介紹補充資料的內容
Introduction to the Content of the Supplementary Notes

樣本試題
Sample Examination Questions

13.3.2021

《設計與應用科技課程及評估指引(中四至中六)—補充資料》簡介會(新辦)
Briefing Session on the "Design and Applied Technology (DAT) Curriculum and Assessment Guide (Secondary 4 to 6) Supplementary Notes" (New)

必修部分：學習範疇二–科技原理
Compulsory part:
Strand 2 - Technological Principles

設計與應用科技課程及評估指引（中四至中六）2015 (摘錄)
DAT C&A Guide (S4-6) 2015 (extract)

課題 學生應可學習到 **Topics** Students should learn	**成果** 學生應能 **Outcomes** Students should be able to	**說明** Explanatory notes
科技的本質 • 創新與科技 • 能量與能源 • 材料及標準元件	18. ... 19. ... 20. ... 21. 了解常用材料的性質	• 探索並描述材料的性質（例如物質的結構、結合、應力及應變）包括塑膠/木材/金屬/陶器 • 使用合適的材料和標準元件來設計及製造產品（例如螺栓及螺帽）
Nature of technology • Innovation and technology • Energy and energy resources • Materials and standard components	18. ... 19. ... 20. ... 21. Understand the properties of commonly used materials	• Explore and describe material properties (e.g. the structure of matter, bonding, and stress and strain) of plastics/ wood/ metal/ ceramic • Design and make products using appropriate materials and standard components (e.g. bolt and nut)

設計與應用科技課程及評估指引（中四至中六）2015 (摘錄)
DAT C&A Guide (S4-6) 2015 (extract)

課題 學生應可學習到 **Topics** Students should learn	**成果** 學生應能 **Outcomes** Students should be able to	**說明** Explanatory notes
生產程序 • 健康和工業安全 • 工具、設備及機械 • 製造系統	22. … 23. … 24. 執行合適的製作程序	• 應用適當的工具於材料加工，包括成形（例如銼削和鍛造）、接合（例如鉚接和上螺釘），機器加工（例如鑽孔、車削，鐳射切割，真空成形）和表面處理（例如塗層、上漆）
Production process • Health and industrial safety • Tools, equipment and machineries • Manufacturing systems	22. … 23. … 24. Execute appropriate fabrication processes	• Apply appropriate tools in the shaping (e.g. filing and forging), joining (e.g. riveting and screwing), machining (e.g. drilling, turning, laser cutting and vacuum forming) and finishing (e.g. coating and painting) of materials

設計與應用科技課程及評估指引（中四至中六）2015 (摘錄)
DAT C&A Guide (S4-6) 2015 (extract)

課題 學生應可學習到 **Topics** Students should learn	**成果** 學生應能 **Outcomes** Students should be able to	**說明** Explanatory notes
系統及控制 • 輸入 – 處理 – 輸出 • 邏輯門 • 機械系統 • 實體結構 • 基本電子學	26. … 27. … 28. … 29. 應用機械概念知識於設計、製作、及控制系 30. … 31. …	• 設計一個機械玩具時，建議合適類型的控制、傳輸系統和運動變換（例如連杆、凸輪和隨動件、滑塊曲柄機構、齒條和齒輪、棘輪和棘爪）
Systems and control • Input-Process-Output • Logic gates • Mechanical systems • Physical structure • Basic electronics	26. … 27. … 28. … 29. Apply knowledge/concepts of mechanics in design, fabrication and control of systems 30. … 31. …	• Propose suitable types of control, transmission systems and motion conversion (e.g. linkage, cam and follower, slider crank, rack and pinion, and ratchet and pawl) in designing a mechanical toy

選修部分：單元三–設計實踐及材料處理
Elective part: Module 3 - Design Implementation & Material Processing

設計與應用科技課程及評估指引（中四至中六）2015 (摘錄)
DAT C&A Guide (S4-6) 2015 (extract)

