

B O A R D O F S T U D I E S
NEW SOUTH WALES

Industrial Technology

Stage 6

Syllabus

Original published version updated:

September 1999 – Board Bulletin/Official Notices Vol 8 No 7 (BOS 54/99)

April 2000 – Board Bulletin/Official Notices Vol 9 No 2 (BOS 13/00)

March 2002 – Board of Studies *Job Number 2002162*

May 2002 – Board Bulletin/Official Notices Vol 11 No 2 (BOS 24/02)

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Material on p 5 from *Securing Their Future* © NSW Government 1997.

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Published by
Board of Studies NSW
GPO Box 5300
Sydney NSW 2001
Australia

Tel: (02) 9367 8111

Internet: <http://www.boardofstudies.nsw.edu.au>

ISBN: 0 7313 4228 3

2002162

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1 The Higher School Certificate Program of Study

The purpose of the Higher School Certificate program of study is to:

- provide a curriculum structure which encourages students to complete secondary education;
- foster the intellectual, social and moral development of students, in particular developing their:
 - knowledge, skills, understanding and attitudes in the fields of study they choose
 - capacity to manage their own learning
 - desire to continue learning in formal or informal settings after school
 - capacity to work together with others
 - respect for the cultural diversity of Australian society;
- provide a flexible structure within which students can prepare for:
 - further education and training
 - employment
 - full and active participation as citizens;
- provide formal assessment and certification of students' achievements;
- provide a context within which schools also have the opportunity to foster students' physical and spiritual development.

2 Rationale for Industrial Technology in the Stage 6 Curriculum

Much of Australia's economic, social and cultural development can be related to the capacity of our industries to develop and use technology in the manufacture of goods and services. The effective and responsible application of industrial technologies has a direct bearing upon the quality of our lives. For this reason, the study of industrial technology and its role in industry is relevant and purposeful for many students.

The subject provides students with a choice of eight different focus area industries, through which they can study the course. These focus areas have been chosen to cover a wide range of potentially accessible and locally available industries.

Industrial Technology has been developed to incorporate content related to current and developing technologies. It offers students the opportunity to study the interrelationships of technologies, equipment and materials used by industry and to develop skills through the processes of design, planning and production.

Rapid technological change, particularly in the computer-based technologies, is influencing the nature of our industrial enterprises and the work that is undertaken in these enterprises. As a result, our industrial enterprises are becoming more globally competitive.

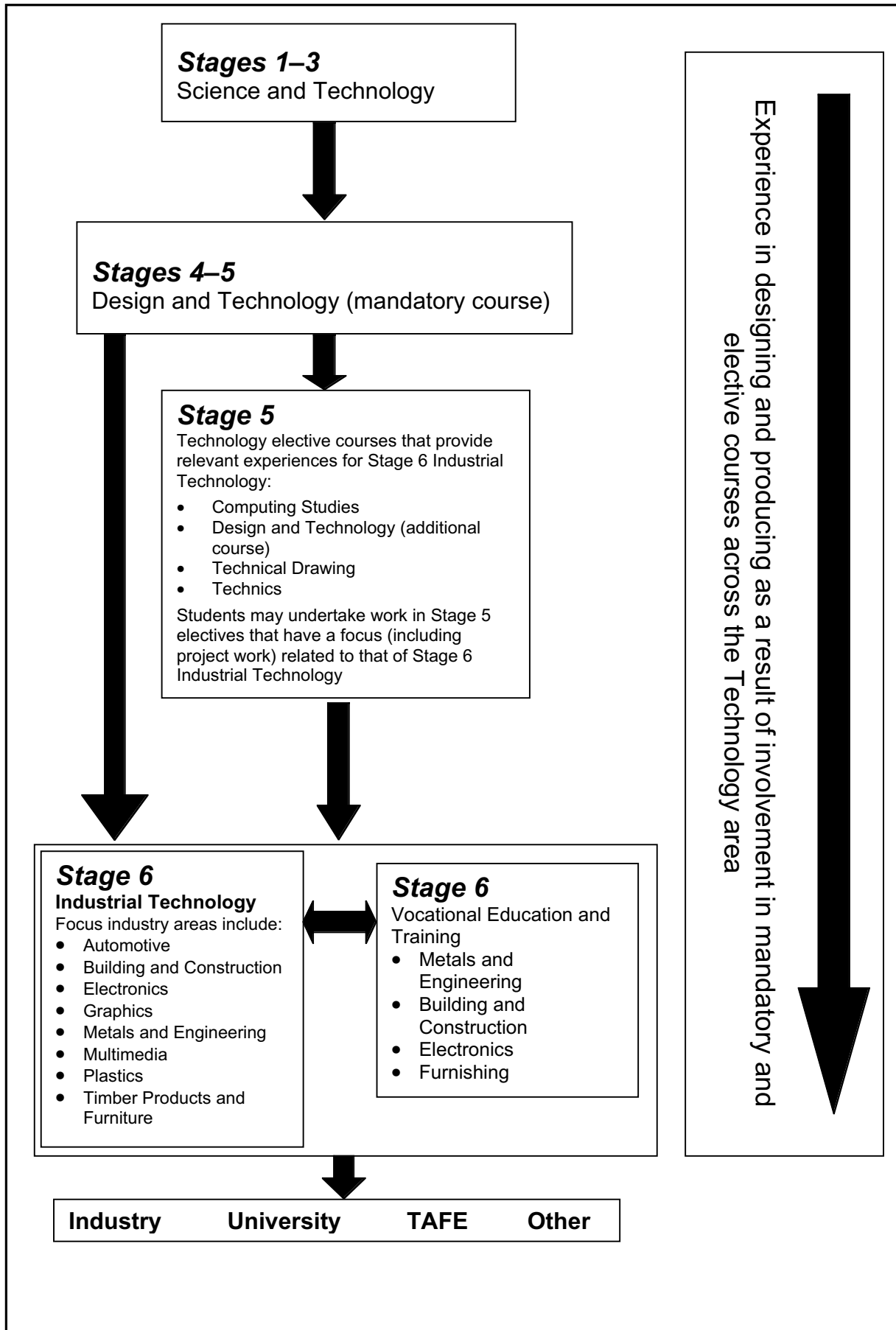
Industrial Technology seeks to raise students' awareness of the interaction between technology, industry, society and the environment, and to develop their ability to make value judgements about issues, decisions and problems arising from this interaction. Students achieve this by applying practical experiences to the study of the technology, management and organisation of industry.

The current Australian industrial workforce is diverse in nature, gender-inclusive and better educated through ongoing training and development.

Increasing retention rates within NSW schools have resulted in a need to link the senior school curriculum more closely with post-school vocational education and work options. This syllabus acknowledges the need to strengthen such links. Through a process of observing and analysing industry practice and through personal practical experiences, students will gain knowledge and skills together with appropriate attitudes about technology and industry.

The course has been designed to be inclusive of the needs, interests and aspirations of students and it provides opportunities for them to learn explicitly about gender issues relating to the industry studied. It also caters for students who wish to undertake further study in a related area at university level or to pursue further industry training. Therefore the skills and knowledge gained through the study of Industrial Technology Stage 6 will enable students to make positive contributions to Australian industry and society.

3 Continuum of Learning for Industrial Technology Stage 6 Students



4 Aim

Industrial Technology at Stage 6 is designed to develop in students a knowledge and understanding of the selected industry and its related technologies with an emphasis on design, management and production through practical applications.

5 Objectives

Students will develop:

- knowledge and understanding of the focus area industry and of manufacturing processes and techniques used by industry
- knowledge and understanding of safe and cooperative work practices and of the need for a safe and cooperative work environment
- competence in designing, managing and communicating within a relevant industry context
- knowledge and skills in producing quality products
- knowledge and skills in communication and information processing related to the industry focus area
- an appreciation of quality products and the principles of quality control
- an appreciation of the relationships between technology, the individual, society and the environment.

6 Course Structure

Industrial Technology Stage 6 has a Preliminary course and an HSC course.

The Preliminary course of 120 indicative hours consists of project work and an industry study that provide a broad range of skills and knowledge related to the focus area chosen and an introduction to industrial processes and practices.

The HSC course of 120 indicative hours consists of the development of a major project and industry study.

Students choose to study ONE of EIGHT focus areas. The same area is to be studied in both the Preliminary and HSC courses. The focus areas are:

- Automotive Industries
- Building and Construction Industries
- Electronics Industries
- Graphics Industries
- Metal and Engineering Industries
- Multimedia Industries
- Plastics Industries
- Timber Products and Furniture Industries.

Both the Preliminary and HSC courses are organised around four sections:

- A. Industry study
- B. Design and management
- C. Workplace communication
- D. Industry-specific content and production.

