the outcomes of suitable learning programmes, or the recognition of prior learning, in this new discipline.

The specific purpose of the qualification represents the skills, knowledge and understanding required by competent practitioners to:

1. Initiate, implement and oversee engineering and maintenance practices and improvements that:
 - ensure high-speed production lines operate continuously at optimum efficiency
 - introduce new technology, equipment and product lines
 - co-ordinate activities of maintenance staff and contractors
2. Solve problems and provide technical support to the maintenance personnel.

This qualification can be obtained in the context of a variety of manufacturing and packaging operations for fast-moving consumer goods.

This qualification is conceptualised as forming an integrated part of the National Diploma in Maintenance of High-speed Production Processes (Fast-moving Consumer Goods): NQF Level 5. However, it is also complete in itself and fulfils all the requirements for a National Certificate.

Learning assumed to be in place:

The credits and the related unit standards assume that the learner is either formally qualified or has extensive experience in the installation, repair and maintenance of electrical, mechanical and electronic components and control systems and some experience with instrumentation. If a learner does not have such experience or qualifications, the learning time will be increased.

Access to the qualification:

There is an Open access to this qualification bearing in mind the learning assumed to be in place mentioned above.

Exit level Outcomes:

Exit level outcome 1

Implement new maintenance programmes

Associated Assessment Criteria

- The new maintenance intervention is operational
- The intervention is implemented in time and within budget
- Feedback on the effectiveness of the intervention is provided
- Understanding of various maintenance programmes and the implementation steps required is demonstrated

Exit level outcome 2

Monitor, manage and maintain machinery and equipment

Associated Assessment Criteria

- Machinery and equipment availability is optimised
- Operations are within budget
- Equipment and machinery safety devices are operational and in use
- Production and maintenance records are analysed and evaluated and recommendations are made
- Issues related to cost impacts, maintenance, spares and downtime and maintenance options are explained and discussed

Exit level outcome 3

Plan, implement and monitor a project:

- A continuous improvement project
- New product
- New sizes of product

Associated Assessment Criteria

- The intervention is implemented on time and within budget and the intervention works as planned
- All aspects of the project are co-ordinated effectively
- Progress against set milestones is achieved
- Issues related to project management in the maintenance environment are explained and discussed

Exit level outcome 4

Co-ordinate the activities of maintenance staff and contractors

Associated Assessment Criteria

- Work is scheduled and allocated
- Documents for the process are prepared and provided
- Progress and quality, including safety, health and environmental issues, are evaluated and verified
- Stoppages are communicated, documents collated and progress reported
- The ability to prioritise and allocate resources for maintenance is demonstrated
- An understanding of the machinery, the control systems and the process is demonstrated

Exit level outcome 5

Solve equipment and machinery-related problems and provide technical support to maintenance personnel

Range: Equipment and machinery related problems would include all parts of the production line, mechanical, electric, electronic, instrumentation, communication and control; repair maintenance, programming, diagnostics

Associated Assessment Criteria

- An in-depth knowledge and understanding of the machinery, equipment and systems is demonstrated
- Records show that the problem has been eliminated or controlled or the frequency of failure has been consistently reduced
- Records show that downtime has been reduced, efficiencies have improved and waste has been reduced
- Complex failures or problems have been documented and show the impact of changes
- Maintenance personnel have been trained and coached and task teams have been provided with leadership and guidance

Integrated Assessment:

The integrated assessment must be based on a summative assessment guide. The guide must spell out how the assessor will assess different aspects of the performance and will include:

- Observing (and listening to) the learner at work, both in primary activities as well as in other interactions, or in relevant simulations
- Asking questions and initiating short discussions to test understanding
- Looking at records and reports and evaluating projects included in a portfolio of evidence.

The learner may choose in which language s/he wants to be assessed. This should be established as part of a process of preparing the learner for assessment and familiarising the learner with the approach being taken.

While this is primarily a workplace-based qualification, evidence from other areas of endeavour may be presented if pertinent to any of the exit level outcomes.

The assessment process should cover the explicit tasks required for the qualification as well as the understanding of the concepts and principles that underpin the activities required for installation, repair and maintenance of high-speed and integrated production equipment. The assessment process should also establish how the learning process has advanced the critical outcomes.

Assessors should also evaluate evidence that the learner has been performing consistently over a period of time.

International comparability:

A search for similar qualifications elsewhere was made. This was done in three phases:

1. Reviewing qualifications on the New Zealand Qualifications Framework
2. Conducting a search on the world-wide web
3. Liasing with respondents in the international partner sites of local companies

No comparable qualifications were found. This is not surprising since it is a relatively new and emerging discipline. Some overseas respondents expressed an interest in such a qualification for their own use.

Recognition of prior learning:

This qualification may be obtained through the recognition of prior learning and/or experience. For the purposes of recognising prior learning, providers are required to develop structured means for the assessment of individual candidates on a case by case basis. Such procedures, and the assessment of individual candidates must be subject to moderation.

Articulation possibilities:

This qualification allows for horizontal (persons with qualifications at the same or higher NQF level can pursue this qualification for career orientation) and vertical (persons completing this qualification can proceed to a relevant higher qualification) articulation.

