THE SCHOOL OF MECHANICAL AND NUCLEAR ENGINEERING

and

RHEINMETALL DENEL MUNITION

PRESENTS

Short Learning Programmes in Explosives Science and Engineering
# SHORT LEARNING PROGRAMMES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Short Learning Programme Name</th>
<th>Contact Time RSA Students (Weeks)</th>
<th>Duration in Weeks (Non English Speaking Nations)</th>
<th>Entry requirement</th>
<th>Aim of the SLP</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPL112</td>
<td>SLP in Legal Requirements for Explosives</td>
<td>1</td>
<td>2</td>
<td>NQF 4</td>
<td>Provides sufficient knowledge to understand the Explosives Act and the Occupational Health and Safety Act with specific reference to the explosives regulations. Provides knowledge of the basic principles to work safely in an explosives operational work area.</td>
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<tr>
<td>EXPL111</td>
<td>Short learning programme in explosives I</td>
<td>1</td>
<td>2</td>
<td>NQF 4</td>
<td>Ensures that an understanding is created of what explosives are, and how it is classified. It introduces the concepts of detonation, deflagration and burning, etc. Practical plant visits are conducted in the primary explosives plant and the explosives laboratory for candidates to experience the manufacture and analysis of explosives. A practical demonstration is conducted where candidates can experience the behaviour and reaction of low, secondary and high explosives, confined and unconfined, when exposed to and activation energy.</td>
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<tr>
<td>EXPL271</td>
<td>Short learning programme in explosives II</td>
<td>2</td>
<td>3</td>
<td>111 *</td>
<td>Establishes an in-depth understanding of explosives, its chemical and physical properties. Various calculations are done, e.g. oxygen balance calculations, etc.</td>
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<tr>
<td>EXPL114</td>
<td>Short learning programme in ammunition theory</td>
<td>1</td>
<td>2</td>
<td>111</td>
<td>After completing this SLP the person should be able to identify and understand the basic roles and functions of different types of ammunition. This is done by using methods of theoretical and practical identification of ammunition. The person will also understand the roles and functions of ammunition packaging and ammunition markings.</td>
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<tr>
<td>EXPL124</td>
<td>Introductory course in weapon systems</td>
<td>0.6</td>
<td>1</td>
<td>NQF 4</td>
<td>This course prepares the person to attend the SLP in Ammunition Systems. The principles of weapon systems are discussed in terms of the characteristics and principles of operation of detectors, e.g. radar, optronics, etc. The handling of sensor data which leads to decision making and the allocation and designation of effectors to a target is addressed. The principles of effectors (weapons) are addressed, e.g. gun systems, missiles, etc. The environment in which a weapon system is functioning is also addressed, e.g. landwards systems, air and naval systems as well as support requirements.</td>
</tr>
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<tr>
<td>EXPL215</td>
<td>Introductory course in ballistics</td>
<td>0.6</td>
<td>1</td>
<td>111</td>
<td>After completing this course the person will understand what ballistics are and understand the various concepts applicable to internal, intermediate, external and terminal ballistics.</td>
</tr>
<tr>
<td>EXPL211</td>
<td>Short learning programme in ammunition systems</td>
<td>2</td>
<td>4</td>
<td>271, 114</td>
<td>During this course the principles of operation and functions of the various generic ammunition types and its components are addressed in depth. This includes ammunition packaging and markings. Practical training is conducted by visiting the production site where participants can see the assembly of different components of various rounds of ammunition, including fuzes.</td>
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<tr>
<td>EXPL113</td>
<td>Introductory course in explosives storage and distribution</td>
<td>1</td>
<td>2</td>
<td>111</td>
<td>After completion of this SLP the person should be able to execute the duties of an ammunition/explosives storeman. The classification of explosives and its compatibility groups are taught. Practical training is conducted in a form of a project where candidates are expected to plan the transportation and storage of explosives. This is concluded by a practical explosives magazine audit. The field storage of ammunition can be addressed if required.</td>
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<tr>
<td>EXPL212</td>
<td>Advanced course in explosives storage and distribution</td>
<td>2</td>
<td>4</td>
<td>113</td>
<td>This SLP aims to teach the person why and how the storage of explosives and ammunition is done. The concepts of explosives magazine design and safety distances are addressed. The strategic distribution of inventory and the layout of magazines are discussed. The shipping of ammunition and explosives as well as accounting principles are addressed. The practical execution of the storage of explosives and ammunition in explosives warehouses are mastered. The practical execution of the transportation of explosives and ammunition are mastered.</td>
</tr>
<tr>
<td>Course Code</td>
<td>Short Learning Programme Name</td>
<td>Contact Time RSA Students (Weeks)</td>
<td>Duration in Weeks (Non English Speaking Nations)</td>