A. Industry Study

Preliminary Course	HSC Course
Activity <ul style="list-style-type: none"> visits to and from industry and/or work experience 	Activity <ul style="list-style-type: none"> visits to and from industry and/or work experience
Scope <ul style="list-style-type: none"> study of the organisation and management of an individual business within the industry, including: structural, technical, environmental, sociological, personnel, industrial relations, work place culture and OH&S factors safety and basic first aid in the workshop 	Scope <ul style="list-style-type: none"> study of the overall industry related to the specific focus area global influences on Australian industry safety requirements for industry related to the specific focus area

B. Design and Management

Preliminary Course	HSC Course
Activity <ul style="list-style-type: none"> design, construction and development of a number of projects (at least one group project) development of management folios 	Activity <ul style="list-style-type: none"> design, construction and development of projects, including the major project and the management folio
Scope <ul style="list-style-type: none"> development of skills related to research, analysis and evaluation skills in designing and managing projects documentation skills in the preparation, planning and presentation of a management folio 	Scope <ul style="list-style-type: none"> application of research, analysis and evaluation skills culmination of design, planning and management in a major project

C. Workplace Communication

Preliminary Course	HSC Course
Activity <ul style="list-style-type: none"> acquiring a range of communication skills through a number of projects with folios (at least one to be a group project) 	Activity <ul style="list-style-type: none"> further develop communication skills
Scope <ul style="list-style-type: none"> skills in literacy through written reports, folio work skills in computer-based technologies numeracy skills related to sizing, costing and estimating graphical skills related to the project work knowledge and understanding of Workplace communication 	Scope <ul style="list-style-type: none"> application of a full range of communication skills, culminating in the development of the major project folio refine communication skills in the reporting of the Industry study

D. Industry-Specific Content and Production

Preliminary Course	HSC Course
Activity <ul style="list-style-type: none"> developing knowledge and skills through the construction of a number of projects (at least one to be a group project) 	Activity <ul style="list-style-type: none"> extending and refining knowledge and skills through practical experiences, including the production of the major project
Scope <ul style="list-style-type: none"> basic knowledge and understanding of a range of materials, processes, tools, equipment and machinery acquisition of relevant practical skills 	Scope <ul style="list-style-type: none"> in-depth knowledge and understanding of appropriate materials, processes, tools, machinery and equipment refinement of the relevant practical skills new/emerging technologies associated with the focus area industry

7 Objectives and Outcomes

7.1 Table of Objectives and Outcomes

Objectives	Preliminary Outcomes	HSC Outcomes
<p>Students will develop</p> <p>1. knowledge and understanding of the focus area industry and of manufacturing processes and techniques used by industry</p>	<p>A Student:</p> <p>P1.1 describes the organisation and management of an individual business within the focus area industry</p> <p>P1.2 identifies appropriate equipment, production and manufacturing techniques, including new and developing technologies</p>	<p>A Student:</p> <p>H1.1 investigates industry through the study of businesses in one focus area</p> <p>H1.2 identifies appropriate equipment, production and manufacturing techniques and describes the impact of new and developing technologies in industry</p>
<p>2. knowledge and understanding of safe and cooperative work practices and of the need for a safe and cooperative work environment</p>	<p>P2.1 describes and uses safe working practices and correct workshop equipment maintenance techniques</p> <p>P2.2 works effectively in team situations</p>	<p>H2.1 demonstrates proficiency in the use of safe working practices and workshop equipment maintenance techniques</p>
<p>3. competence in designing, managing and communicating within a relevant industry context</p>	<p>P3.1 sketches, produces and interprets drawings in the production of projects</p> <p>P3.2 applies research and problem-solving skills</p> <p>P3.3 demonstrates appropriate design principles in the production of projects</p>	<p>H3.1 is skilled in sketching, producing and interpreting drawings</p> <p>H3.2 selects and applies appropriate research and problem-solving skills</p> <p>H3.3 applies design principles effectively through the production of projects</p>
<p>4. knowledge and skills in producing quality products</p>	<p>P4.1 demonstrates a range of practical skills in the production of projects</p> <p>P4.2 demonstrates competency in using relevant equipment, machinery and processes</p> <p>P4.3 identifies and explains the properties and characteristics of materials/components through the production of projects</p>	<p>H4.1 demonstrates competency in practical skills appropriate to the major project</p> <p>H4.2 explores the need to outsource appropriate expertise where necessary to complement personal practical skills</p> <p>H4.3 critically applies knowledge and skills related to properties and characteristics of materials/components</p>

Objectives	Preliminary Outcomes	HSC Outcomes
Students will develop: 5. knowledge and skills in communication and information processing related to the industry focus area	A Student: P5.1 uses communication and information processing skills P5.2 uses appropriate documentation techniques related to the management of projects	A Student: H5.1 selects and uses communication and information processing skills H5.2 selects and applies appropriate documentation techniques to project management
6. an appreciation of quality products and the principles of quality control	P6.1 identifies the characteristics of quality manufactured products P6.2 identifies and explains the principles of quality and quality control	H6.1 evaluates the characteristics of quality manufactured products H6.2 applies the principles of quality and quality control
7. an appreciation of the relationships between technology, the individual, society and the environment	P7.1 explains the impact of one related industry on the social and physical environment	H7.1 evaluates the impact of the focus area industry on the social and physical environment

Students studying Industrial Technology for each of the focus areas will undertake work in four sections:

- A. Industry study**
- B. Design and management**
- C. Workplace communication**
- D. Industry-specific content and production.**

The course outcomes together with the first three sections above (A, B and C) are common to each industry focus area.

The Industry-specific content and production (section D) is listed separately for each industry focus area.

It is essential that the content and the focus area outcomes be considered collectively when programming for the course in order to ascertain the depth and breadth of treatment of each topic.

The content in the Preliminary course and the HSC course within each focus area is to be differentiated in terms of depth of study and its application to the individual student projects. In the Preliminary study, the content is introductory and is related to a number of Preliminary projects and the study of an individual business in the focus area. The HSC content is a more detailed study, which is relevant to the student's major project and their study of the overall industry in the focus area. Students in the HSC course are expected to select and apply a more in-depth understanding of the topics.

7.2 Key Competencies

Industrial Technology Stage 6 provides a context within which to develop general competencies essential for students to become effective learners and make a positive contribution to their community.

During the course, students learn to:

- source, select and sequence information about issues in a selected industry, developing competence in **collecting, analysing, and organising information**
- debate, describe, discuss and explain issues in written, graphic and oral form, developing competence in **communicating ideas and information**
- plan, prepare and present project work and planning folio to meet a range of needs, developing competence in **planning and organising activities**
- cooperate with individuals and groups, developing competence in **working with others and teams**
- design, implement and evaluate solutions to practical situations in a specific focus industry, developing competence in **solving problems**
- plan, develop and modify projects including costing, quantities, measurement and time, developing competence in **using mathematical ideas and techniques**
- experiment with and prepare practical projects using appropriate materials and equipment, developing competence in **using technology**

The course structure and pedagogy provide extensive opportunities to develop the key competencies.

8 Content: Industrial Technology Stage 6 Preliminary Course

Preliminary Course Outcomes and Content (Sections A, B and C)

Focus area: All

It is essential that the content and the focus area outcomes be considered collectively in order to ascertain the depth and breadth of treatment for each topic.

Course Outcomes

A student:

- P1.1 describes the organisation and management of an individual business within the focus area industry
- P1.2 identifies appropriate equipment, production and manufacturing techniques, including new and developing technologies
- P2.1 describes and uses safe working practices and correct workshop equipment maintenance techniques
- P2.2 works effectively in team situations
- P3.1 sketches, produces and interprets drawings in the production of projects
- P3.2 applies research and problem-solving skills
- P3.3 demonstrates appropriate design principles in the production of projects
- P4.1 demonstrates a range of practical skills in the production of projects
- P4.2 demonstrates competency in using relevant equipment, machinery and processes
- P4.3 identifies and explains the properties and characteristics of materials/components through the production of projects
- P5.1 uses communication and information processing skills
- P5.2 uses appropriate documentation techniques related to the management of projects
- P6.1 identifies the characteristics of quality manufactured products
- P6.2 identifies and explains the principles of quality and quality control
- P7.1 explains the impact of one related industry on the social and physical environment

A. Industry Study (Preliminary)

Students will study an individual business related to the focus area industry.

Students learn about:	Students learn to:
<p>Structural factors</p> <ul style="list-style-type: none"> • organisation and management • marketing and sales • production and efficiency • technology and restructuring • quality control <p>Technical factors</p> <ul style="list-style-type: none"> • mechanisation, specialisation • mass production and automation • emerging technologies <p>Environmental and sociological factors</p> <ul style="list-style-type: none"> • resources, alternatives, limitations • recycling • pollution • government legislation • Environmental Impact Studies (EIS) • sustainable development <p>Personnel issues</p> <ul style="list-style-type: none"> • industrial relations • entry level training requirements • retraining and multiskilling • unions • roles of industry personnel • equity/EEO <p>Occupational health and safety</p> <ul style="list-style-type: none"> • government legislation • industry requirements (standards) • first aid • safety training and human factors • materials handling • workplace culture • workplace communication 	<ul style="list-style-type: none"> • investigate the overall organisation and structure of the business • identify the range of equipment and processes used by the business • identify how the resources and processes used in the business impact on environmental and sociological factors • appreciate the impact of government legislation on the decision-making process • identify the problems of pollution and any recycling of materials associated with the business • be aware of the concept of EIS and sustainable development to industry decision-making • describe the various roles and requirements of key personnel within a business • identify career opportunities and working conditions, including gender issues within the focus area industry • identify relevant OH&S factors in the workplace that ensure a safe working environment

B. Design and Management (Preliminary)

Students learn to design, plan and manage their work through the completion of a management folio linked to each project produced.

