1. **INTRODUCTION**

1.1 **Summary**

This information package is intended to provide guidance for any country or organisation involved in the establishment of a course which will satisfy the standards of the International Society for Prosthetics and Orthotics (ISPO) in respect of the training of the Category III professional worker (Prosthetic/Orthotic Technician).

It contains a description of the professional profile of the Category II worker (Prosthetic/Orthotic Technician). For comparison it also contains at Appendix A the Professional Profile of the Category I worker (Prosthetist/Orthotist) and at Appendix B the Professional Profile of the Category II worker (Orthopaedic Technologist). It gives an example of an appropriate Code of Ethics for the Prosthetist/Orthotist. It describes the learning objectives of a course for Category III workers and gives an example of an acceptable syllabus.

1.2 **ISPO Categorisation**

A major difficulty encountered in this field is that of nomenclature. Different titles are used in different areas for the same kind of worker and this confusion is made worse by differences introduced by language and translation. This led ISPO to develop a categorisation system which would be based on the levels of education and training provided and would avoid dependence on titles.

The categories may be displayed as follows:

- **Category I** Prosthetist/Orthotist (or equivalent term)
  - Entry requirement: University entry level (or equivalent)
  - Training: 3/4 years formal structured leading to University Degree (or equivalent)

- **Category II** Orthopaedic Technologist (or equivalent term)
  - Entry requirement: ‘O’ level (or equivalent) - the usual requirement for paramedical education in developing countries
  - Training: 3 years formal structured - lower than degree level

- **Category III** Prosthetic/Orthotic Technician (or equivalent term)
  - Entry requirement: basic education – the usual requirement for technician training in the country.
  - Training: 2 years formal structured or 4 years on the job or in-house training.

The Society’s education philosophy encompasses these three categories, Category I and II professionals who take part in patient care activities and Category III workers who are only concerned with manufacture and assembly.

It must be emphasised that this is not an attempt to describe all of those who work in this field throughout the world. It is a description of the levels of education and training which the society believes meantime represent the desirable levels for those involved in patient care in the developed and the developing world respectively and in the support function of manufacture and assembly.

For the industrial world, the Society believes that the Category I professional prosthetist/orthotist should, for the future, be educated and trained at University Degree level or equivalent. It further believes that although there are many different approaches that can lead to this level of training and education any course must consist of:
a) teaching of theoretical subjects
b) closely supervised practical instruction
c) structured and controlled clinical experience

Many industrial countries do not at present satisfy this goal.

It is recognised that at present training in Category I does not exist in many places in the developing countries and is mostly available in the industrial world. Despite this it is felt important that some personnel in developing countries should be trained to this level to provide leadership for the prosthetic/orthotic profession and be responsible for education and training within their own countries. It is anticipated, however, that the majority of the clinical service will be provided by Category II personnel who should work under Category I direction, wherever possible.

The concept of Category II responsibilities is regarded as an interim solution for the developing world although it is recognised that a dynamic situation exists.

The Category III worker exists in both the industrial and developing worlds and is responsible for the production of prosthetic and orthotic devices under the direction of the Category I or Category II professional. He/she is not directly involved in patient treatment.

It is recognised that there is a wide variation in the format of different schemes of training for Category III. This information package is intended to provide a useful guideline for the development of any training programme.
2. **PROFESSIONAL PROFILE FOR CATEGORY III**  
**(PROSTHETIC/ORTHOTIC TECHNICIAN)**  

The following professional profile has its basis in the Report of the United Nations Inter-Regional Seminar on Standards for the Training of Prosthetists (UN, 1968) - the so-called Holte Report. It has moreover been modified to comply with Guidelines for Training Personnel in Developing Countries for Prosthetic and Orthotic Services (WHO, 1990) and further refined by the Education Committee of ISPO.

2.1 **Prosthetic/Orthotic Fabrication**

In direct assistance to the prosthetic/orthotic or orthopaedic technologist.