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<td>Aim of the SLP</td>
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<tr>
<td>EXPL121</td>
<td>Short learning programme in ammunition support</td>
<td>2</td>
<td>2</td>
<td>114</td>
<td>The aim of this course is to teach the person how to function as an assistant in an ammunition workshop as well as conducting basic inspection and repacking of ammunition tasks. This course is designed to provide training for ammunition storemen and bulk demolition operators who are not ammunition technicians to be able to conduct basic maintenance tasks safely and correctly.</td>
</tr>
<tr>
<td>EXPL213</td>
<td>Short learning programme in ammunition maintenance</td>
<td>3</td>
<td>4</td>
<td>121*</td>
<td>This course aims to provide ammunition technicians with the skills and knowledge to safely and correctly maintain ammunition. The maintenance will include preventative and corrective maintenance as well as the changes of the configuration of ammunition.</td>
</tr>
<tr>
<td>EXPL312</td>
<td>Short learning programme in ammunition maintenance management</td>
<td>2</td>
<td>4</td>
<td>213*</td>
<td>This course is aimed at training ammunition technicians the details to conduct planning and management of ammunition maintenance tasks as well as the approval and monitoring of ammunition maintenance tasks.</td>
</tr>
<tr>
<td>EXPL123</td>
<td>Short learning programme in ammunition production</td>
<td>2</td>
<td>4</td>
<td>114*</td>
<td>On completion of this SLP a person will have sufficient knowledge of ammunition manufacturing processes and skills to safely and effectively work in an ammunition production or associated environment. The theoretical training is complemented by practical production plant visits in order to enhance the comprehension of theory.</td>
</tr>
<tr>
<td>EXPL313</td>
<td>Short learning programme in ammunition production management</td>
<td>2</td>
<td>4</td>
<td>123</td>
<td>The person completing this course will have a thorough understanding of ammunition production processes. The person will be able to plan and manage production activities at an ammunition plant.</td>
</tr>
<tr>
<td>EXPL312</td>
<td>Short learning programme in quality engineering of explosives</td>
<td>4</td>
<td>6</td>
<td>111*</td>
<td>On completion of this course the person should be able to function as an quality inspector in an ammunition/explosives production environment. Personnel attending this course must have a solid aptitude for statistics. Practical training covers sampling inspections, acceptance inspections, metrology practices, etc.</td>
</tr>
<tr>
<td>EXPL214</td>
<td>Short learning programme in quality management of explosives</td>
<td>1</td>
<td>4</td>
<td>111</td>
<td>Personnel who completed this course will have a solid understanding of quality management concepts and processes utilised in explosives environments.</td>
</tr>
<tr>
<td>Course Code</td>
<td>Short Learning Programme Name</td>
<td>Contact Time RSA Students (Weeks)</td>
<td>Duration in Weeks (Non English Speaking Nations)</td>
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<td>Aim of the SLP</td>
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<tr>
<td>EXPL122</td>
<td>Introductory course in blasting</td>
<td>1</td>
<td>2</td>
<td>111</td>
<td>A person who completes this course will: Understand and apply the safety principles during blasting operations. Understand and construct basic explosives trains utilising demolition/blasting tools. Work as a team member on a blasting team.</td>
</tr>
<tr>
<td>EXPL221</td>
<td>Short learning programme in bulk demolitions</td>
<td>3</td>
<td>4</td>
<td>122, 211*</td>
<td>After completing this SLP the person will be able to plan, prepare for and execute the destruction of ammunition and explosives in bulk safely and with the most cost effective method. The person will also be able to apply the safety rules applicable to the different techniques and effectively control the demolition teams.</td>
</tr>
<tr>
<td>EXPL222</td>
<td>Short learning programme in explosives ordnance disposal</td>
<td>2</td>
<td>3</td>
<td>114, 122</td>
<td>After completing this SLP the person will be able to plan, prepare for and execute the rendering safe of blind and stray conventional ammunition in military training as well as battle area conditions. The person will also be able to apply the safety rules applicable to the different techniques and effectively control the EOD teams. It excludes the clearance of minefields.</td>
</tr>
<tr>
<td>EXPL223</td>
<td>Short learning programme in structural demolitions</td>
<td>3</td>
<td>4</td>
<td>122*</td>
<td>On completion of this SLP the person will be able to plan and safely destroy structures, plant and equipment as well as provide battlefield support blasting tasks. The clearance of landmines can be added. The person will also be able to apply the safety rules applicable to the different techniques and effectively control the demolition teams.</td>
</tr>
<tr>
<td>EXPL224</td>
<td>Short learning programme in production blasting</td>
<td>3</td>
<td>4</td>
<td>122*</td>
<td>After completion of this SLP the person will have a solid understanding and skills of the rules and techniques employed during typical construction blasting work, such as cuttings for roads, trenching, etc. The person will also be able to apply the safety rules applicable to the different techniques and effectively control the blasting teams.</td>
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</table>
## SHORT LEARNING PROGRAMMES

