



# Curriculum Framework

## Gravure Machine Minding



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## 1 Introduction:

Gravure Machine Minding is a well established and defined trade in a fast growing industry. Technological advancement in the last decade has left the only structured mode of learning, namely apprenticeships, far behind.

It has therefore become necessary to address the currency and quality of the curriculum for apprenticeships.

The introduction of the amendment to the Skills Development Act has also strongly influenced the approach to this curriculum framework. There is a shift from the established Competency Based Modular Training system to an Outcomes Based approach.

In addition to the shift to Outcomes Based education, there is also a shift to strong occupationally based exit level outcomes. In an attempt to recognise occupations within the trade qualifications, previously unrecognised occupations like machine assistants and the like, will now find a recognised and formalised learning path.

The qualification framework also addresses the inclusion/exclusion of certain processes within the trade by using **elective** exit level outcomes. This will enable the employer and the apprentice to define the learning path that the apprentice will specialise in based on the company equipment and the apprentice areas of interest.

## 2 Background:

The Printing and Packaging industries have a legacy of above average artisan training. Implementation of apprentice training has gradually evolved from a time-based apprenticeship with the option to do a voluntary trade test, to CBMT (Competency Based Modular Training) and now there is an inevitable shift to Outcomes Based training.

This evolution in delivery modes has strived to improve the control over context and quality of learning. The benefit of Outcomes Based training lies in an approach that has a strong focus on occupations and the fundamental, core and elective learning that will enable the learner to not only master a skill, but apply it in a fast developing economy.

In order to compete in the global economy, the apprenticeship system and its curricula has to transform into a mode of delivery that will produce artisans who are knowledgeable, skilled and adaptable with strong critical thinking and problem solving abilities.

This curriculum framework is the culmination of the best technical experts and curriculum development experts applying a clean slate approach without discarding the work previously done by advisory groups and technical committees.



### 3 Purpose of the qualification:

This qualification is to be registered at level 3 / 4 on the National Vocational Qualifications framework.

It is designed to equip learners with an integrated practical and theoretical grounding in the basic principles and practices of Gravure Machine Minding.

It will equip learners to be able to successfully complete the gravure processes within a range of printing industry contexts.

It will include broad areas of learning including, the impact of printing on the environment and the basics of mechanical, pneumatical, hydraulic and electronic equipment.

Learners acquiring this qualification will demonstrate competencies across areas including maintenance and the operation of high speed gravure presses, and various ancillary operations.

Further to these qualifying learners will be able to specialise in various elective components which will include quality and colour standards and inline finishing operations.

The fundamental learning will prepare the learner for the business environment, communication, mathematical, scientific and computer abilities together with life skills.

Learners completing this qualification will be able to operate proficiently in this fast growing high speed printing environment.

#### Learning to be assumed to be in place:

Learners will be assumed to be competent in the following abilities:

Using Science and Technology	NQF level 2 / grade ten
Solving mathematical problems	NQF level 2 / grade ten
Literacy & Numeracy	NQF level 2 / grade ten



#### 4 Range Statement:

The learning will cover all aspects of the trade / related trades limited to the printing industry. The learning will cover all aspects of the gravure operation, related practices such as Environmental, Health and Safety and all related theoretical underpinning knowledge.

The learning is intended to act as an entry level programme, initiating a potential career in the printing industry. The learning in this qualification will not cover subject matter at an advanced level (assumed to be contained in a future programme designed for advanced / technician studies.

The learning will be primarily practical or on site training with the learner exposed to theoretical training in traditional 'block release programmes.

#### 5 Assumptions:

This Qualification Framework assumes that learners will be in possession of a minimum of a grade ten qualification?

Learners will be assessed to determine whether they have the aptitude to deal with the level of learning required;

The level of reading / writing and arithmetic assumed to be in place will be at a NQF level of 2 or the minimum of a grade ten;

The printing industry will continue to require the trades to be defined narrowly in a functional specific manner as Gravure as an example;

The industry will define trades in two levels, one of technicians for more complex environments and one of trades for more rudimentary purposes of learning;

Learning will be provided by a range of learning providers, but primarily by the industry accepted 'colleges' of learning for the foundational aspects and by the workplace providers and workplace context;

Learners will be assigned to accredited workplaces to complete there workplace context learning requirements;

The qualification framework will serve as a guide until such time as the vocationally based qualification frameworks are released / approved by the relevant ETQA;