2.1.1 Fabricates and assembles prosthetic/orthotic devices, including component parts, sockets, suspension systems as designed by the prosthetist/orthotist;

2.1.2 Performs bench alignment of the device to the specifications of the prosthetist/orthotist;

2.1.3 As directed, assists the prosthetist/orthotist in fitting and aligning activities with patients;

2.1.4 As directed, performs finishing operations on prostheses and orthoses, including the use of alignment transfer tools and equipment;

2.1.5 Reports any pertinent information regarding the device or the patient to the prosthetist/orthotist;

2.1.6 Takes part in follow-up procedures in respect of maintenance, repair and replacement of the appliance;

2.1.7 Is responsible for the care and economical use of laboratory materials, equipment and tools.

2.2 **Management and Supervision**

2.2.1 Supervises the activity of supporting staff as appropriate.

2.2.2 Manages laboratory/workshop activities assigned to him, including :

- use and maintenance of tools and equipment
- maintenance of safe working environment and procedures
- inventory and stock control
- personnel matters
- financial matters
- appropriate record keeping
- total quality management

2.2.3 Devises improved job methods for increasing efficiency.

2.2.4 Reports to the prosthetist/orthotist on special needs regarding laboratory materials, equipment and tools.
2.3 Training and Education

2.3.1 May supervise and take part in the training of individuals in Category III (technicians).

2.3.2 Is required to take part in and contribute to the process of continuing professional development.

2.3.3 Keeps abreast of new developments in materials, tools, equipment and processes which apply to his duties in the laboratory.

2.4 Medical, Legal and Ethical Requirements

2.4.1 Complies with any medical/legal or ethical requirements of the employing institution.
3. CODE OF ETHICS FOR THE PROSTHETIST/ORTHOOTIST

An appropriate code of ethical behaviour is an essential framework for the activities of any professional responsible for the treatment of patients. The following is the code of ethics suggested in the Report of the United Nations Inter-regional Seminar on Standards for the Training of Prosthetists (UN, 1969).

This is, however, only given as an example which satisfies the minimal requirements of such a code. It may require elaboration in different cultural, ethnic or religious settings.

This code is displayed for the information of the technician and so that it may provide a framework for his or her own activities.

*Ethical code for the prosthetist/orthotist*

i) He/she shall observe loyal relations with his/her colleagues and with other members of the clinic team without assuming roles outside his/her own profession.

ii) He/she shall practise absolute discretion regarding personal matters or knowledge he/she might acquire in his/her professional work.

iii) He/she, like all other members of the clinic team, should supply service only as a member of that team and respect its conclusions.

iv) He/she shall collaborate freely in the necessary exchange of information between colleagues and others in the different but related disciplines.

v) He/she shall strive to perform to the highest possible standard of his/her professional skill.

vi) He/she shall provide services to patients in a professional manner; personal, financial or commercial interests shall be secondary.

vii) He/she shall always honestly represent himself/herself as well as his/her services to the patient and all others concerned.

viii) He/she shall observe similar restrictions in his/her personal relations with patients as are normally accepted by the medical profession.
4. LEARNING OBJECTIVES OF COURSE FOR CATEGORY III

The following outlines the learning objectives of a course for Category III workers in respect of theoretical subjects (4.1 to 4.9) and closely supervised practical instruction (4.10). It should be emphasised that this is a guideline and local variations may produce an acceptable course. In respect of the supervised practical instruction, regional requirements may influence the emphasis in areas of patient provision. However, the outline in 4.10 is considered to represent the minimum essential elements of prosthetic and orthotic practice which should be contained within the learning objective for a course to produce a technician qualified in all areas of prosthetics and orthotics. Where possible other elements of provision should also be included.

It is also noted that courses which encompass these learning objectives may have different structures. For example a course may be offered within a formal college or school environment or it may be offered as structured “on the job” training augmented by formal teaching. For guidance a course offered in a formal school environment would be of about 2 years duration while an “on the job” or in-house programme might be of about 4 years. Entrants to this training will have adequate schooling to permit them to benefit from the theoretical teaching.

4.1 Anatomy

In the area of anatomy the student should have basic knowledge of the following:

- the structure of the skeletal system, particularly the bones and joints of the lower and upper limbs, the shoulder girdle, the spine and the thorax;
- the structure and function of the muscular system, with emphasis on the muscular systems of the lower and upper limbs, the shoulder girdle and the spine and thorax;
- the structure and function of joints, including axes of rotation, range of movements and stabilisation;
- introduction to the nervous system:

The student should have a basic understanding of the musculo-skeletal system. He/she should be familiar with the relevant anatomical terminology

4.2 Pathology

The student will have an introduction to the following areas:

- paralysis resulting from nerve lesions, stroke and other causes;
- amputations and amputation levels;
- spinal and thoracic deformities;
- limb deformities.