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<th>Contact Time RSA Students (Weeks)</th>
<th>Duration in Weeks (Non English Speaking Nations)</th>
<th>Entry requirement</th>
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<tbody>
<tr>
<td>EXPL323</td>
<td>Short learning programme in explosives testing and evaluation</td>
<td>2</td>
<td>3</td>
<td>271</td>
<td>This SLP will teach the person the principles and techniques to test various aspects of ammunition and explosives.</td>
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<tr>
<td>EXPL311</td>
<td>Short learning programme in explosives III (Detonics)</td>
<td>TBD</td>
<td>TBD</td>
<td>271</td>
<td>This is an in-depth SLP on the physics of detonics and the associated decomposition processes.</td>
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<tr>
<td>EXPL411</td>
<td>Short learning programme in explosives IV (Explosives application &amp; Ballistics)</td>
<td>TBD</td>
<td>TBD</td>
<td>311</td>
<td>This is an in-depth SLP on the application of explosives as well as the intricacies of ballistics.</td>
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<tr>
<td>TDB</td>
<td>Short learning programme in explosives manufacturing (New course)</td>
<td>TBD</td>
<td>TBD</td>
<td>271</td>
<td>On completion of this SLP a person will have sufficient knowledge of explosives and energetic material manufacturing processes and skills to safely and effectively work in an explosives production or associated environment.</td>
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</tbody>
</table>

### Legend

<table>
<thead>
<tr>
<th>C</th>
<th>Module is compulsory</th>
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<tr>
<td>E</td>
<td>Elective module</td>
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<tr>
<td>*</td>
<td>Compulsory to have mathematics and science at NQF 4 level</td>
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<tr>
<td>**</td>
<td>General engineering subject is compulsory but not listed here</td>
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<tr>
<td>NFQ4</td>
<td>Equivalent to grade 12/year 12</td>
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## Uniform Learning Programme (SLP)

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<tr>
<th>Number</th>
<th>Module Code</th>
<th>Short Learning Programme Name (SLP)</th>
<th>Notional Hrs</th>
<th>Contact Time</th>
<th>Explosives Manufacturing</th>
<th>Ammunition Storeman</th>
<th>Magazine Master</th>
<th>EOD Operator</th>
<th>Ammunition Demilitarization Operator</th>
<th>Ammunition Manufacturing</th>
<th>Ammunition Technician</th>
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<tr>
<td>1</td>
<td>EXPL112</td>
<td>Introduction to legislation for explosives</td>
<td>80</td>
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<td>EXPL111</td>
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<td>EXPL271</td>
<td>Short learning programme in explosives II</td>
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<td>EXPL114</td>
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<td>5</td>
<td>EXPL124</td>
<td>Introductory course in weapon systems</td>
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<td>EXPL215</td>
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<td>EXPL211</td>
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<td>160</td>
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<td>271, 114</td>
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<td>23</td>
<td>EXPL311</td>
<td>Short learning programme in explosives III (Detonics)</td>
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<td>Short learning programme in explosives IV (Exp application &amp; Ballistics)</td>
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<td>TBD</td>
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<td>EXPL324</td>
<td>Short learning programme in explosives manufacturing (New course)</td>
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**Legend**
- **C**: Module is compulsory
- **E**: Elective module
- **NFQ4**: Compulsory to have mathematics and science at NFQ 4 level
- **TBD**: To be determined
Short Learning Programmes in Explosives Science and Engineering

Summary of Course Content
SHORT LEARNING PROGRAMME – LEGAL REQUIREMENTS FOR EXPLOSIVES

PURPOSE OF THIS LEARNING PROGRAM

It is important that a learning program such as this makes a contribution to the total advancement of the students’ knowledge on the particular subject and in this case the Safety, Health and Environment of Explosives Processes. The subject-matter of this learning program is aimed at improving their expertise and to shape them as responsible and mature explosives workers and to empower them with knowledge to make the correct decisions to create and maintain a safe working environment.