**6 Criteria for inclusions / Exclusions:**

<b>Inclusion Criteria:</b>	<b>Exclusion Criteria:</b>
<p>Core gravure processes;  Broad underpinning knowledge to ensure flexibility;  Critical cross field outcomes to be provided through delivery modality;  Generic applications;  Minimum plant practices such as overall operating procedures / health &amp; safety / small groups, etc.</p>	<p>Plant specific training requirements;  Dated machine technologies (to be covered by plant specific training if required);  Plant specific applications / technologies;  International Best Practices  (Learners should be able to carry special credits but not required for minimum pass rates)</p>



## 7. Applied Competence (Exit Level Outcomes)

Fundamental		Core		Elective	
				10.	Understand the inline <b>perforating unit</b> on a printing press.
		9.	Demonstrate an understanding of and perform <b>press production</b> .	9.	Demonstrate an understanding of the <b>sheeter operation</b> .
8.	Demonstrate an understanding of the printing industries impact on the <b>environment</b>	8.	Demonstrate competence and the understanding of a basic <b>Make Ready</b> process and procedure.	8.	Understand and perform <b>inline inkjet</b> printing operations.
7.	Demonstrate and understanding basic printing <b>science</b>	7.	Understand and perform the setup process for a <b>folder operation</b> .	7.	Understand and perform <b>inline mailing</b> operations.
6.	Apply basic <b>mathematical</b> calculations specific to the printing environment	6.	Understand and perform <b>inking system</b> setup operations.	6.	Understand and perform <b>inline trimming</b> and finishing operations.
5.	Demonstrate an understanding of production <b>economics</b> for a printing / bookbinding operation.	5.	Understand and perform <b>printing unit</b> setup operations.	5.	Understand the <b>inline stitching</b> unit on a printing press.
4.	Demonstrate an understanding of the principles of <b>mechanical</b> , pneumatic, hydraulic and electronic components of bookbinding equipment.	4.	Understand the principles of <b>Densitometry</b> .	4.	Understand the <b>inline gluing</b> operation.
3.	Demonstrate an understanding of printing <b>industry processes</b> , terms, concept and principles.	3.	Understand the process and perform a press <b>pre-make ready</b> .	3.	Understand and implement <b>colour standards</b> .
2.	Demonstrate an understanding of basic <b>computer skills</b> and the use of Graphic User Interface equipment.	2.	Understand and perform an <b>assistant's</b> role in a gravure environment.	2.	Understanding and implement national and international <b>quality standards</b> .
1.	Demonstrate an understanding of <b>company policies</b> and procedures as applied to your specific work area.	1.	Understand different <b>paper handling</b> operations in a gravure environment	1.	Understand gravure <b>cylinder preparation</b> .



## 8 Specific Outcomes

### Fundamental Outcomes:

#### Exit Level Outcomes:

- F1:** Demonstrate an understanding of company policies and procedures as applied to your specific work area.

Specific Outcome:	
SP1:	They must have a basic understanding of discipline, grievance & appeals.
SP2:	A basic understanding of the company policies.
SP3:	A basic understanding of basic health and safety act as applied to their workplace.
SP4:	A basic First Aid understanding.
SP5:	A basic understanding of HIV & AIDS.
SP5:	An Understanding of company structure, roles and responsibilities of their reporting line.
SP6:	An understanding of basic legislation as applied to their role.

#### Exit Level Outcomes:

- F2:** Demonstrate an understanding of basic computer skills and the use of Graphic User Interface equipment.

Specific Outcome:	
SP1:	Learners must have an understanding of computer hardware and peripherals.
SP2:	An basic understanding of the computer operating system.
SP3:	A basic understanding of mail applications and the internet.
SP4:	A basics understanding of MS Office applications.
SP5:	Understand the basics of (GUI) graphic user interface applications.



**Exit Level Outcomes**

**F3:** Demonstrate an understanding of printing industry processes, terms, concept and principles. (Induction to printing)

<b>Specific Outcome:</b>	
SP1:	An overview of the history of the entire printing industry.
SP2:	Understand the production flow of the publishing environment.
SP3:	Understand the pre-press processes and environment.
SP4:	An understanding of the major printing processors and their markets.
SP5:	Understand the history, current state and future of Gravure.