The student should have a knowledge of the pathological conditions giving rise to prosthetic/orthotic provision and be familiar with the relevant terminology.
4.3 Biomechanics (alignment principles)

The student should have an understanding of the following topics:

- the anatomical planes and reference points of the body;
- prosthetic and orthotic measurement techniques;
- the interaction of anatomical joints and prosthetic/orthotic joints;
- lower limb prosthetic components and their application;
- bench, static and dynamic alignment of lower limb prostheses with reference to biomechanical implications;
- orthoses for lower limb diseases;
- lower limb orthotic components and their application;
- orthoses for diseases and deformation of the spine and thorax;
- upper limb prosthetic alignment and function
- upper limb prosthetic components and their application;
- upper limb orthotic fitting, alignment and function;
- upper limb orthotic components and their application.

The student requires the above knowledge in order to fabricate prosthetic and orthotic devices.

4.4 Elementary Mathematics

The student will have a knowledge of the following areas of elementary mathematics and their application.

- simple algebraic manipulation;
- indices;
- solution of simple equations;
- geometry;
- trigonometric functions;
- solution of simple trigonometric equations;
- use of calculators and mathematical tables.

4.5 Materials Technology

The student will have an understanding of the characteristics, properties and the processing of the following commonly used materials with particular reference to their applications in prosthetics and orthotics:

- steel and its alloys;
- non-ferrous metals and their alloys;
- plastics: thermoforming, thermosetting, composites;
- wood;
- leather;
- plaster of Paris;
- adhesives.

4.6 Workshop Technology

The student will understand and be able to apply, in the field of orthopaedic technology, the following areas of knowledge:

- hand tools: their selection, use and maintenance;
- measuring instruments: use and methods of application;
- machine tools: selection, installation, use and maintenance;
- welding processes and equipment for metals and plastics;
- sewing machines: selection, use and maintenance;
- general equipment: ovens, compressors, vacuum pumps, fume and dust extraction apparatus;
- workshop layout;
- health and safety regulations and practice.

4.7 **Graphical Communication**

The student will have knowledge and practice in the following:

- isometric sketching and three-dimensional visualisation;
- first and third angle projection;
- auxiliary views and sections;
- use of drawing standards;
- application of machining tolerances;
- simple assembly drawings;
- applications in orthopaedic technology.

4.8 **Prosthetic and Orthotic Services**

The student will have an appreciation of:

- the clinic team, functions and members;
- prosthetics and orthotics personnel;
- ethical considerations;
- prosthetics and orthotics care systems.

4.9 **Clinical Sciences**

The student will by observation have an experience of:

- patient examination;
- measurement and casting;
- cast rectification;
- dynamic alignment, fitting and delivery.

4.10 **Workshop Practice**

The student will be proficient in the following practical areas with an understanding based on the integration of his/her theoretical studies:

- general workshop practice: use of hand tools, machine tools and materials;
- fabrication, bench, alignment and finishing the following devices:
  - partial foot prosthetics;
  - ankle disarticulation prosthetics;
  - trans-tibial prosthetics;
  - knee disarticulation prosthetics;
  - trans-femoral prosthetics;
  - trans-radial prosthetics;
  - trans-humeral prosthetics;
• foot orthotics; (FO)
• ankle-foot orthotics; (AFO)
• knee-ankle-foot orthotics; (KAFO)
• hip-knee-ankle-foot orthotics; (HKAFO)
• wrist-hand orthotics; (WHO)
• elbow-wrist-hand orthotics; (EWHO)

• thoraco-lumbo-sacral orthotics; (TLSO)
• cervical orthotics; (CO)
• cervico-thoraco-lumbo-sacral orthotics; (CTLSO)
5. GUIDELINE FOR SYLLABUS OF TWO YEAR COURSE LEADING TO QUALIFICATION AS PROSTHETIC/ORTHOTIC TECHNICIAN (CAT III)

It should be noted that this is only a recommended guideline intended to assist those involved in course construction. It is based on a 40 week teaching year, with each week having 30 teaching hours. Consequently, hours are allocated to subjects in multiples of 20.