Overview of the proposed qualifications pathway and articulation possibilities:

| NQF level | Manufacturing | Maintenance | | Engineering | |
|-----------|--|--|--|---|----------------------|
| 5 | | Diploma: Maintenance of high-speed production processes (FMCG) 240 | | Engineering Diplomas, mechanical, electrical... | |
| 5 | Various Manufacturing qualifications | Certificate: Maintenance of high-speed production processes (FMCG) 120 | | <i>Millwright</i> <--- | Mechatronics <--- |
| 4 | | 'Fitting' | <i>Industrial Electrical Maintenance</i> | <i>Millwright</i> | Mechatronics |
| 3 | | 'Fitting' | <i>Industrial Electrical Maintenance</i> | <i>Millwright</i> | Mechatronics |
| 2 | | 'Fitting' | <i>Industrial Electrical Maintenance</i> | <i>Millwright</i> | Mechatronics |
| 1 | National Certificate in Manufacturing, Engineering and Related Activities: NQF 1 | | | | |

'Fitting', Industrial Electrical Maintenance and Millwright represent either trade qualifications or appropriate National Certificates in Mechanical Engineering (Fitting) or (Fitting and Machining) or any others that may still be developed. Qualifications in italics represent existing trades that are currently being transformed into NQF qualifications. There is a possibility of an NQF 5 certificate qualification being developed for the millwright qualification pathway – hence this is followed by a question mark.

Moderation options:

Accredited providers should establish or refine moderation procedures and systems in line with the requirements of the relevant ETQA.

Results of the assessment should be moderated by one or more external moderators. External moderators should provide reports not only on the fairness and consistency of assessment, but also on the validity of the assessment design in terms of the specified outcomes.

To assure the quality of the assessment process, the moderation should cover the following:

- Assessor credentials
- The assessment instrument
- The assessment process

Criteria for registration of assessors:

Range: Accredited providers may use their own qualified staff as assessors.

The following criteria should be applied by the relevant ETQA:

1. Appropriate qualification in the field of maintenance science, with a minimum of 2 years' experience in a high-speed manufacturing environment. The subject matter expertise of the assessor can be established by recognition of prior learning.
2. Appropriate experience and understanding of assessment theory, processes and practices.
3. Good interpersonal skills and ability to balance the conflicting requirements of:
 - Maintaining national standards
 - The interests of the learner
 - The need for transformation and redressing the legacies of the past
 - The cultural background and language of the learner.
4. Registration as an assessor with a relevant ETQA.
5. Any other criteria required by a relevant ETQA.

NATIONAL CERTIFICATE IN MAINTENANCE OF HIGH-SPEED PRODUCTION PROCESSES (FAST-MOVING CONSUMER GOODS): LEVEL 5

| NLRD | Fundamental | L | C |
|-------|---|---|------------|
| | Communication | | |
| 8647 | Apply workplace communication skills | 5 | 10 |
| | Project Management | | |
| | Implement new projects in a rubber manufacturing and assembly process conceptualized for Maintenance of High-speed Production Processes | 5 | 30 |
| 12669 | Total Fundamental | | 40 |
| | Core | | |
| | Maintenance | | |
| | Install and commission a new high-speed production line | 5 | 32 |
| | Implement a new maintenance programme | 5 | 34 |
| 9895 | Coordinate predictive and preventive maintenance | 5 | 12 |
| | Optimise maintenance activities and practices for high-speed production lines | 5 | 18 |
| | Safety, Health & Environmental Quality Assurance | | |
| 13224 | Monitor the application of safety, health and environmental protection procedures | 4 | 4 |
| | People Interacting, leading and developing | | |
| 9904 | Coordinate work group to produce product conceptualized for Maintenance of High-speed Production Processes | 5 | 8 |
| | Total Core | | 108 |

| | Elective | | |
|-------|---|---|------------|
| | Maintenance | | |
| 13114 | Install, test and maintain a complex computer integrated manufacturing system | 5 | 20 |
| | Project Management | | |
| 13835 | Contribute to project initiation, scope definition and scope change control | 4 | 9 |
| | Quality Assurance | | |
| 10144 | Identify, suggest and implement corrective actions to improve quality | 4 | 6 |
| | Business Relations | | |
| 10134 | Participate in the estimation and preparation of cost budgets for an element of work and monitor and control actual cost against budget | 4 | 6 |
| | Elective credits required for qualification | | 12 |
| | Total for qualification | | 160 |

**UNIT STANDARDS AND SPECIFIC OUTCOMES IN
NATIONAL CERTIFICATE IN MAINTENANCE OF HIGH-SPEED PRODUCTION PROCESSES
(FAST-MOVING CONSUMER GOODS): NQF LEVEL 5**

Title 1: Install and commission a high-speed production line

- Specific outcome 1.1: Plan and determine material and equipment requirements; complete documentation and plan changes required for the installation process
- Specific outcome 1.2: Brief and prepare contractors and production and maintenance personnel
- Specific outcome 1.3: Co-ordinate activities of production and maintenance personnel and contractors and confirm that each aspect of the installation has been completed according to specification
- Specific outcome 1.4: Run trials, compare results to manufacturer's specifications and resolve outstanding issues
- Specific outcome 1.5: Hand over the new line to production, monitor the new line and resolve problems

Title 2: Implement a new maintenance programme

- Specific outcome 2.1: Plan and schedule activities, determine material and equipment requirements and complete requisitions for required materials and equipment
- Specific outcome 2.2: Brief maintenance personnel and prepare and co-ordinate their activities
- Specific outcome 2.3: Monitor the new programme, coach and assess personnel involved in the new programme and make adjustments to the programme when required
- Specific outcome 2.4: Evaluate effectiveness and efficiency of activities and resolve conflicts, complaints and problems
- Specific outcome 2.5: Provide feedback to management and the workgroup and discuss issues which may arise

Title 3: Optimise maintenance activities and practices for high-speed production lines

- Specific outcome 3.1: Generate, test and evaluate options to achieve improvement
- Specific outcome 3.2: Develop optimisation plan, brief maintenance and production personnel and implement plan
- Specific outcome 3.3: Collect and evaluate results; review and adjust the optimisation process until objectives have been achieved
- Specific outcome 3.4: Compile reports and update maintenance procedures