**Exit Level Outcomes:**

**F4:** Demonstrate an understanding of the principles of mechanical, pneumatic, hydraulic and electronic components of Gravure equipment.

<b>Specific Outcome:</b>	
SP1:	Understand basic mechanical principles.
SP2:	Understand the basic principles of pneumatics.
SP3:	Understand the basic principles of hydraulics.
SP4:	Understand the basic principles of electronic components.
SP5:	Understand the basics of problem solving techniques.
SP5:	Understand maintenance aspects in the Gravure environment.



**Exit Level Outcomes:**

**F5:** Demonstrate an understanding of production economics for a printing / bookbinding operation.

<b>Specific Outcome:</b>	
SP1:	Understanding the cost implications of raw materials.
SP2:	Understand the cost implications of labour costs and value added costs.
SP3:	Understand the cost implications of maintenance and replacement.
SP4:	Understand the basics of estimating.
SP5:	Understand work tickets.

**Exit Level Outcomes:**

**F6:** Apply basic **mathematical** calculations specific to the printing environment

<b>Specific Outcome:</b>	
SP1:	Understand arithmetic.
SP2:	Understand basic algebra applied to the printing industry.
SP3:	Understand basic geometry applied to the printing industry.
SP4:	Understand units of measurement methods.



**Exit Level Outcomes:****F7:** Demonstrate and understanding of basic printing science

<b>Specific Outcome:</b>	
SP1:	An understanding of basic science.
SP2:	An understanding of heat and humidity.
SP3:	Understand the properties of fluids.
SP4:	Understand chemical types and reactions.
SP5:	Understand PH in printing.
SP6:	Understand light and colour.
SP7:	Understand metals.
SP8:	Understand the properties and principles of inks, varnishes and adhesives.

**Exit Level Outcomes:****F8:** Demonstrate an understanding of the printing industries impact on the environment.

<b>Specific Outcome:</b>	
SP1:	Have a good understanding of waste management.
SP2:	Have a good understanding of pollution.
SP3:	Have a good understand of supplier accreditation.
SP4:	Have a good understanding of energy management.



### Core Outcomes

#### Exit Level Outcome:

**C1:** Understand different Paper handling operations in a Heatset Offset environment

Specific Outcome:	
SP1:	Understand the manufacturing process.
SP2:	Understand characteristics, grades and types of paper.
SP3:	Understand international Paper sizes.
SP4:	Understand paper storage and identification.
SP5:	Understand problems relating to paper.

#### Exit Level Outcome:

**C2:** Understand and perform an assistant's role in a gravure printing environment.

Specific Outcome:	
SP1:	Understand the basic press operations.
SP2:	Understand and operate the reelstand.
SP3:	Understand the webbing-up procedure and web-up the press.
SP4:	Understand and operate the stacker.
SP5:	Assist with the handling of the gravure cylinders.
SP6:	Assist with press production.



**Exit Level Outcome:**

**C3:** Understand the process and perform a press pre-make ready.

<b>Specific Outcome:</b>	
SP1:	Understanding tension in relation to the infeed unit.
SP2:	Setting up web guides and cut-off controls.
SP3:	Understand the colour registration.
SP4:	Zero set the press colour registration system.
SP5:	Set the automatic colour registration device.
SP6:	Understand and perform the setup of angle bars and related compensators.
SP7:	Understand and setup the ribbon slitting devices.
SP8:	Understand the pre-setup of the silicone application unit if applicable.
SP9:	Understand the role of cleanliness in relation to the dryer.

**Exit Level Outcome:**

**C4:** Understand the principles of Densitometry

<b>Specific Outcome:</b>	
SP1:	Understand the standard colour bar and company specific colour bar.
SP2:	Understand the basic operation of and maintenance requirements of a densitometer and its uses.
SP3:	Understand dot gain and dot gain controls and purpose
SP4:	Understand slur and slur gauge controls and purpose
SP5:	Understand greyscale and greyscale controls and purpose
SP6:	Understand the solid density patch and its controls and purpose



**Exit Level Outcome:**

**C5:** Understand and perform printing unit setup operations.

<b>Specific Outcome:</b>	
SP1:	Understand print unit configurations.
SP2:	Handling and moving of gravure cylinders.
SP3:	Cylinder instillation into the press unit.
SP4:	Understand the care, purpose and maintenance of the doctor blade and doctor blade holder.
SP5:	Install the doctor blade into the doctor blade holder and were applicable install the doctor blade holder.
SP7:	Understand and set the impression and backup roller on the printing unit.
SP8:	Understand and set different electro static control devices.