Students learn about:	Students learn to:
<p>Designing</p> <ul style="list-style-type: none"> research and analysis elements sequence planning material suitability and selection <p>Drawing</p> <ul style="list-style-type: none"> interpretation sketching production <p>Computer applications</p> <ul style="list-style-type: none"> computer software related to management and development of folio and project <p>Project management</p> <ul style="list-style-type: none"> planning documentation group activities 	<ul style="list-style-type: none"> make appropriate decisions about the range of options available to them during the designing/modifying and planning stages of each project interpret and prepare appropriate drawings required for the management of projects use computer software to assist in the development of their projects and the preparation of their management folios prepare and complete a management folio understand the importance of teamwork associated with group activities

C. Workplace Communication (Preliminary)

Students will learn communication and information processing skills in the following areas.

Students learn about:	Students learn to:
<p>Literacy</p> <ul style="list-style-type: none"> industry terminology written reports materials list management folio computer software – word processing <p>Calculations</p> <ul style="list-style-type: none"> ordering sizing quantities costing estimates <p>Graphics</p> <ul style="list-style-type: none"> reading and interpretation freehand drawing and sketching working drawings computer software graphics signage 	<ul style="list-style-type: none"> report information gathered in relation to Industry study/visits document all relevant information into their management folios develop word processing skills during the preparation of their management folio use the appropriate measuring and costing processes relevant to the focus area industry interpret and understand drawings associated with the focus area industry use sketches and freehand drawings to interpret ideas prepare working drawings for the production of projects discuss signage used in the focus area industry

9 Content: Industrial Technology HSC Course

HSC Course Outcomes and Content (Sections A, B and C)

Focus area: All

It is essential that the content and the focus area outcomes be considered collectively in order to ascertain the depth and breadth of treatment for each topic.

Course Outcomes

A student:

- H1.1 investigates industry through the study of businesses in one focus area
- H1.2 identifies appropriate equipment, production and manufacturing techniques and describes the impact of new and developing technologies in industry
- H2.1 demonstrates proficiency in the use of safe working practices and workshop equipment maintenance techniques
- H3.1 is skilled in sketching, producing and interpreting drawings
- H3.2 selects and applies appropriate research and problem-solving skills
- H3.3 applies design principles effectively through the production of projects
- H4.1 demonstrates competence in practical skills appropriate to the major project
- H4.2 explores the need to outsource appropriate expertise where necessary to complement personal practical skills
- H4.3 critically applies knowledge and skills related to properties and characteristics of materials/components
- H5.1 selects and uses communication and information processing skills
- H5.2 selects and applies appropriate documentation techniques to project management
- H6.1 evaluates the characteristics of quality manufactured products
- H6.2 applies the principles of quality and quality control
- H7.1 evaluates the impact of the focus area industry on the social and physical environment

A. Industry Study (HSC)

Students will undertake a broad study of businesses related to the specific organisation studied in the Preliminary course.

Students learn about:	Students learn to:
<p>Structural factors</p> <ul style="list-style-type: none"> • organisation and management • marketing and sales • production and efficiency • technology and restructuring • quality control <p>Technical factors</p> <ul style="list-style-type: none"> • mechanisation, specialisation • mass production and automation • emerging technologies <p>Environmental and sociological factors</p> <ul style="list-style-type: none"> • resources, alternatives, limitations • recycling • pollution • government legislation • Environmental Impact Studies (EIS) • sustainable development <p>Personnel issues</p> <ul style="list-style-type: none"> • industrial relations • entry-level training requirements • retraining and multiskilling • unions • roles of industry personnel • equity/EEO <p>Occupational health and safety</p> <ul style="list-style-type: none"> • government legislation • industry requirements (standards) • first aid • safety training and human factors • materials handling • workplace culture • Workplace communication 	<p>Students learn to:</p> <ul style="list-style-type: none"> • prepare a report on the organisation and structure of a range of businesses related to the specific organisation studied in the Preliminary course • identify factors that affect quality control within the industries • describe the significance that the various technical factors have in the efficiency of the industries studied • distinguish between the approaches to the various environmental and sociological factors adopted by each industry studied • discuss and justify the ramifications of Environmental Impact Statements (EIS) and sustainable development when studying the overall industry • describe the personnel issues that businesses have to address in their organisation • identify government legislation and policies that ensure the rights and protection for employees • discuss the importance of OH&S factors in a successful business • identify significant government legislation and industry requirements that ensure a safe working environment

B. Design and Management (HSC)

Students learn to refine and extend their project management skills in the following areas, largely through the development and completion of their major project management folio.

Students learn about:	Students learn to:
<p>Designing</p> <ul style="list-style-type: none"> research and analysis elements sequence planning material suitability and selection <p>Drawing</p> <ul style="list-style-type: none"> interpretation sketching production <p>Computer applications</p> <ul style="list-style-type: none"> computer software related to management and development of folio and project <p>Project management</p> <ul style="list-style-type: none"> planning documentation 	<ul style="list-style-type: none"> explain and justify decisions made during the designing/modifying and planning stages of each project select appropriate materials and justify decision refine skills in interpreting and creating drawings relevant to the focus area prepare all necessary sketches and working drawings required for the production of the major project utilise computer software in the development of the management folio apply time and finance plans select and use appropriate industrial processes and equipment incorporate a range of presentation skills and techniques in the development of the management folio

C. Workplace Communication (HSC)

Students learn to extend their knowledge in communication and information processing skills.

Students learn about:	Students learn to:
<p>Literacy</p> <ul style="list-style-type: none"> industry terminology written reports materials list management folio computer software – word processing <p>Calculations</p> <ul style="list-style-type: none"> ordering sizing and quantities costing estimates <p>Graphics</p> <ul style="list-style-type: none"> reading and interpretation freehand drawing and sketching working drawings computer software graphics signage 	<ul style="list-style-type: none"> incorporate the full range of literacy skills in the development of their management folio, Industry study and the production of projects utilise appropriate word processing in the management folio use appropriate terminology competently use current industry standards with all calculations utilise the full range of graphics techniques and standards used in the focus area

D. Industry-specific Content and Production

Focus Area: Automotive Industries (Preliminary)

Note: all repairs/modifications made to motor vehicles must conform to government and statutory regulations and guidelines.

Students learn about:	Students learn to:
<p>Power sources</p> <ul style="list-style-type: none"> • 2 and 4 stroke, diesel, orbital, rotary • electric • solar <p>Engine and related systems</p> <ul style="list-style-type: none"> • cylinder heads, blocks • cooling systems • exhaust systems • fuel systems <p>Chassis and related components</p> <ul style="list-style-type: none"> • drive line, differential, gearbox • brakes • steering • suspension • wheels and tyres <p>Electrical</p> <ul style="list-style-type: none"> • ignition • lighting/accessories • instrumentation • engine management systems <p>Body</p> <ul style="list-style-type: none"> • structural and panel repairs • spray painting/finishing systems • trim and accessories <p>Tools and equipment</p> <ul style="list-style-type: none"> • the use and maintenance of tools and equipment involved in the processes associated with the engine, chassis, electrical system and body <p>Automotive design</p> <ul style="list-style-type: none"> • safety • materials • aerodynamics • environmental factors <p>Government and statutory regulations</p> <ul style="list-style-type: none"> • Australian Design Rule (ADR) 37 – Emission Control for Light Vehicles • registration • insurance • vehicle modifications 	<p>Students learn to:</p> <ul style="list-style-type: none"> • discuss and differentiate between the characteristics and advantages/disadvantages of a range of power sources • gain an awareness of the operation of an engine and its related systems • use basic fault finding techniques • conduct basic routine maintenance • dismantle and reassemble a variety of engine components • identify the chassis and its related components • use basic fault finding techniques • conduct basic routine maintenance • dismantle and reassemble a variety of chassis and related components • outline the basic automotive electrical systems • conduct basic routine maintenance • use basic fault-finding techniques • identify and discuss the principles of body repair and finishing techniques • carry out basic repairs • use safely and correctly a variety of tools and equipment • appreciate safe working procedures and conditions • explain the basic principles of automotive design • discuss the various government and statutory regulations that apply to the automotive industry • describe the procedures required to register and insure a motor vehicle

D. Industry-specific Content and Production**Focus Area: Automotive Industries (HSC)**

Note: all repairs/modifications made to motor vehicles must conform to government and statutory regulations and guidelines.