課題 學生應可學習到 **Topics** Students should learn	**成果** 學生應能 **Outcomes** Students should be able to	**說明** Explanatory notes
材料、元件及系統 • 材料的特性和選擇 • 材料及結構 • 機械組織 • 新興材料	1. 了解材料和元件的選擇會受材料本質和工作特性影響 2. … 3. 懂得在控制系統內使用機械組織 4. …	• 在設計、製作和控制等個別層面上，探索各種材料的應用 • 利用簡單運算方式計算一個機械系統的機械利益、速度比、效率及扭矩
Materials, components and systems • Properties and choice of materials • Materials and structures • Mechanisms • New materials	1. Understand that properties and working characteristics influence the choice of materials and components 2. … 3. Apply mechanisms for control systems 4. …	• Explore various materials for particular applications in design, fabrication and control • Apply simple calculations to determine the mechanical advantage (M.A.), velocity ratio (V.R.), efficiency and torque of a mechanical system

設計與應用科技課程及評估指引（中四至中六）2015 (摘錄)
DAT C&A Guide (S4-6) 2015 (extract)

課題 學生應可學習到 **Topics** Students should learn	**成果** 學生應能 **Outcomes** Students should be able to	**說明** Explanatory notes
生產程序及製造 • 製造程序及技術 • 生產規模 • 質量保證與質量控制	5. 挑選、解釋及執行適當的製造程序與技術 6. … 7. …	• 建議適合的製造程序（例如人手或自動化、夾具、刀具、機械及儀器、構成作業、成形及模塑、表面處理）
Processing and manufacturing • Manufacturing processes and techniques • Scale of production • Quality assurance and quality control	5. Select, explain and execute appropriate manufacturing processes and techniques 6. … 7. …	• Suggest appropriate manufacturing processes for production (e.g. manual or automated, jig and fixture, tools, machinery and equipment, fabrication processes, forming and moulding, and finishing processes)

於[　　]內的項目表示學生只需指出其名稱及意識到其於設計和製造過程中的應用。

For items marked within [　　], students are only required to name and be aware of their application in the design and make processes.

材料 Materials

於 [ ] 內的項目表示學生只需指出其名稱及意識到其於設計和製造過程中的應用。
For items marked within [ ], students are only required to name and be aware of their application in the design and make processes.

木材

- 軟木: 松木、 杉木、 [柏木]
- 硬木: 飛機木、 櫸木、 樺木、 橡木、 山樟、 柚木、 白楊木、 [櫻桃木、 桃花心木、 胡桃木]
- 人造板材: 大芯夾板、 刨花板、 中密度纖維板 (MDF)、 夾板

Woods

- Softwoods: pine, spruce, [cedar]
- Hardwoods: balsa, beech, birch, oak, san cheong, teak, poplar, [cherry, mahogany, walnut]
- Manufactured boards: blockboard, particle board, medium-density fibreboard (MDF), plywood

材料 Materials

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金屬

- 含鐵金屬及合金: 鑄鐵、 碳鋼、 軟鋼、 不銹鋼、 鍍鋅鋼、 [高速鋼、 工具鋼]
- 非含鐵金屬及合金: 鋁、 黃銅、 青銅、 紅銅、 鉛、 錫、 鋅、 [杜拉鋁、 碳化鎢]

Metals

- Ferrous and its alloys: cast iron, carbon steel, mild steel, stainless steel, galvanised steel, [high speed steel, tool steel]
- Non-ferrous and its alloys: aluminium, brass, bronze, copper, lead, tin, zinc, [duralumin, tungsten carbide]

材料

於 [ ] 內的項目表示學生只需指出其名稱及意識到其於設計和製造過程中的應用。

聚合物

- 熱塑性塑料: 丙烯腈-丁二烯-苯乙烯共聚物(ABS)、亞加力/聚甲基丙烯酸甲酯(PMMA)、尼龍/聚醯胺(PA)、聚對苯二甲酸乙二酯(PET)、聚丙烯(PP)、聚苯乙烯(PS)、發泡膠/泡沫聚苯乙烯(EPS)、高密度發泡膠/擠塑聚苯乙烯(XPS)、聚氯乙烯(PVC)、[高密度聚乙烯(HDPE)、低密度聚乙烯(LDPE)、聚碳酸酯(PC)、鐵氟龍/聚四氟乙烯(PTFE)、聚乳酸(PLA)、賽鋼/聚甲醛(POM)]
- 熱固性塑料: 環氧樹脂 (ER)、水晶膠/聚酯樹脂 (PR)、聚氨基甲酸酯 (PU)、脲甲醛 (UF) 樹脂
- 彈性體: 合成橡膠、矽膠

Materials

For items marked within [ ], students are only required to name and be aware of their application in the design and make processes.