The purpose of this learning program is to equip the learner with basic knowledge about the aspects of safety, health and environment as found in the typical ammunition and explosives environments.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of the Safety, Health and Environment of Explosives Processes. The student should be able to demonstrate an understanding of:

- Occupational health and safety management of explosives related processes.
- The environmental management of explosives related processes.
- Identifying and assessing hazards and risks in the explosives environment.
- Managing all work in compliance with relevant occupational health, safety, and environmental laws, legislation and regulations

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- General safety practices concerning explosives
- Health and Safety Requirements
- Hazardous Chemicals
- Risk Assessment
SHORT LEARNING PROGRAMME – EXPLOSIVES I

PURPOSE OF THIS LEARNING PROGRAM

The purpose of this learning program is to equip the student with basic knowledge of elementary explosives technology and the characteristics of explosive materials.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of the technology of chemical explosives. The student should be able to demonstrate an understanding of:

- The history of explosives
- The properties of different types of explosives
- The different applications of explosives
- The performance characteristics of explosives

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- The history of explosives
- The basic concept
- Primary explosives
- Secondary explosives
- Low explosives
- Pyrotechnics
- Initiation
- The application of explosives
- Fundamental features
PURPOSE OF THIS LEARNING PROGRAM

This is the second short learning program on the particular subject of the technology of chemical explosives. The subject-matter of this learning program is aimed at improving the students’ expertise and to give them a better understanding of the chemistry of some of the more important explosives.

The purpose of this short learning program is to equip the participant with the knowledge to apply elementary explosives technologies during manufacturing processes in an explosives environment and to equip the participant with basic knowledge about the composition, chemical structure and properties of explosive materials.

LEARNING PROGRAM OUTCOMES

After studying this short learning program students will have an advanced knowledge of the chemistry of explosives. The following learning outcomes are applicable:

- After completion of this short learning program, the participant should apply the properties of various types of explosives in theoretical scenarios.
- After completion of this short learning program, the participant should demonstrate an informed understanding of different explosions.
- After completion of this short learning program, the participant should have an informed understanding of the differences between primary high explosives and secondary high explosives.
- After completion of this short learning program, the participant should have basic knowledge of different primary high explosives.
- After completion of this short learning program, the participant should have basic knowledge of different secondary high explosives.
- After completion of this short learning program, the participant should have an informed knowledge of different physical effects applied by the use of explosives.
- After completion of this module, the participant should have a good insight into the different applications of low explosives.
- After completion of this module, the participant should demonstrate an understanding of the different types of low explosives.
- After completion of this module, the participant should have a good insight into the differences between propellants and pyrotechnics.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Basic chemistry
- Chemical reactions
- Secondary explosives
- Primary explosives
- Propellants
- Pyrotechnics
- Commercial explosive compositions
- Explosive effects
SHORT LEARNING PROGRAMME – AMMUNITION THEORY

PURPOSE OF THIS LEARNING PROGRAM

The subject-matter of this learning program is aimed at improving the students’ expertise and to shape them as responsible and mature explosives workers in tasks such as the inspection and minor maintenance of ammunition and for basic demolition tasks.

The purpose of this learning program is to equip the student with basic knowledge of ammunition theory and the characteristics of different types of ammunition. The student will also possess the necessary entry-level requirements for more advanced training in Ammunition related subjects.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of some typical applications of military explosives in different explosives ordnance.

The student should be able to demonstrate an understanding of:

- The history of ammunition
- The properties of different types of ammunition
- The typical military applications of various types of explosives.
- The different rounds of ammunition.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- The history of Ammunition
- Small arms ammunition
- Gun ammunition
- Mortar ammunition
- Rockets and Missiles
- Grenades
- Land Mines
- Pyrotechnics
- Ammunition Marking
SHORT LEARNING PROGRAMME – WEAPON SYSTEMS

PURPOSE OF THIS LEARNING PROGRAM

The subject-matter of this learning program is aimed at improving the students’ knowledge base of weapons, explosives and ammunition and the interaction of these fields.