Students learn about:	Students learn to:
<p>Power sources</p> <ul style="list-style-type: none"> • 2 and 4 stroke, diesel, orbital, rotary • electric • solar <p>Engine and related systems</p> <ul style="list-style-type: none"> • cylinder heads, blocks • cooling systems • exhaust systems • fuel systems <p>Chassis and related components</p> <ul style="list-style-type: none"> • drive line, differential, gearbox • brakes • steering • suspension • wheels and tyres <p>Electrical</p> <ul style="list-style-type: none"> • ignition • lighting/accessories • instrumentation • engine management systems <p>Body</p> <ul style="list-style-type: none"> • structural and panel repairs • spray painting/finishing systems • trim and accessories <p>Tools and equipment</p> <ul style="list-style-type: none"> • the use and maintenance of tools and equipment associated with the engine, chassis, electrical system and body <p>Automotive design</p> <ul style="list-style-type: none"> • safety • materials • aerodynamics • environmental factors <p>Government and statutory regulations</p> <ul style="list-style-type: none"> • Australian Design Rule (ADR) 37 – Emission Control for Light Vehicles • registration • insurance • vehicle modifications 	<p>Students learn to:</p> <ul style="list-style-type: none"> • discuss the principles and relative merits of a range of power sources • apply the principles of an engine and its related systems through the use of proficient, routine maintenance procedures • select and apply appropriate fault-finding techniques, procedures and repairs • dismantle and re-assemble engine components • safely use a range of related tools and equipment • be proficient in routine maintenance procedures • select and apply appropriate fault-finding techniques, procedures and repairs • dismantle and re-assemble chassis and related components • be proficient in routine maintenance procedures • apply the principles of a range of electrical components and systems • select and apply appropriate finishes • be competent in repair techniques and procedures • safely use a range of related tools and equipment • recognise the need for maintenance procedures and perform them where necessary, on tools and equipment • outsource appropriate expertise where necessary to complement personal practical skills • discuss the implications of vehicle design and ownership • apply government and statutory regulations during any vehicle modification • accurately complete forms for registration and insurance of a motor vehicle

D. Industry-specific Content and Production

Focus Area: Building and Construction Industries (Preliminary)

Students learn about:	Students learn to:
<p>Building principles/materials</p> <p><i>Building types</i></p> <ul style="list-style-type: none"> • common residential styles <ul style="list-style-type: none"> – rural – city • light commercial • religious • civic/public <p><i>Regulations</i></p> <ul style="list-style-type: none"> • building codes • local government regulations <p><i>Materials/resources</i></p> <ul style="list-style-type: none"> • plans and specifications • building materials <p><i>Utilities and services</i></p> <ul style="list-style-type: none"> • gas • water • electricity • telephone • security • fire detection • drainage • insulation <p>Processes, tools, machinery and equipment</p> <p><i>Processes</i></p> <ul style="list-style-type: none"> • Construction experiences with: <ul style="list-style-type: none"> – foundations – footings – walls – roofing – cladding – flooring – auxiliary joinery – surface coating – landscaping <p><i>Tools and machinery</i></p> <ul style="list-style-type: none"> • the use and maintenance of the tools and machinery involved in the processes listed above 	<ul style="list-style-type: none"> • recognise and discuss the common residential styles in the local area • differentiate between the general characteristics of light commercial, religious and civic building styles <ul style="list-style-type: none"> • discuss local government building codes <ul style="list-style-type: none"> • read and interpret plans and specifications • identify common building materials • apply a basic knowledge of the various utilities and services to practical and project activities <ul style="list-style-type: none"> • develop skills in the range of building processes listed • discuss the skills and techniques required to satisfactorily carry out the building procedures listed <ul style="list-style-type: none"> • develop skills in using a variety of tools and machinery • correctly maintain tools and machinery related to the building processes

D. Industry-specific Content and Production

Focus Area: Building and Construction Industries (HSC)

Students learn about:	Students learn to:
<p>Building principles/materials</p> <p><i>Building types</i></p> <ul style="list-style-type: none"> • common residential styles <ul style="list-style-type: none"> – rural – city • light commercial • religious • civic/public <p><i>Regulations</i></p> <ul style="list-style-type: none"> • building codes • local government regulations <p><i>Materials/resources</i></p> <ul style="list-style-type: none"> • plans and specifications • building materials <p><i>Utilities and services</i></p> <ul style="list-style-type: none"> • gas • water • electricity • telephone • security • fire detection • drainage • insulation <p>Processes, tools, machinery and equipment</p> <p><i>Processes</i></p> <ul style="list-style-type: none"> • construction experiences with: <ul style="list-style-type: none"> – foundations – footings – walls – roofing – cladding – flooring – auxiliary joinery – surface coating – landscaping <p><i>Tools and machinery</i></p> <ul style="list-style-type: none"> • the use and maintenance of the tools and machinery involved in the processes listed above 	<ul style="list-style-type: none"> • discuss a variety of architectural styles • prepare for submission to local council Development and Building Applications • apply local government regulations to all practical projects undertaken • select and competently use a range of building materials • understand the principles and procedures for accessing a variety of utilities and services related to domestic buildings • select and competently use a variety of common building processes • explain the skills and techniques required to satisfactorily carry out the building processes listed • outsource appropriate expertise where necessary to complement personal practical skills • use a range of tools and machinery associated with a construction site • competently maintain tools and machinery related to the processes in the industry

D. Industry-specific Content and Production

Focus Area: Electronics Industries (Preliminary)

Note: any project using or developing voltages in excess of 32V must be inspected and approved in writing as safe by a qualified and accredited person in accordance with appropriate Australian Standards.

Students learn about:	Students learn to:
<p>Electrical Principles</p> <p><i>Fundamentals</i></p> <ul style="list-style-type: none"> • electrical potential • current flow (AC/DC) • resistance • power • electromagnetism • units and measurement <p><i>Supply and safety</i></p> <ul style="list-style-type: none"> • sources of power • basic safety issues <p><i>Circuitry</i></p> <ul style="list-style-type: none"> • series and parallel circuits • basic calculations <ul style="list-style-type: none"> – Ohm's law – components in series and parallel power <p><i>Digital electronics</i></p> <ul style="list-style-type: none"> • current flow in analogue vs digital electronics • binary numbering system • basic logic gates and truth tables <p><i>Components</i></p> <ul style="list-style-type: none"> • labelling and preferred values of common components • examples and applications of: <ul style="list-style-type: none"> – conductors, insulators, resistors: LDR, thermistor, fixed and variable • capacitors <ul style="list-style-type: none"> – different types, fixed and variable • inductive coils and relays <ul style="list-style-type: none"> – transformers • relays • semiconductors <ul style="list-style-type: none"> – diodes: signal, power, regulator, Light Emitting Diode (LED), light sensitive • transistors: bipolar/Field Effect Transistor (FET) <ul style="list-style-type: none"> – integrated circuits: analogue, digital, microprocessors, VLSI 	<ul style="list-style-type: none"> • identify the fundamentals of electrical principles <ul style="list-style-type: none"> • compare sources of power • outline safety issues with power sources <ul style="list-style-type: none"> • explain the principles of parallel and series circuits • apply basic knowledge to complete simple circuits <ul style="list-style-type: none"> • compare and discuss analogue and digital systems • identify the binary system, logic gates and truth tables <ul style="list-style-type: none"> • identify and appropriately select common components • explain and use conductors, insulators, resistors, both fixed and variable • identify thermistors and LDR • describe the different types of capacitors • explain inductive coils and relays • use the range of semiconductors • identify transistors • describe the function of integrated circuits

D. Industry-specific Content and Production

Focus Area: Electronics Industries (Preliminary) (*continued*)

Students learn about:	Students learn to:
<p><i>Input/output devices</i></p> <ul style="list-style-type: none"> • solenoids • stepped motors, free running motors • speakers, buzzers, piezo devices • UHF transmitter receivers • movement/vibration switches • microphones <p><i>Peripherals</i></p> <ul style="list-style-type: none"> • heat sinks/cooling • heat shrink/cable looming • enclosures <p>Processes</p> <ul style="list-style-type: none"> • use of tools and equipment • circuit assembly <ul style="list-style-type: none"> – prototyping techniques – PCB manufacture – component layout – testing fault finding techniques <p>Graphics</p> <ul style="list-style-type: none"> • schematic and circuit symbols • PCB design principles and tools <p>Instruments and test equipment</p> <ul style="list-style-type: none"> • measurement equipment <ul style="list-style-type: none"> – analogue and digital meters, – oscilloscope • testing equipment, eg in-circuit transistor tester • digital simulation of circuits • testing of circuits and models • applications of circuits <ul style="list-style-type: none"> – amplifiers – timers – detectors/sensors • applications of integrated circuits <ul style="list-style-type: none"> – oscillators – op amps – logic gates – displays – counters – programmable ICs 	<ul style="list-style-type: none"> • describe different input/output devices <ul style="list-style-type: none"> • identify peripherals <ul style="list-style-type: none"> • use appropriate tools and equipment in the processes listed • use different circuit assembly techniques • explain single PCB manufacture and component layouts • analyse and interpret schematic diagrams <ul style="list-style-type: none"> • recognise circuit symbols • communicate PCB design principles and use appropriate tools to produce simple circuits • use appropriate test equipment • demonstrate safe working practices in using equipment <ul style="list-style-type: none"> • identify the essential function of amplifiers, timers and detectors/sensors • explain the principles of the operation of integrated circuits • identify the application of ICs

D. Industry-specific Content and Production

Focus Area: Electronics Industries (HSC)

Note: any project using or developing voltages in excess of 32V must be inspected and approved in writing as safe by a qualified and accredited person in accordance with appropriate Australian Standards.