Polymers

- Thermoplastics: acrylonitrile butadiene styrene (ABS), acrylic/polymethyl methacrylate (PMMA), nylon/polyamide (PA), polyethylene terephthalate (PET), polypropylene (PP), polystyrene, (PS), expanded polystyrene (EPS), extruded polystyrene (XPS), polyvinyl chloride (PVC), [high-density polyethylene (HDPE), low-density polyethylene (LDPE), polycarbonate (PC), Teflon/polytetrafluoroethylene (PTFE), polylactic acid (PLA), polyoxymethylene (POM)]
- Thermosetting plastics: epoxy resin (ER), polyester resin (PR), polyurethane (PU), urea-formaldehyde (UF) resin
- Elastomer: synthetic rubber, silicon rubber

材料

於 [ ] 內的項目表示學生只需指出其名稱及意識到其於設計和製造過程中的應用。

聚合物

- 熱塑性塑料: 丙烯腈-丁二烯-苯乙烯共聚物(ABS)、亞加力/聚甲基丙烯酸甲酯(PMMA)、尼龍/聚醯胺(PA)、聚對苯二甲酸乙二酯(PET)、聚丙烯(PP)、聚苯乙烯(PS)、發泡膠/泡沫聚苯乙烯(EPS)、高密度發泡膠/擠塑聚苯乙烯(XPS)、聚氯乙烯(PVC)、[高密度聚乙烯(HDPE)、低密度聚乙烯(LDPE)、聚碳酸酯(PC)、鐵氟龍/聚四氟乙烯(PTFE)、聚乳酸(PLA)、賽鋼/聚甲醛(POM)]
- 熱固性塑料: 環氧樹脂 (ER)、水晶膠/聚酯樹脂 (PR)、聚氨基甲酸酯 (PU)、脲甲醛 (UF) 樹脂
- 彈性體: 合成橡膠、矽膠

Materials

For items marked within [ ], students are only required to name and be aware of their application in the design and make processes.

Polymers

- Thermoplastics: acrylonitrile butadiene styrene (ABS), acrylic/polymethyl methacrylate (PMMA), nylon/polyamide (PA), polyethylene terephthalate (PET), polypropylene (PP), polystyrene, (PS), expanded polystyrene (EPS), extruded polystyrene (XPS), polyvinyl chloride (PVC), [high-density polyethylene (HDPE), low-density polyethylene (LDPE), polycarbonate (PC), Teflon/polytetrafluoroethylene (PTFE), polylactic acid (PLA), polyoxymethylene (POM)]
- Thermosetting plastics: epoxy resin (ER), polyester resin (PR), polyurethane (PU), urea-formaldehyde (UF) resin
- Elastomer: synthetic rubber, silicon rubber

材料 Materials

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For items marked within [ ], students are only required to name and be aware of their application in the design and make processes.

其他
(包括模型製作材料、複合材料及智慧型材料)

- 陶器、卡紙板、瓦通紙板、[牛皮紙、石膏、形狀記憶合金、碳纖維、 玻璃纖維、保温陶瓷、納米材料、製造太陽電池板及液晶體顯示 (LCD) 的材料]

Others
(include materials for model making, composites and smart materials)

- ceramics, cardboards, corrugated boards, [kraft, plaster of Paris, shape memory alloys, carbon fibres, glass fibres, thermo-ceramics, nano-materials, materials for making solar panels and liquid crystal display (LCD)]

材料

按題目提供的條件(應用)
寫出材料名稱

於[ ]內項目:
指出名稱及意識其應用

2018-DAT2C-Q8

(c) 利用注釋草圖，改良該滑板車的設計，以符合下列要求：

(ii) 踏板要輕巧、結構穩固和不容易斷裂，以及可承載達 50 kg 的重量；並建議一種合適製造踏板的新興材料； (4 分)