The purpose of this learning program is to equip the participant with basic knowledge of weapon systems, in order to understand the environment and design characteristics and attributes that are applicable to ammunition and explosives in a weapon system.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of what weapon systems are and the various concepts in the field of weapon systems.

The student should be able to demonstrate an understanding of:

- The different types of weapon systems.
- The basics principles of weapon system design.
- The typical main components that makeup a weapon system.
- The concept of weapon system support.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Weapon systems types
- Weapon system design
- Weapon system units
- Weapon system support
SHORT LEARNING PROGRAMME – INTRODUCTORY COURSE IN BALLISTICS

PURPOSE OF THIS LEARNING PROGRAM

The purpose of this short course is to equip the participant with basic knowledge of ballistics as is found in tube launched projectiles and free flight rockets.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of what ballistics is and the various concepts in the field of ballistics.

The student should be able to demonstrate an understanding of:

- The different concepts of internal ballistics, transitional ballistics, external ballistics and terminal ballistics.
- The basics principles of tube launched projectiles internal ballistics.
- The basics principles of transitional ballistics.
- The forces and moments to which a projectile is subjected and how these shape the flight path.
- The basics principles of rocket motor internal ballistics.
- The different warhead effects on a target.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- The history of Ballistics
- Internal Ballistics (Tube Launched)
- Transitional Ballistics
- External Ballistics
- Terminal Ballistics
- Internal Rocket Motor Ballistics
SHORT LEARNING PROGRAMME – AMMUNITION SYSTEMS

PURPOSE OF THIS LEARNING PROGRAM

The purpose of this learning program is to equip the student with in-depth knowledge of ammunition theory and the characteristics of different types of ammunition, functioning of ammunition and the functions of different components as found in different types of ammunition. The student will also possess the necessary entry-level requirements for more advanced training in Ammunition related subjects.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of some typical applications of military explosives in different explosives ordnance. The student should demonstrate an understanding and knowledgeably discuss:

- Different ammunition systems.
- The function of various types of explosives in ammunition systems.
- The design and functioning of various types of ammunition.
- How the products of explosion are used during the design of military explosive ordnance using different effects.
- Different ammunition marking conventions.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Small arms ammunition
- Quick fire medium calibre ammunition
- Quick fire large calibre ammunition
- 155mm Ammunition
- Mortar ammunition
- Grenades
- Land Mines
- Pyrotechnics
- Rockets and Missiles
- Demolition charges
- Aircraft bombs
- Torpedoes
- Ammunition Marking
SHORT LEARNING PROGRAMME – INTRODUCTORY COURSE IN EXPLOSIVES STORAGE AND DISTRIBUTION

PURPOSE OF THIS LEARNING PROGRAM

It is important that a course such as this makes a contribution to the total advancement of the student’s knowledge on the particular subject and in this case the Ammunition Storage and Distribution Function.

The aim of this learning program is to ensure that a high standard of safety is maintained and that maximum efficiency and standardisation is achieved in the execution of ammunition storage and transport.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of the Ammunition Storage and Distribution Function and enable him to carry out tasks related to the storage and transport of explosives by the user. The student should be able to:

- Demonstrate an understanding of the storage of ammunition and explosives, including the basic requirements of explosive storehouses under operational conditions.
- Demonstrate an understanding of hazard divisions and compatibility groups.
- Conduct storage inspections to ensure compliance to national legislation and organisational procedures.
- Identify and explain the various explosives transport requirements in terms of legislation.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Basic requirements for storage
- Ammunition storage areas
- Storage requirements
- Hazard codes
- Field storage
- Transportation
SHORT LEARNING PROGRAMME – ADVANCED COURSE IN EXPLOSIVES STORAGE AND DISTRIBUTION

PURPOSE OF THIS LEARNING PROGRAM

The aim of this learning program is to build on what was learnt in the previous course and to ensure that a high standard of safety is maintained and maximum efficiency and standardisation is achieved in the execution of ammunition storage and transport. The focus will be on the management of ammunition and explosives storehouses, basic explosives storehouse licensing and the planning and management of transportation of explosives and ammunition.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have an in-depth knowledge of the Ammunition Storage and Distribution Function and enable him to carry out tasks related to the storage and transport of explosives by the user. The student should be able to:

- Demonstrate an understanding of the storage of ammunition and explosives, including the requirements of explosive storehouses under operational conditions.
- Demonstrate an understanding of the licensing of explosive storehouses.
- Demonstrate an understanding of the planning of storage of explosive in explosives storehouses and temporary storage facilities.
- Manage ammunition stock according to principles of ammunition accounting.
- Identify and explain the various explosives transport requirements in terms of legislation.
- Execute explosives transport to ensure compliance to national legislation and organisational procedures.
- Manage shipping of ammunition and explosives.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Standard Buildings for Military Explosives
- Traverses
- Determination Of Quantity Distances And Nett Explosive Quantity
- Condition Classification Of Ammunition
- Special Storage Rules
- Stock Location In Explosive Storehouses
- Inventory Management
- Ammunition Accounting
- Transportation & Shipping
SHORT LEARNING PROGRAMME – AMMUNITION SUPPORT

PURPOSE OF THIS LEARNING PROGRAM

The aim of this learning program is to equip the student with the skills and techniques required to safely perform workshop practices while maintaining ammunition.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of the Ammunition Support Function. The student should be able to demonstrate an understanding of:

- Safe workshop procedure.
- Precautionary measures
- Performance of inspection tasks

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Inspection points
- Packaging
- Ammunition
- Basic inspection procedure
PURPOSE OF THIS LEARNING PROGRAM

Munitions maintenance encompasses all actions necessary to ensure that stocks are either serviceable, or that unserviceable stocks are restored to serviceable condition or disposed of properly. Maintenance responsibilities are assigned to ammunition units based on the unit’s primary mission and the availability of skilled personnel, time, tools, equipment, and supplies. This learning program discusses maintenance and surveillance operations, procedures, and functions.

The subject-matter of this learning program is aimed at improving the student’s expertise and to shape them as responsible and mature explosives workers and empowering them with knowledge to make the correct decisions to create and maintain a safe working environment.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of the Ammunition Support Function. The student should be able to demonstrate an understanding of:

- Workshop safety
- Planning documentation
- Work instructions
- Flow charts
- Maintenance tasks

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Workshop Safety
- Planning Documentation
- Flow Charts
- Work Instructions
- Maintenance tasks
PURPOSE OF THIS LEARNING PROGRAM

The subject-matter of this learning program is aimed at improving the student’s expertise, to shape them as responsible and mature explosives maintenance managers and to empowering them with knowledge to ensure that all explosives related practices and the workplaces where explosives related tasks are carried out, conform to all relevant safety and quality standards.

The aim of this learning program is to ensure that a high standard of safety and quality is maintained and that maximum efficiency and standardization is achieved in the management of ammunition inspection and repair.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of the Ammunition maintenance management function. The student should be able to demonstrate an understanding of:

- Maintenance management concepts
- Ammunition maintenance management
- Workshop safety
- Risk management
- Supervision of ammunition process operations.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Maintenance management concept
- Workshop safety
- Risk management
- Supervision of ammunition process operations
- The prevention and control of electrostatic discharge
SHORT LEARNING PROGRAMME – AMMUNITION PRODUCTION

PURPOSE OF THIS LEARNING PROGRAM

The aim of this learning program is to ensure that a high standard of safety is maintained and that maximum efficiency and standardisation is achieved in the execution of ammunition production. This course is aimed at ensuring that the student comprehends the principles of ammunition manufacturing and assembly and that the student is able to work safely in an ammunition production plant by applying the principles learnt during the course.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of the Ammunition Production Function and enable him to carry out tasks related to the production of ammunition by the manufacturer. The following are the learning outcomes:

After completion of this module, the participant will:

- have a thorough understanding of the various engineering processes that are followed to produce different types of ammunition components.
- explain the safety procedures to be followed during manufacture of explosive related products.
- explain the component material selection and treatment procedures to be followed for ammunition production.
- understand the different defect detection methods used during ammunition production.
- have an understanding of the filling processes applied during ammunition production.
- have an understanding of the assembly processes applied during ammunition production