Students learn about:	Students learn to:
<p>Electrical Principles</p> <p><i>Fundamentals</i></p> <ul style="list-style-type: none"> • electrical potential • current flow (AC/DC) • resistance • power • electromagnetism • units and measurement <p><i>Supply and safety</i></p> <ul style="list-style-type: none"> • sources of power • basic safety issues <p><i>Circuitry</i></p> <ul style="list-style-type: none"> • series and parallel circuits • basic calculations <ul style="list-style-type: none"> – Ohm's law – components in series and parallel power <p><i>Digital electronics</i></p> <ul style="list-style-type: none"> • current flow in analogue vs digital electronics • binary numbering system • basic logic gates and truth tables <p><i>Components</i></p> <ul style="list-style-type: none"> • labelling and preferred values of common components • examples and applications of: <ul style="list-style-type: none"> – conductors, insulators, resistors: LDR, thermistor, fixed and variable • capacitors <ul style="list-style-type: none"> – different types, fixed and variable • inductive coils and relays <ul style="list-style-type: none"> – transformers • relays • semiconductors <ul style="list-style-type: none"> – diodes: signal, power, regulator, Light Emitting Diode (LED), light sensitive • transistors: bipolar/Field Effect Transistor (FET) 	<ul style="list-style-type: none"> • apply the fundamentals of electrical principles to projects • select and apply correct units and measurements <ul style="list-style-type: none"> • select and use appropriate sources of power safely and correctly <ul style="list-style-type: none"> • select and correctly apply appropriate circuits to projects • select and apply components to series and parallel circuits • apply Ohm's law to circuitry <ul style="list-style-type: none"> • use analogue and digital circuitry where appropriate • read and apply binary numbering system to digital projects • explain and apply basic logic gates and truth tables • select and competently use conductors, insulators, resistors, both fixed and variable • apply the use of LDR and thermistors • competently use different types of capacitors and semiconductors in practical projects <ul style="list-style-type: none"> • use inductive coils and relays • compare the different types of semiconductors • analyse and apply the most appropriate semiconductors for the production of circuits • discuss and use transistors

D. Industry-specific Content and Production**Focus Area: Electronics Industries (HSC)**

Students learn about:	Students learn to:
<ul style="list-style-type: none"> ● integrated circuits: <ul style="list-style-type: none"> – analogue – digital – microprocessors – VLSI <p><i>Input/output devices</i></p> <ul style="list-style-type: none"> ● solenoids ● stepped motors ● free running motors ● speakers ● buzzers ● piezo devices ● UHF transmitter receivers ● movement/vibration switches ● microphones <p><i>Peripherals</i></p> <ul style="list-style-type: none"> ● heat sinks/cooling ● heat shrink/cable looming ● enclosures <p>Processes</p> <ul style="list-style-type: none"> ● Use of tools and equipment ● Circuit Assembly <ul style="list-style-type: none"> – prototyping techniques – PCB manufacture – component layout – testing, fault finding techniques <p>Graphics</p> <ul style="list-style-type: none"> ● schematic and circuit symbols ● PCB design principles and tools <p>Instruments and Test Equipment</p> <ul style="list-style-type: none"> ● measurement equipment <ul style="list-style-type: none"> – analogue and digital meters – oscilloscope ● testing equipment, e.g. in-circuit transistor tester ● digital simulation of circuits ● testing of circuits and models ● applications of circuits <ul style="list-style-type: none"> – amplifiers, timers, detectors/sensors ● applications of integrated circuits <ul style="list-style-type: none"> – oscillators – op amps – logic gates – displays – counters – programmable ICs 	<ul style="list-style-type: none"> ● competently use a variety of ICs <ul style="list-style-type: none"> ● analyse the various input/output devices and competently select the appropriate one for practical situations ● competently use the correct devices in practical exercises <ul style="list-style-type: none"> ● describe the use of peripherals ● use peripheral materials and components <ul style="list-style-type: none"> ● use a range of tools and equipment during circuit assembly ● apply sound techniques to circuit designs and assemblies ● read and use circuit graphics ● use PCB design ● outsource appropriate expertise where necessary to complement personal practical skills <ul style="list-style-type: none"> ● select and use most appropriate testing equipment and instruments in testing circuits in practical projects <ul style="list-style-type: none"> ● produce appropriate circuitry <ul style="list-style-type: none"> ● apply a variety of ICs in the production of projects

D. Industry-specific Content and Production

Focus Area: Graphics Industries (Preliminary)

Note: Students should develop a series of drawings around a product or theme to gain skills in the areas of engineering, product and architectural drawing. They should complete at least one project or theme in each area.

Students learn about:	Students learn to:
<p>Processes</p> <p><i>Engineering and product drawing</i></p> <ul style="list-style-type: none"> • orthogonal and pictorial details of machine, product components and common appliances <p><i>Architectural drawing</i></p> <ul style="list-style-type: none"> • architectural styles • architectural details <p><i>Freehand drawing</i></p> <ul style="list-style-type: none"> • 2D and 3D <p><i>Pictorial drawing</i></p> <ul style="list-style-type: none"> • isometric • perspective (mechanical and measuring point) <p><i>Principles of planes and coordinates</i></p> <p><i>Presentation techniques</i></p> <ul style="list-style-type: none"> • composition/balance • colour • rendering • modelling <p><i>Computer-generated drawing</i></p> <ul style="list-style-type: none"> • 2D and 3D <p>Principles/standards</p> <ul style="list-style-type: none"> • 3rd and 1st angle projection • AS1100 and AS1100.301 • section drawings • detail drawings • symbols • dimensions • manuscript identification <p>Equipment</p> <ul style="list-style-type: none"> • computer software packages and/or mechanical drafting equipment • photocopiers/printers • laminators 	<ul style="list-style-type: none"> • use drawing instruments and/or CAD and appropriate rendering techniques • develop skills in mechanical and/or computer-generated techniques • produce orthogonal and a range of pictorial drawings to illustrate the shape and features of objects • recognise and sketch examples of Australian architectural styles and details • sketch an overall outline and develop it into freehand orthogonal, isometric, oblique and perspective sketches • construct isometric drawings of simple product parts and architectural details using mechanical and/or CAD techniques • plot or generate mechanical and measuring point perspective drawings and/or a range of computer-generated perspective drawings • use planes and coordinates to plot outlines • recognise and apply good composition and balance in developing well presented drawings • use colour as a means of defining texture, shape and colour of materials • use various materials to construct simple models of design • operate at least one software package to communicate a design solution or design process through text or drawing • interpret 3rd and 1st angle projection from real and pictorially drawn objects • use AS1100 and AS1100.301 requirements by producing orthogonal drawings from engineering/product and architectural themes • use a range of mediums and computer software programs to define and enhance drawings • use a range of equipment appropriate to processes undertaken

D. Industry-specific Content and Production**Focus Area: Graphics Industries (HSC)**

Note: As part of the HSC, the major project should incorporate a set of related drawings around the design and planning of a product or structure.

Students learn about:	Students learn to:
<p>Processes</p> <p><i>Engineering and product drawing</i></p> <ul style="list-style-type: none"> orthogonal and pictorial details of machine, product components and common appliances <p><i>Architectural drawing</i></p> <ul style="list-style-type: none"> architectural styles architectural details <p><i>Freehand drawing</i></p> <ul style="list-style-type: none"> 2D and 3D <p><i>Pictorial drawing</i></p> <ul style="list-style-type: none"> isometric perspective (mechanical and measuring point) <p><i>Principles of planes and coordinates</i></p> <p><i>Presentation techniques</i></p> <ul style="list-style-type: none"> composition/balance colour rendering modelling <p><i>Computer-generated drawing</i></p> <p>Principles/standards</p> <ul style="list-style-type: none"> 3rd and 1st angle projection AS1100 and AS1100.301 section drawings detail drawings symbols dimensions working and presentation (orthogonal) drawings <p>Equipment</p> <ul style="list-style-type: none"> computer software packages and/or mechanical drafting equipment photo copiers/printers laminators 	<ul style="list-style-type: none"> use orthogonal and a range of pictorial drawing types to communicate design ideas and solutions analyse and use Australian architecture styles if applicable to projects undertaken use architectural details of timber, brick veneer and solid brick domestic construction where applicable to projects undertaken use freehand orthogonal and appropriate pictorial sketches to communicate design ideas as needed in the production of projects use appropriate pictorial drawings to illustrate aspects of projects undertaken use planes and coordinates to plot computer generated or mechanically drawn outlines of intended designs wherever relevant to projects undertaken produce well composed and balanced drawings using colour and rendering appropriate to the needs of the projects produced construct models of intended design solutions use computer generated graphics to communicate some aspects of the major project select and use relevant drawing standards in producing drawings produce working and presentation drawings in accordance with appropriate standards use a range of mediums and computer software programs to define and enhance drawings where necessary in the production of projects experience a range of equipment appropriate to processes used

D. Industry-specific Content and Production

Focus area: Metals and Engineering Industries (Preliminary)

Note: Teachers must adequately supervise the design and manufacture of projects where welding is involved. Design of welded projects must consider loadings and weld positioning. The structural design should be such that the welds do not carry the full load.