CATEGORY III SYLLABUS

Theory

<table>
<thead>
<tr>
<th>Subjects</th>
<th>First Year</th>
<th>Second Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomy</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Pathology</td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Biomechanics (alignment principles)</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Mathematics</td>
<td>40</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Materials technology</td>
<td>100</td>
<td>60</td>
<td>160</td>
</tr>
<tr>
<td>Workshop technology</td>
<td>40</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>Graphical communication</td>
<td></td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Prosthetics and orthotics services</td>
<td>20</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>Clinical sciences</td>
<td></td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>240</td>
<td>480</td>
</tr>
</tbody>
</table>

Practice (laboratory instruction and workshop practice)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>First Year</th>
<th>Second Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>General workshop practice</td>
<td>240</td>
<td>240</td>
<td>480</td>
</tr>
<tr>
<td>Lower limb prosthetics</td>
<td>120</td>
<td>510</td>
<td>630</td>
</tr>
<tr>
<td>Upper limb prosthetics</td>
<td></td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Lower limb orthotics</td>
<td>360</td>
<td>60</td>
<td>420</td>
</tr>
<tr>
<td>Upper limb orthotics</td>
<td>90</td>
<td></td>
<td>90</td>
</tr>
<tr>
<td>Spinal orthotics</td>
<td>120</td>
<td></td>
<td>120</td>
</tr>
<tr>
<td>Shoe modifications</td>
<td>30</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>Total</td>
<td>960</td>
<td>960</td>
<td>1920</td>
</tr>
</tbody>
</table>

Based on a 40 weak year, 30 hour week, over 2 years.
6. REFERENCES AND BIBLIOGRAPHY


ISPO (1985). Report of ISPO Workshop on prosthetics and orthotics in the developing world with respect to training and education and clinical services, Moshi, Tanzania 6-12 May 1984. / edited by NA Jacobs, G Murdoch. - Copenhagen, Denmark: ISPO.


A.

PROFESSIONAL PROFILE FOR CATEGORY I
(PROSTHETIST/ORTHOTIST, ORTHOPAEDIC ENGINEER, ORTHOPAEDIC MEISTER ETC.)

The following professional profile has its basis in the Report of the United Nations Inter-Regional Seminar on Standards for the Training of Prosthetists (UN,1968) – the so-called Holte Report. It has moreover been modified to comply with Guidelines for Training Personnel in Developing Countries for Prosthetic and Orthotic Services (WHO, 1990) and further refined by the Education Committee of ISPO.

A.1 Patient Care

Formulation of treatment

A.1.1 Participates as full member of the clinic team; takes part in the examination and prescription; and advises on the design of the prosthetic/orthotic device, including the socket or body/device interface, suspension and selection of proper components.

A.1.2 Assists and advises on relevant aspects of pre-surgical, post-surgical, medical and therapeutic management of individuals requiring prosthetic/orthotic devices.

A.1.3 Records and reports any pertinent information regarding patients and their families, including a determination of expectations and needs.

A.1.4 Communicates appropriate information to patients and their families.

Fitting, fabrication and treatment

A.1.5 Supervises and directs the activities of the orthopaedic technologist and technician in fitting and fabrication.

A.1.6 Identifies physical and other relevant characteristics of the patient.

A.1.7 Formulates prosthetic or orthotic designs, including selection of materials, components and additional aids.

A.1.8 Takes all casts and measurements required for proper fabrication and fitting.

A.1.9 Modifies positive and/or negative models and/or layouts of design to obtain optimal fit and alignment.

A.1.10 Carries out fitting, static and dynamic alignment and, where appropriate, preliminary training and initial check-out.

A.1.11 Performs and/or supervises fabrication of the prosthesis or orthosis.

Evaluation and follow-up

A.1.12 Advises the team and participates directly in final check-out and evaluation of fit, function and cosmesis.

A.1.13 Instructs the patient or family in the use and care of the device.
A.1.14 Takes part in follow-up procedures as well as maintenance, repair and replacement of the appliance.

A.1.15 Recognises the need to repeat any of the identified steps in order to optimise fit and function.

A.1.16 Collaborates and consults with others engaged in the management of the patient.

A.2 Management and Supervision

A.2.1 Supervises the activity of supporting staff as appropriate.

A.2.2 Manages clinical and laboratory/workshop activities assigned to him, including:

- use and maintenance of tools and equipment
- maintenance of safe working environment and procedures
- inventory and stock control
- personnel matters
- financial matters
- appropriate record keeping
- total quality management

A.2.3 Devises improved job methods for increasing efficiency.

A.2.4 Interacts with professional groups as well as governmental and non-governmental agencies.