**Exit Level Outcome:**

**C6:** Understand and perform inking system setup operations.

<b>Specific Outcome:</b>	
SP1:	Understand the inking system configuration.
SP2:	Understand the ink duct operation and settings.
SP3:	Understand and reset the ink usage system.
SP4:	Understand the use and operation of the various viscosity control and measuring devices.
SP5:	Critically solve ink flow problems.
SP6:	Understand the importance of temperature control in the unit inking train.



**Exit Level Outcome:**

**C7:** Understand and perform the setup process for a folder operation.

<b>Specific Outcome:</b>	
SP1:	Understand and demonstrate competence in folding and different folding configurations.
SP2:	Understand different folder configurations.
SP3:	Understand the function of the components in the press folder.
SP4:	Understand and setup the folder for a saddle stitched product.
SP5:	Understand and setup the folder for a perfect bound product.
SP6:	Understand and setup the folder for a double parallel product. (2 x A5)
SP7:	Understand and setup the folder for a tabloid product.
SP8:	Understand and perform maintenance and care of a folding unit.
SP9:	Critically solve folder problems.

**Exit Level Outcome:**

**C8:** Demonstrate competence and the understanding of a basic make ready process and procedure.

<b>Specific Outcome:</b>	
SP1:	Prepare materials for the make ready.
SP2:	Mount the correct gravure cylinders.
SP3:	Load paper on to the reel stand and web-up the press.
SP4:	Perform press start-up.
SP5:	Obtain colour, colour registration.
SP6:	Obtain a sheet pass.



**Exit Level Outcome:****C9:** Demonstrate an understanding of and perform press production.

<b>Specific Outcome:</b>	
SP1:	Maintain register and fit quality at production speeds.
SP2:	Maintain colour to the press pass or required density.
SP3:	Maintain general print quality.
SP4:	Maintain quantity control.



**Elective Outcomes:****Exit Level Outcome:****E1:** Understand gravure cylinder preparation.

<b>Specific Outcome:</b>	
SP1:	Understand the preparation process of a gravure cylinder.
SP2:	Understand the engraving process of a gravure cylinder.
SP3:	Understand the properties and quality aspect of an ink cell in a gravure cylinder.

**Exit Level Outcome:****E2:** Understanding and implement national and international quality standards.

<b>Specific Outcome:</b>	
SP1:	Research various quality standards
SP2:	Analyse their benefits
SP3:	Apply an international quality standard to achieve consistent quality control
SP4:	Understand the difference between the various quality standards

**Exit Level Outcome:****E3:** Understand and implement Colour Standards.

<b>Specific Outcome:</b>	
SP1:	Research various colour standards
SP2:	Analyse their benefits
SP3:	Apply an international colour standard to achieve consistent colour control
SP4:	Understand the difference between the various colour standards
SP5:	Understand the electronic colour control systems



**Exit Level Outcome:****E4:** Understand the inline gluing operation.

<b>Specific Outcome:</b>	
SP1:	Understand different inline gluing systems.
SP2:	Understand the setup procedure for the different gluing systems used in the company.
SP3:	General house keeping and maintenance of the whole gluing system.
SP4:	Critically solve problems in the inline gluing system.

**Exit Level Outcome:****E5:** Understand the inline stitching unit on a printing press.

<b>Specific Outcome:</b>	
SP1:	Understand different inline stitching systems.
SP2:	Understand the setup procedure for the different inline stitching systems used in the company.
SP3:	General house keeping and maintenance of the whole stitching unit.
SP4:	Critically solve problems in the inline stitching system.

**Exit Level Outcome:****E6:** Demonstrate an understanding of the sheeter operation.

<b>Specific Outcome:</b>	
SP1:	Understand the sheeting process, sheeter configuration and equipment.
SP2:	Perform setup of the sheeter.
SP3:	Perform a pallet change at press running speed.
SP4:	Critically address any problems that can occur on the sheeter.



**Exit Level Outcome:**

**E7:** Understand and perform inline trimming and finishing operations.

<b>Specific Outcome:</b>	
SP1:	Understand the trimming process and the inline trimming configuration.
SP2:	Perform setup of the trimmer.
SP3:	Critically address any problems that can occur on the trimmer.
SP4:	Perform maintenance on the inline trimming system.