Students learn about:	Students learn to:
<p>Materials</p> <p><i>Ferrous and non-ferrous metals in common use, including:</i></p> <ul style="list-style-type: none"> • solid sections • tubes • sheet materials • preformed sections, eg weldmesh • extruded sections <p><i>Fittings and allied materials</i></p> <ul style="list-style-type: none"> • fasteners • mechanical joints • hardware items • adhesives/sealants <p>Processes, tools and machinery</p> <p><i>Processes</i></p> <p>Skills and methods used in:</p> <ul style="list-style-type: none"> • marking out • cutting • machining • fabrication • joining • casting • modification of properties • finishing <p><i>Tools and machinery</i></p> <ul style="list-style-type: none"> • the use and maintenance of the tools and machinery involved in the processes listed above 	<ul style="list-style-type: none"> • recognise and use a range of ferrous and non-ferrous metals • discuss the uses of the various shapes and forms of sheets, bars and tubes <ul style="list-style-type: none"> • describe the range of fittings and allied materials available • identify the range of appropriate fasteners, adhesives and sealants available <ul style="list-style-type: none"> • engage in a broad range of processes through a variety of practical projects • use the appropriate industry processes, where possible, in the production of projects • gain an awareness of processes used in industry, appropriate to the practical activities being undertaken, which may not be possible in the school environment • identify and apply appropriate finishes to completed projects • use the various techniques to modify the properties of metals <ul style="list-style-type: none"> • experience a range of machines appropriate to processes used • safely use tools and machinery • perform basic maintenance procedures on tools and machinery • identify tools and machinery used by industry, not available in the school environment, but appropriate to the practical activities being undertaken

D. Industry-specific Content and Production

Focus Area: Metals and Engineering Industries (HSC)

Note: Teachers must adequately supervise the design and manufacture of projects where welding is involved. Design of welded projects must consider loadings and weld positioning. The structural design should be such that the welds do not carry the full load.

Students learn about:	Students learn to:
<p>Materials</p> <p><i>Ferrous and non-ferrous metals in common use, including:</i></p> <ul style="list-style-type: none"> • solid sections • tubes • sheet materials • preformed sections, eg weldmesh • extruded sections <p><i>Fittings and allied materials</i></p> <ul style="list-style-type: none"> • fasteners • mechanical joints • hardware items • adhesives/sealants <p>Processes, tools and machinery</p> <p><i>Processes</i> Skills and methods used in:</p> <ul style="list-style-type: none"> • marking out • cutting • machining • fabrication • joining • casting • modification of properties • finishing <p><i>Tools and machinery</i></p> <ul style="list-style-type: none"> • the use and maintenance of the tools and machinery involved in the processes listed above. 	<ul style="list-style-type: none"> • select and justify the most appropriate material/s for use in the production of projects • select, for use in practical projects, the most suitable of the various shapes and forms of sheets, bars and tubes • choose the most appropriate items from the range of fittings and allied materials available • select and use appropriate fasteners, adhesives and sealants • competently perform the range of processes, through practical experiences, which are required for the production work undertaken • select and use appropriate industrial processes, where possible, in the production of projects • describe processes used in industry, appropriate to the practical activities being undertaken, which may not be possible in the school environment • outsource appropriate expertise where necessary to complement personal practical skills • identify and apply quality finishes to completed projects • apply techniques to modify the properties of metals appropriate to the practical projects being undertaken • use machines appropriate to processes undertaken • use tools and machinery safely and correctly • perform maintenance procedures on tools and machinery • describe tools and machinery used by industry, not available in the school environment, but appropriate to the practical activities being undertaken

D. Industry-specific Content and Production

Focus Area: Multimedia Industries (Preliminary)

Students learn about:	Students learn to:
<p>Processes, tools and machines</p> <p><i>Tools and machines</i></p> <ul style="list-style-type: none"> • computers capable of multimedia • colour printers • colour scanners • appropriate software relevant to the project in the areas of authoring, publishing, sound editing, image editing, 2D/3D drawing, web page design • access to additional equipment that allows the relevant projects to be undertaken, to include modem, CD writer, digital camera, video and in and out cards etc <p><i>Processes</i></p> <ul style="list-style-type: none"> • storyboarding in relation to: <ul style="list-style-type: none"> – information – entertainment – training and development – marketing • image creation/editing • sound creation/editing • publishing/page layout • authoring • copyright <p>Materials and resources</p> <ul style="list-style-type: none"> • file formats/compatibility • image formats • pictorial 2D/3D • video formats • text creation/formats/importing • sound files • world wide web resources • paper types and print resolution • digital libraries (clip art, fonts, images, photos, sounds) 	<ul style="list-style-type: none"> • identify computers and related systems, both input and output • describe multimedia software and related memory, processing and storage requirements • identify and use input and output devices in conjunction with specific multimedia software <ul style="list-style-type: none"> • identify and use planning processes related to a range of multimedia presentations • discuss the processes of obtaining, creating and modifying images, sound and text • discuss ethical constraints in authoring and copyright <ul style="list-style-type: none"> • discuss a wide range of industry terminology and its application to multimedia • use presentation techniques and strategies in multimedia

D. Industry-specific Content and Production

Focus Area: Multimedia Industries (HSC)

Students learn about:	Students learn to:
<p>Processes, tools and machines</p> <p><i>Tools and machines</i></p> <ul style="list-style-type: none"> • computers capable of multimedia • colour printers • colour scanners • appropriate software relevant to the project in the areas of authoring, publishing, sound editing, image editing, 2D/3D drawing, web page design • access to additional equipment that allows the relevant projects to be undertaken, to include modem, CD writer, digital camera, video and in and out cards etc <p><i>Processes</i></p> <ul style="list-style-type: none"> • storyboarding in relation to: <ul style="list-style-type: none"> – information – entertainment – training and development – marketing • image creation/editing • sound creation/editing • publishing/page layout • authoring • copyright <p>Materials and resources</p> <ul style="list-style-type: none"> • file formats/compatibility • image formats • pictorial 2D/3D • video formats • text creation/formats/importing • sound files • world wide web resources • paper types and print resolution • digital libraries (clip art, fonts, images, photos, sounds) 	<ul style="list-style-type: none"> • select and justify an appropriate computer system for use in the production of projects • select and use a suitable software package and identify requirements of memory, processing speed, storage and peripherals to complete a selected project <ul style="list-style-type: none"> • competently plan all processes and stages required to complete selected projects • obtain, create and modify images, sound and text • apply ethical constraints relating to authoring and copyright • outsource appropriate expertise where necessary to complement personal practical skills <ul style="list-style-type: none"> • select from a wide range of industry techniques and strategies and apply them in the production and presentation of the major project

D. Industry-specific Content and Production

Focus Area: Plastics Industries (Preliminary)

Students learn about:	Students learn to:
<p>Materials</p> <ul style="list-style-type: none"> • glues and resins • gelcoats and flow coats • paints • foams and sheets • pelletised forms • plastisols • extrusions and hollow sections • threads and woven fabrics <p><i>Fittings and allied materials</i></p> <ul style="list-style-type: none"> • fasteners • solvents • mould releases • waxes and wax additives • polishes • pigments • exotic fabrics • commercial attachments • reinforcing materials <p>Processes, tools and machinery</p> <p><i>Processes</i></p> <p>Skills and methods used in:</p> <ul style="list-style-type: none"> • marking out and cutting • shaping, machining, fabricating • heat forming • finishing • casting • laying up • plug and mould production • sandwich construction • vacuum bagging • injection moulding • rotational moulding • blow and vacuum moulding • extrusion • fluidising • heat welding <p><i>Tools and machinery</i></p> <ul style="list-style-type: none"> • the use and maintenance of the tools and machinery involved in the processes listed above 	<ul style="list-style-type: none"> • recognise and use a range of materials related to the manipulation of wet and dry plastics • handle and use plastic materials safely • describe the properties and uses of a range of materials <ul style="list-style-type: none"> • identify the range of fittings and allied materials available • discuss the use of fittings and allied materials used in the plastics industry • describe the hazards associated with these materials and fittings <ul style="list-style-type: none"> • engage in a broad range of processes through a variety of practical projects • safely use appropriate industry processes where possible in the production of projects • gain an awareness of processes used in industry, appropriate to the practical activities being undertaken, which may not be possible in the school environment • identify and apply appropriate finishes to completed projects <ul style="list-style-type: none"> • safely use machines and tools appropriate to processes undertaken • describe tools and machines used by industry, not available in the school environment, but appropriate to the practical activities being undertaken • perform basic maintenance procedures on tools and machinery