A.2.5 Takes part in planning and implementation of technical orthopaedic care systems.

A.3 Training and Education

A.3.1 Supervises and conducts the education and training of individuals in Category I (prosthetists/orthotists), Category II (orthopaedic technologists) and Category III (technicians).

A.3.2 Lectures and demonstrates to colleagues in his profession and other professionals concerned with prosthetics/orthotics and also to other interested groups.

A.3.3 Is required to take part in and contribute to the process of continuing professional development.

A.3.4 Keeps abreast of new developments concerning prosthetics/orthotics.

A.4 Community Services

A.4.1 Makes a professional contribution to and takes part in community rehabilitation programmes.
A.5 Research and Development

A.5.1 Conducts continuing evaluation of his activities.

A.5.2 Participates in formal evaluation and research programmes.

A.5.3 Participates in scientific/professional meetings and contributes papers to scientific/professional journals.

A.6 Medical, Legal and Ethical Requirements

A.5.1 Provides patient care within a recognised prosthetics/orthotics code of ethics.

A.5.2 Provides patient care which complies with medical/legal requirements.
Appendix B

B. PROFESSIONAL PROFILE FOR CATEGORY II
(ORTHOPAEDIC TECHNOLOGIST)

This professional profile is specific to workers in the developing world. Its origin is in the Guidelines for Training Personnel in Developing Countries for Prosthetic and Orthotic Services (WHO, 1990) and it has been further refined by ISPO to ensure compliance with its categorization system.

B.1 Patient Care

Formulation of treatment

B.1.1 In the absence of a Category I professional, participates as full member of the clinic team; takes part in the examination and prescription; and advises on the design of the prosthetic/orthotic device interface, suspension and selection of the proper components.

B.1.2 Assists and advises on relevant aspects of pre-surgical, post-surgical, medical and therapeutic management of individuals requiring prosthetic/orthotic devices.

B.1.3 Records and reports any pertinent information regarding patients and their families, including a determination of expectations and needs.

B.1.4 Communicates appropriate information to patients and their families.

Fitting, fabrication and treatment

B.1.5 Identifies physical and other relevant characteristics of the patient.

B.1.6 Formulates a range of prosthetic or orthotic designs as specified in the curriculum guidelines. This includes selection of materials, components and additional aids.

B.1.7 Takes all casts and measurements required for proper fabrication and fitting.

B.1.8 Modifies positive and/or negative models and/or layouts of design to obtain optimal fit and alignment.

B.1.9 Carries out fitting, static and dynamic alignment and, where appropriate, preliminary training and initial check-out.

B.1.10 Performs and/or supervises fabrication of the prosthesis or orthosis.

Evaluation and follow-up

B.1.11 Advises the team and participates directly in final check-out and evaluation of fit, function and cosmesis.

B.1.12 Instructs the patient or family in the use and care of the device.
B.1.13 Takes part in follow-up procedures as well as maintenance, repair and replacement of the appliance.

B.1.14 Recognises the need to repeat any of the identified steps in order to optimise fit and function.

B.1.15 Collaborates and consults with others engaged in the management of the patient.

B.2 Management and Supervision

B.2.1 Supervises the activity of supporting staff as appropriate.

B.2.2 Manages clinical and laboratory/workshop activities assigned to him, including:

- use and maintenance of tools and equipment
- maintenance of safe working environment and procedures
- inventory and stock control
- personnel matters
- financial matters
- appropriate record keeping
- total quality management

B.2.3 Devises improved job methods for increasing efficiency.

B.2.4 Interacts with professional groups as well as governmental and non-governmental agencies.

B.2.5 Takes part in planning and implementation of technical orthopaedic care systems.

B.3 Training and Education

B.3.1 May supervise and take part in the training of individuals in Category II (orthopaedic technologists) and Category III (technicians).

B.3.2 May lecture and demonstrate to colleagues in his profession and other professionals concerned with prosthetics/orthotics and also to community and other interested groups.

B.3.3 Is required to take part in and contribute to the process of continuing professional development.

B.3.4 Keeps abreast of new developments concerning prosthetics/orthotics.

B.4 Community Services

B.4.1 Makes a professional contribution to and takes part in community rehabilitation programmes.

B.5 Medical, Legal and Ethical Requirements

B.5.1 Provides patient care within a recognised prosthetics/orthotics code of ethics.

B.5.2 Provides patient care which complies with medical/legal requirements.