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Material Selection
- Detonators
- Cartridge Cases
- Shells & Bombs
- Shells & Bombs Forgings Machining
- Bomb Bodies
- Shot Blasting
- Pre-treatment
- Packaging
- Explosives Used
- Cast Weaknesses
- Explosives Melting
- Shell Conditioning Finishing
- Process Parameters
- Nougat Filling
- Nougat Specifications
- Press Loading
- Pellet Pressing
- Squeeze Casting
- Smoke Composition
- TiCl4
- WP
- Inert Components
- Augmenting Charges
- Wax Fillings
- Fixed Ammunition Assembly
- Mortar Specifications
- Mortar Assembly
- X-ray
- NDT
SHORT LEARNING PROGRAMME – QUALITY ENGINEERING OF EXPLOSIVES

PURPOSE OF THIS LEARNING PROGRAM

It is important to realize that the future of an enterprise can only be ensured if its efficiency improves by means of improved quality and productivity.

When you set out to improve quality, the first thing to do is identify the processes that need improvement and then identify the problem in the process that needs to be addressed.

If we do a poor job of identifying the root causes of our problems, we will waste time and resources putting band-aids on the symptoms of the problem.

Understanding processes so that they can be improved by means of a systematic approach requires the knowledge of a simple kit of tools or techniques. Students will learn to work with tools designed to help identify not only what and how an event occurred, but also why it happened.

LEARNING PROGRAM OUTCOMES

After studying this module students will have an advanced knowledge of:

- Collection and Summarisation of Data
- Probability Distributions
- Root Cause Analysis
- Problem solving techniques

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Introduction to quality engineering problem solving
- Statistics
- Variation
- Summarization of data
- Probability
- Discrete Probability Distributions
- Continuous Probability Distributions
- Framework for improvement
- Customer satisfaction
- Root cause analysis
- Brainstorming
- 5 why’s
- CE diagram
- Pareto analysis
- Scatter diagrams
- Check sheets
- Failure mode and effect analysis
- Process capability
- Control charts
### PURPOSE OF THIS LEARNING PROGRAM

It is important that a course such as this makes a contribution to the total advancement of the student’s enterprise. It is also important to realize that the future of an enterprise can only be ensured if its efficiency improves by means of improved quality and productivity. The subject-matter of this course is aimed at improving the quality and productivity of an enterprise.

This course focuses on typical quality management principles and how it is applied throughout the life cycle of explosive related products.

### LEARNING PROGRAM OUTCOMES

After studying this module students will have an advanced knowledge of quality management and some application of quality management principles in the modern world. You should be able to:

- Demonstrate an informed understanding of the typical quality function in typical manufacturing and/or service delivery environment
- Compare the work of some of the quality gurus
- Apply the PDCA principle in all elements of a Quality Management System
- Apply the Process Approach in Planning, Implementation and Sustaining of a Quality Management System

### SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Introduction to quality
- Managing for Sustained Success
- Quality management
- Implementing a Quality Management System
- The process approach
- The PDCA Principle
PURPOSE OF THIS LEARNING PROGRAM

The purpose of this programme is to equip the student with basic knowledge to apply elementary explosive technologies during the use of explosives for production/destruction.

LEARNING PROGRAM OUTCOMES

When the course has been successfully passed, the participant should be able to:

- Demonstrate an understanding of the hazards of controlled explosions.
- Demonstrate an understanding of the hazards created by detonation and burning.
- Identify and operate the taught demolition non explosive equipment safely and correctly.
- Identify and operate the taught demolition explosive equipment safely and correctly.
- Make up basic demolition trains safely and correctly.
- Work as a Demolition Team member under supervision.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Introduction to demolitions and disposals
- Rules and regulations
- Non-explosives demolition equipment
- Explosives demolition equipment
- Explosives train and charge makeup
- Initiation methods
SHORT LEARNING PROGRAMME – BULK DEMOLITIONS

PURPOSE OF THIS LEARNING PROGRAM

The purpose of this programme is to equip the students with knowledge of and enable them to conduct the demilitarisation of ammunition and explosives by open detonation and burning techniques.