D. Industry-specific Content and Production

Focus Area: Plastics Industries (HSC)

Students learn about:	Students learn to:
<p>Materials</p> <ul style="list-style-type: none"> • glues and resins • gelcoats and flow coats • paints • foams and sheets • pelletised forms • plastisols • extrusions and hollow sections • threads and woven fabrics <p><i>Fittings and allied materials</i></p> <ul style="list-style-type: none"> • fasteners • solvents • mould releases • waxes and wax additives • polishes • pigments • exotic fabrics • commercial attachments • reinforcing materials <p>Processes, tools and machinery</p> <p><i>Processes</i></p> <p>Skills and methods used in:</p> <ul style="list-style-type: none"> • marking out and cutting • shaping, machining, fabricating • heat forming • finishing • casting • laying up • plug and mould production • sandwich construction • vacuum bagging • injection moulding • rotational moulding • blow and vacuum moulding • extrusion • fluidising • heat welding <p><i>Tools and machinery</i></p> <ul style="list-style-type: none"> • the use and maintenance of the tools and machinery involved in the processes listed above 	<ul style="list-style-type: none"> • select and justify the most appropriate materials for use in the production of projects • competently use and handle materials • describe the properties and uses of a range of materials <ul style="list-style-type: none"> • choose the most appropriate items from the range available for the production of projects • competently use and justify the selection of composite materials <ul style="list-style-type: none"> • competently perform the range of processes, through practical experiences, which are required for the production work undertaken • select and use appropriate industrial processes, where possible, in the production of projects • discuss processes used in industry, appropriate to the practical activities being undertaken, which are not possible in the school environment • identify and apply appropriate quality finishing techniques to completed projects • outsource appropriate expertise where necessary to complement personal practical skills <ul style="list-style-type: none"> • safely use machines, tools, and equipment appropriate to the processes undertaken • perform basic maintenance procedures on tools and machinery • describe tools and machinery used by industry, not available in the school environment, but appropriate to the practical activities being undertaken

D. Industry-specific Content and Production

Focus Area: Timber Products and Furniture Industries (Preliminary)

Students learn about:	Students learn to:
<p>Materials</p> <p><i>Timber and timber products</i></p> <ul style="list-style-type: none"> • selection, sizing • manufactured boards <p><i>Fittings and allied materials</i></p> <ul style="list-style-type: none"> • cabinet hardware • composite materials • glass, metal, polymers • upholstery materials • mechanical fasteners • adhesives <p>Processes, tools and machinery</p> <p><i>Processes</i></p> <ul style="list-style-type: none"> • component manufacturing • carcass construction • framing • assembly • fabrication • laminating • finishing <p><i>Tools and machinery</i></p> <ul style="list-style-type: none"> • the use and maintenance of the tools and machinery involved in the processes listed above 	<ul style="list-style-type: none"> • identify the range of available timber and timber products • discuss the timber industry terms in relation to sizing and selection • describe the range of manufactured boards available • identify the various uses for the available range of cabinet hardware and fasteners • describe the composite materials used in the Focus area industries • identify and select appropriate adhesives <ul style="list-style-type: none"> • use a broad range of processes through a variety of practical projects • identify and apply appropriate finishes to completed projects • use the appropriate industry processes, where possible, in the production of projects • discuss processes used in industry, appropriate to the practical activities being undertaken, which may not be possible in the school environment <ul style="list-style-type: none"> • competently use as wide a range of machines as available equipment allows • safely and correctly use tools and machinery • perform basic maintenance procedures on tools and machinery • describe tools and machinery used by industry, not available in the school environment, but appropriate to the practical activities being undertaken

D. Industry-specific Content and Production

Focus Area : Timber Products and Furniture Industries (HSC)

Students learn about:	Students learn to:
<p>Materials</p> <p><i>Timber and timber products</i></p> <ul style="list-style-type: none"> • selection, sizing • manufactured boards <p><i>Fittings and allied materials</i></p> <ul style="list-style-type: none"> • cabinet hardware • composite materials • glass, metal, polymers • upholstery materials • mechanical fasteners • adhesives <p>Processes, tools and machinery</p> <p><i>Processes</i></p> <ul style="list-style-type: none"> • component manufacturing • carcass construction • framing • assembly • fabrication • laminating • finishing <p><i>Tools and machinery</i></p> <ul style="list-style-type: none"> • the use and maintenance of the tools and machinery involved in the processes listed above 	<ul style="list-style-type: none"> • apply timber industry terms related to selection and sizing • select and use the most appropriate manufactured boards • select and competently use cabinet hardware and mechanical fasteners • competently use and justify the selection of composite materials • select and use the most appropriate adhesives • competently perform the range of processes, through practical experiences, which are required for the production work undertaken • select and apply quality finishes • outsource appropriate expertise where necessary to complement personal practical skills • select and competently use the most appropriate tools and machinery • recognise the need for and perform maintenance procedures, where necessary, on tools and machinery

10 Course Requirements

The course requirements are:

- a Preliminary and HSC course, each of 120 hours indicative time.
- exclusions exist between Industrial Technology and some Vocational Education and Training Curriculum Frameworks, and some Content Endorsed Courses. For details of these exclusions refer to the current ACE Manual.

The Preliminary course, of 120 indicative hours, consists of project work and an industry study that provide a broad range of skills and knowledge related to the focus area chosen and an introduction to industrial processes and practices.

The HSC course, of 120 indicative hours, consists of the development of a major project and industry study.

Students choose to study ONE of EIGHT focus areas. The same area is to be studied in both the Preliminary and HSC courses. The focus areas are:

- Automotive Industries
- Building and Construction Industries
- Electronics Industries
- Graphics Industries
- Metal and Engineering Industries
- Multimedia Industries
- Plastics Industries
- Timber Products and Furniture Industries.

Both the Preliminary and HSC courses are organised around four sections:

- A. Industry study
- B. Design and management
- C. Workplace communication
- D. Industry-specific content and production.

11 Post-school Opportunities

The study of Industrial Technology Stage 6 provides students with knowledge, understanding and skills that form a valuable foundation for a range of courses at university and other tertiary institutions.

In addition, the study of Industrial Technology Stage 6 assists students to prepare for employment and full and active participation as citizens. In particular, there are opportunities for students to gain recognition in vocational education and training. Teachers and students should be aware of these opportunities.

11.1 Recognition of Student Achievement in Vocational Education and Training (VET)

Wherever appropriate, the skills and knowledge acquired by students in their study of HSC courses should be recognised by industry and training organisations. Recognition of student achievement means that students who have satisfactorily completed HSC courses will not be required to repeat their learning in courses in TAFE NSW or other Registered Training Organisations (RTOs).

Registered Training Organisations, such as TAFE NSW, provide industry training and issue qualifications within the Australian Qualifications Framework.

The degree of recognition available to students in each subject is based on the similarity of outcomes between HSC courses and industry training packages endorsed within the Australian Qualifications Framework (AQF). Training packages are documents that link an industry's competency standards to AQF qualifications. More information about industry training packages can be found on the National Training Information Service (NTIS) website (www.ntis.gov.au).

Recognition by TAFE NSW

TAFE NSW conducts courses in a wide range of industry areas, as outlined each year in the *TAFE NSW Handbook*. Under current arrangements, the recognition available to students of Industrial Technology in relevant courses conducted by TAFE is described in the *HSC/TAFE Credit Transfer Guide*. This guide is produced by the Board of Studies and TAFE NSW and is distributed annually to all schools and colleges. Teachers should refer to this guide and be aware of the recognition available to their students through the study of Industrial Technology Stage 6. This information can be found on the TAFE NSW website (www.tafensw.edu.au/mchoice).

Recognition by other Registered Training Organisations

Students may also negotiate recognition into a training package qualification with another Registered Training Organisation. Each student will need to provide the RTO with evidence of satisfactory achievement in Industrial Technology Stage 6 so that the degree of recognition available can be determined.

12 Assessment and Reporting

12.1 Requirements and Advice

The information in this section of the syllabus relates to the Board of Studies' requirements for assessing and reporting achievement in the Preliminary and HSC courses for the Higher School Certificate.

Assessment is the process of gathering information and making judgements about student achievement for a variety of purposes.

In the Preliminary and HSC courses, those purposes include:

- assisting student learning
- evaluating and improving teaching and learning programs
- providing evidence of satisfactory achievement and completion in the Preliminary course
- providing the Higher School Certificate results.

Reporting refers to the Higher School Certificate documents received by students that are used by the Board to report both the internal and external measures of achievement.

NSW Higher School Certificate results will be based on:

- **an assessment mark** submitted by the school and produced in accordance with the Board's requirements for the internal assessment program
- **an examination mark** derived from the HSC external examinations.

Results will be reported using a course report containing a performance scale with bands describing standards of achievement in the course.