**Exit Level Outcome:**

**E8:** Understand and perform inline mailing operations.

<b>Specific Outcome:</b>	
SP1:	Understand the configuration of various inline mailing equipment.
SP2:	Perform setup of mailing equipment were relevant.
SP3:	Operate mailing equipment during a production run.
SP4:	Critically address any problems that can occur on inline mailing equipment.
SP5:	Perform maintenance on inline mailing equipment.



**Exit Level Outcome:**

**E9:** Understand and perform inline inkjet printing operations.

<b>Specific Outcome:</b>	
SP1:	Understand the configuration of various inline inkjet printing equipment.
SP2:	Perform setup of inkjet printing equipment were relevant.
SP3:	Operate inkjet printing equipment during a production run.
SP4:	Critically address any problems that can occur on inline inkjet printing equipment.
SP5:	Perform maintenance on inline inkjet printing equipment.

**Exit Level Outcome:**

**E10:** Understand the inline perforating unit on a gravure press.

<b>Specific Outcome:</b>	
SP1:	Understand different inline perforating systems.
SP2:	Understand the setup procedure for the different perforating systems used in the company.
SP3:	General house keeping and maintenance of the perforating system.
SP4:	Critically solve problems in the inline perforating system.



**9. Critical Cross Field Outcomes:**

1	Identifying and solving problems in which responses display that responsible decisions using critical and creative thinking have been made;	✓✓✓
2	Working effectively with others as a member of a team, group, organisation, community;	✓
3	Organising and managing oneself and one's activities responsibly and effectively;	✓
4	Collecting, analysing, organising and critically evaluating information;	✓
5	Communicating effectively using visual, mathematical and/or language skills in the modes of oral and/or written persuasion;	✓
6	Using science and technology effectively and critically, showing responsibility towards the environment and health of others;	✓✓
7	Demonstrating an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation;	✓
8	Contributing to the full personal development of each learner and the social and economic development of the society at large, by making it the underlying intention of any programme of learning to make an individual aware of the importance of: Reflecting on and exploring a variety of strategies to learn more effectively; Participating as responsible citizens in the life of local, national and global communities; Being culturally and aesthetically sensitive across a range of social contexts; Exploring education and career opportunities; and Developing entrepreneurial opportunities.	✓ ✓ ✓



## 10 Learning Map (Proposed structure of learning)

In order for an apprentice to qualify in gravure printing it is necessary to complete the whole fundamental component, the whole core component and a choice of **at least three electives** based on the company's equipment and the chosen field of specialisation.

The following occupations within the qualification can also be completed as skills programmes.

### 1. Gravure Assistant

In order for a learner to gain recognition as an assistant in the gravure environment it is necessary to complete the following core and fundamental exit level outcomes.

<b>Fundamental Exit Level Outcomes</b>
<b>F1</b> Demonstrate an understanding of company policies and procedures as applied to your specific work area.
<b>Core Exit Level Outcomes</b>
<b>C1</b> Understand different Paper handling operations in a gravure environment
<b>C2</b> Understand and perform an assistant's role in a gravure environment.
<b>Elective Exit Level Outcomes</b>
At least one elective dependant on the company ancillary equipment. (e.g. E6 )



## 11 References

- Current registered apprentice course maps and training programmes
- Work done by advisory committees.
- GATF training programme.
- Heidelberg handbook of print media
- Printing Science by F. Pateman & L. C Young
- Sappi resource material.
- Internet resources.

## 12 Review Period

This curriculum, once approved should be subject to the monitoring and continuous improvement guidelines and policies of the South African Qualifications Authority.

This would imply continuous improvement as technology evolves and a formal review every three years.

## 14 Definitions

CBMT	Competency based modular training
ETQA	Education training quality assurance body
Apprenticeship	A formally registered tri-party contract that culminates into a qualified artisan.
Skills Programme	A credit or non-credit bearing formal learning programme.
Exit Level Outcome	A group of specific standards, knowledge and skills defined as an outcome.
Fundamental	An underpinning knowledge component that supports the gaining of skills.
Core	The essential skills and knowledge based training component.
Elective	A field of specialisation within the formal training programme.
NQF	National Qualifications Framework.
VQF	Vocational Qualifications Framework.
Occupation	A combination of knowledge and skills that culminate in a recognised job.