LEARNING PROGRAM OUTCOMES

Upon successful completion of the course, the student should be able to:

- Identify and evaluate the hazards of controlled explosions and apply mitigating actions when conducting bulk demolition tasks.
- Demonstrate an ability to identify the hazards created by detonation and burning and select the most appropriate demilitarisation method when conducting the disposal tasks.
- Demonstrate an ability to identify the hazards created by detonation and burning and select the most appropriate demilitarisation method when conducting the disposal task.
- Gather information, analyse data and execute a risk assessment for disposal tasks.
- Plan a bulk disposal program. Execute a bulk disposal program.
- Apply the procedures and methods of bulk disposals.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Disposal planning and preparation
- Disposal by detonation
- Disposal by burning
- Charge placement for HE detonation
- Detting up and firing procedure
- Safety tables and checklists
SHORT LEARNING PROGRAMME – EXPLOSIVES ORDNANCE DISPOSAL

PURPOSE OF THIS LEARNING PROGRAM

The purpose of this programme is to provide training for skills development in order that students may understand the principles of Conventional Explosive Ordnance Disposal and to be able to perform EOD tasks safely and effectively.

LEARNING PROGRAM OUTCOMES

Upon successful completion of the course, the participants should be able to:

- Identify and evaluate the hazards of controlled explosions and apply mitigating actions when conducting EOD tasks.
- Demonstrate an ability to identify the hazards created by detonation and burning and select the most appropriate Render Save Procedure when conducting the EOD tasks.
- Execute a risk assessment.
- Execute EOD in training areas and battle field areas.
- Apply the procedures for the clearance of unexploded ordnance in built-up areas.
- Understand the IMAS BAC rules

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- General Principles for UXO clearance
- Render Safe Action Rural Areas
- Render Safe Action Built-up Areas
- Firing trains and ring mains
- Detting up and firing procedure
- Charge Placement
- Battle Area Clearance (IMAS Regulations)
- Safety tables and checklists
SHORT LEARNING PROGRAMME – STRUCTURAL DEMOLITIONS

PURPOSE OF THIS LEARNING PROGRAM

The purpose of this programme is to provide training for skills development in order that students may understand the concepts and principles of structure demolition and to be able to conduct structure demolitions by using explosives safely and effectively.

LEARNING PROGRAM OUTCOMES

Upon successful completion of the course, the student should be able to:

- Demonstrate an understanding of the principles of structure demolitions.
- Demonstrate an understanding of the effect of contact charges on structures.
- Demonstrate an understanding of water column demolition techniques.
- Demonstrate an understanding of the shock reflection phenomena used in structure demolitions.
- Demonstrate the skills and ability to apply the concepts of structure demolitions.
- Demonstrate the ability to safely and correctly conduct structure demolitions

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- General principles of structure demolitions
- Special demolitions stores
- Calculation of charge mass
- Cutting of steel using plastic explosives
- Target selection – vulnerable points
- Sabotage
- Checklists
SHORT LEARNING PROGRAMME – PRODUCTION BLASTING

PURPOSE OF THIS LEARNING PROGRAM

The purpose of this course is to equip the participant with the skills and knowledge in production blasting and enable him to execute tasks related to the use of explosives for production purposes.

LEARNING PROGRAM OUTCOMES

After studying this learning program students will have a basic knowledge of the use of explosives during production blasting. The student should be able to demonstrate an understanding of:

- The legal aspects and requirements relating to production blasting.
- Surface blasting.
- The equipment used in production blasting.
- The drilling activities related to production blasting.
- Geo-technical aspects related to production blasting.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Introduction to explosives.
- Drilling.
- Legal requirements.
- Blasting equipment.
- Geological impact on blasting.
- Blast design.
- Blast practices
SHORT LEARNING PROGRAMME – EXPLOSIVES TESTING AND EVALUATION

PURPOSE OF THIS LEARNING PROGRAM

The subject-matter of this learning program is aimed at improving the student’s knowledge base of testing and evaluating explosives and munition items.

The purpose of this learning program is to equip the participant with knowledge and skills of what tests and evaluations can be conducted on explosives during its life cycle, from design to disposal.

LEARNING PROGRAM OUTCOMES

After completion of this module the participant should show an informed understanding of:

- how to obtain test and evaluation information.
- the tests and evaluations that is required during the ammunition research and development phase and design qualification phases.
- the typical in production tests.
- the typical life cycle management tests.
- the typical propellant and high explosives and pyrotechnic tests.
- the concept of conducting a defect investigation.
- of IM testing.

SUBJECTS TO BE COVERED CONSIST OF THE FOLLOWING:

- Reasons for test and evaluation
- Life cycle stages
- Physical properties of explosives
- Ballistic measurement
- Laboratory analyses of explosives
- Environmental test methods
- Life cycle test
- Defect investigation