The use of both internal assessment and external examinations of student achievement allows measures and observations to be made at several points and in different ways throughout the HSC course. Taken together, the external examinations and internal assessment marks provide a valid and reliable assessment of the achievement of the knowledge, understanding and skills described for each course.

Standards Referencing and the HSC

The Board of Studies will adopt a standards-referenced approach to assessing and reporting student achievement in the Higher School Certificate Examination.

The standards in the HSC are:

- the knowledge, skills and understanding expected to be learned by students – the *syllabus standards*
- the levels of achievement of the knowledge, skills and understanding – the *performance standards*.

Both *syllabus standards* and *performance standards* are based on the aims, objectives, outcomes and content of a course. Together they specify what is to be learned and how well it is to be achieved.

Teacher understanding of standards comes from the set of aims, objectives, outcomes and content in each syllabus together with:

- the performance descriptions that summarise the different levels of performance of the course outcomes
- HSC examination papers and marking guidelines
- samples of students' achievement on assessment and examination tasks.

12.2 Internal Assessment

The internal assessment mark submitted by the school will provide a summation of each student's achievements measured at points throughout the course. It should reflect the rank order and relative differences between students' achievements.

Internal assessment provides a measure of a student's achievement based on a wider range of syllabus content and outcomes than may be covered by the external examination alone.

The assessment components, weightings and task requirements to be applied to internal assessment are identified on page 43. They ensure a common focus for internal assessment in the course across schools, while allowing for flexibility in the design of tasks. A variety of tasks should be used to give students the opportunity to demonstrate outcomes in different ways and to improve the validity and reliability of the assessment.

12.3 External Examinations

In Industrial Technology Stage 6 the external examinations include a written paper and a major project for external marking. The specifications for the examination in Industrial Technology Stage 6 are on page 45.

The external examination provides a measure of student achievement in a range of syllabus outcomes that can be reliably measured in an examination setting.

The external examination and its marking and reporting will relate to syllabus standards by:

- providing clear links to syllabus outcomes
- enabling students to demonstrate the levels of achievement outlined in the course performance scale
- applying marking guidelines based on established criteria.

12.4 Board Requirements for the Internal Assessment Mark in Board Developed Courses

For each course, the Board requires schools to submit an assessment mark for each candidate.

The collection of information for the HSC internal assessment mark must not begin prior to the completion of the Preliminary course.

The Board requires that the assessment tasks used to determine the internal assessment mark must comply with the components, weightings and types of tasks specified in the table on page 43.

Schools are required to develop an internal assessment program that:

- specifies the various assessment tasks and the weightings allocated to each task
- provides a schedule of the tasks designed for the whole course.

The school must also develop and implement procedures to:

- inform students in writing of the assessment requirements for each course before the commencement of the HSC course
- ensure that students are given adequate written notice of the nature and timing of assessment tasks
- provide meaningful feedback on students' performance in all assessment tasks
- maintain records of marks awarded to each student for all assessment tasks
- address issues relating to illness, misadventure and malpractice in assessment tasks
- address issues relating to late submission and non-completion of assessment tasks
- advise students in writing if they are not meeting the assessment requirements in a course and indicate what is necessary to enable the students to satisfy the requirements
- inform students about their entitlements to school reviews and appeals to the Board
- conduct school reviews of assessments when requested by students
- ensure that students are aware that they can collect their Rank Order Advice at the end of the external examinations at their school.

12.5 Assessment Components, Weightings and Tasks

Assessment should include a range of tasks.

Preliminary Course

The suggested components, weightings and tasks for the Preliminary course are set out below.

Component	Weighting	Tasks might include:
Industry study	20	Tasks might include: <ul style="list-style-type: none"> • research • industry report • partial design, management reports • tests • measuring and costing activities • working drawings • folio presentation • written tests • practical skills test • research relevant industrial processes
Design and management	20	
Workplace communication	10	
Industry-specific content and production	50	
Marks	100	

There should be a balance between the assessment of:

- knowledge and understanding outcomes and course content and
- skills outcomes and course content.

HSC Course

The internal assessment mark for Industrial Technology Stage 6 is to be based on the HSC course only. Final assessment should be based on a range and balance of assessment instruments. Aspects of the Major Project that are used for school-based assessment should not use the HSC examination marking criteria for internal assessment.

Component	Weighting	Tasks might include:
Industry study	20	Tasks might include: <ul style="list-style-type: none"> • broad industry report • document research activities • computer applications relevant to folio development • research and application of a range of processes and technologies to the development of the project
Design and management	20	
Workplace communication	10	
Industry-specific content and production	50	
Marks	100	

There should be a balance between the assessment of:

- knowledge and understanding outcomes and course content
and
- skills outcomes and content.

One task may be used to assess several components. It is suggested that 3–5 tasks are sufficient to assess the HSC course outcomes.

12.6 HSC External Examination Specifications

Industrial Technology Stage 6

The examination will consist of a written paper worth 40% and a Major Project worth 60%. The written paper will be marked out of 100.

Written Paper *(100 marks)*

Time allowed: 1 1/2 hours (plus 5 minutes reading time)

- There will be a separate written paper for each of the eight Industry Focus Areas.
- The written paper will consist of TWO sections: Section I and Section II.
- Students will be required to answer FIVE questions, THREE from Section I and TWO from Section II.
- All questions are compulsory.
- All questions must be answered in the spaces provided on the examination paper.

Section I *(60 marks)*

- There will be THREE questions.
- The first TWO questions will be based on the outcomes relevant to the Industry Study and Design and Management sections of the course, and will have a common format in all the papers.
- Question 3 will be based on the Workplace Communication section of the course. It will address similar outcomes in all papers but will be specific to the Industry Focus Area.

Section II *(40 marks)*

- There will be TWO questions.
- Both questions are of equal value.
- The questions in this section are specific to the Industry Focus Area.

The Major Project (60 marks)

The major project is the principal means of examining the outcomes of the HSC course, including the content of the candidate's identified focus area.

Each candidate must present a major project consisting of a product and an accompanying management folio, which will be examined in conjunction with one another by Board of Studies appointed examiners.

The major project must be completed by a date to be notified annually by the Office of the Board of Studies. It is not to be commenced until the beginning of the HSC course.

The Major Project:

- (i) may consist of one or more related items and must be individually produced by the candidate. Group projects are not permitted
- (ii) must be certified on the appropriate form, provided by the Board of Studies, as the original work of the candidate and be identifiable only through the candidate and centre numbers
- (iii) may have parts completed by the candidate externally to the school. These must be monitored by the supervising teacher and documented in the folio to ensure certification as to being the original work of the candidate.

Any aspect of the major project undertaken by other persons or agencies must be documented in the folio. Candidates will not be given credit for work completed by others

- (iv) must include evidence of the range and depth of skills and knowledge developed in the course
- (v) may incorporate materials, processes and components drawn from other focus areas where appropriate
- (vi) must include a management folio where the use of computer software applications is evident.

The management folio will document the development of the project. Included in the folio will be a statement of intent and details relating to design, planning, management, Workplace communication and evidence of skills and knowledge associated with the focus areas.

The examiners have the right to call for a demonstration of particular aspects of the major project. This must be provided by a person other than the candidate responsible for the major project.

Major Project Examination Criteria

The major project consists of a product and a folio, which will be examined in conjunction with one another. The criteria for examining the major project are shown below:

Marks	Criteria	Description
20	Design and management	<ul style="list-style-type: none"> • statement of intent • research • development of ideas • selection and justification of materials, components, processes and other resources • timeline plan – projected order of production and estimate of time allocation • finance plan – projected cost of materials and services (if applicable) • use of appropriate industrial processes and equipment • evidence of safe working practices and OH&S issues
	Workplace communication	Documentation of the major project from conception to completion including: <ul style="list-style-type: none"> • evidence of ongoing evaluation • appropriateness of design and/or design modification • student's evaluation of the major project and its relationship to the statement of intent • evidence of a range of communication techniques • evidence of a range of computer applications, eg word processing, spreadsheets, CAD, multimedia
40	Production	<ul style="list-style-type: none"> • quality of the product • evidence of a range of skills • degree of difficulty • links between planning and production • evidence of industrial processes • use of appropriate materials • use of industrial technologies • evidence of solutions to problems in production

12.7 Summary of Internal and External Assessment

External Assessment	Weighting	Internal Assessment	Weighting
Written Paper Design and management, Industry Study and Workplace Communication – short structured responses Industries focus areas – short structured responses	24	Industry study	20
		Design, planning and management	20
	16	Workplace communication	10
		Industry-specific content	50
The major project – a product and accompanying management folio	60		
	100		100

12.8 Reporting Student Performance against Standards

Student performance in an HSC course will be reported against standards on a course report. The course report contains a performance scale for the course describing levels (bands) of achievement, an HSC examination mark and the internal assessment mark. It will also show, graphically, the statewide distribution of examination marks of all students in the course.

Each band on the performance scale (except for band 1), includes descriptions that summarise the attainments typically demonstrated in that band.

The distribution of marks will be determined by students' performances against the standards and not scaled to a predetermined pattern of marks.