建議答案

- **製造踏板新興材料：**(下列任何一項)
  - 碳纖維合成物
  - 玻璃碳纖 (玻璃鋼)

Materials

Name the material according to the provided conditions (applications)

[ ] item:
Name and be aware of its application

2018-DAT2C-Q8

(c) Using annotated sketches, modify the design of the scooter to meet the following requirements:

(ii) The deck should be lightweight, sturdy and not easily broken, and be capable of carrying a weight of up to 50 kg and suggest a new material suitable for the deck. (4 marks)

Suggested Answer

- **New material for the deck:** (Any one of the following)

  - Carbon fiber
  - Fiber glass

材料

按所需的設計考慮(應用)
寫出材料名稱

於[ ]內項目：
指出名稱及意識其應用

2020-DAT1-Q1

舉出在選擇支架材料時的**兩項**設計考慮，並就該些考慮建議一合適的材料。 (3 分)

建議答案

選擇支架材料時的兩項設計考慮：

- 適合在不同天氣及戶外環境使用，例如經得起日曬雨淋
- 重量較輕但有足夠強度可支承負荷

合適材料：

- (例如) 鋁合金

Materials

Name the material according to the provided conditions (applications)

[ ] item:
Name and be aware of its application

2020-DAT1-Q1

State **two** design considerations when choosing the material for the stand and suggest one suitable material based on the considerations. (3 marks)

Suggested Answer

Design considerations when choosing the material for the stand:

- Suitable for use in different weather and outdoor conditions, e.g. withstand the elements.
- Lightweight but strong enough to support the load

Suitable material:

- (Example) Aluminium alloy

材料

參《設計與應用科技課程及評估指引（中四至中六）》P.25 ：了解材料和元件的選擇會受材料本質和工作特性影響

非[ ]項：需要說明原因–了解物理和機械特性等

2018-DAT2C-Q8

(b) 建議一種適合製造該滑板車車輪的材料，並舉出該材料適合用作車輪的**兩項**特性 (3 分)

建議答案

(b) **車輪材料：**

- **材料名稱：**(下列任何一項)
  - 橡膠
  - 泡沫橡膠 / 海綿橡膠 / 橡膠海綿 / 橡塑海綿 / 聚氨酯橡膠
- **特性：**(下列任何兩項)
  - 有彈性
  - 防震 / 緩和衝擊
  - 耐磨

Materials

Reference "DAT C&A Guide (Secondary 4-6)" P.25: Understand that properties and working characteristics influence the choice of materials and components

Non [ ] item: Need to give reasons – Understanding of physical and mechanical properties, etc.

2018-DAT2C-Q8

(b) Suggest a suitable material for the wheel of the scooter, and give two properties of the material that are suitable for the wheel. (3 marks)

Suggested Answer

Scooter wheel material:

- **Material:** (Any one of the following)
  - Rubber
  - PU (polyurethane rubber / urethane rubber / urethane sponge / foam rubber / sponge rubber / rubber sponge)
  - PP (polypropylene)

- **Properties:** (Any two of the following)
  - Elastic
  - Shock-proof / impact dampening
  - Wear resistant

材料

非[ ]項：需要說明原因–了解物理和機械特性等

2019-DAT2C-Q7

(a) (i) 建議一種適合製造牀框的木材名稱，並就你的選擇舉出一項理由。(2 分)

建議答案

木材名稱：松木/櫸木/白樺木
理由：硬度適中、耐用、承重力強、不變色

2019-DAT2C-Q9

(a) 建議一種適合製造風扇後殼的塑膠材料，並寫出該材料需具備的一項特性使其適合製造後殼。 (2 分)

建議答案

(a) 製造風扇後殼的塑膠材料，材料特性

- 材料：聚丙烯（PP）/丙烯腈-丁二烯-苯乙烯共聚物 (ABS) /耐衝擊聚苯乙烯 (HIPS)
- 特性：耐熱 / 堅硬 / 輕

Materials

Non [ ] item: Need to give reasons – Understanding of physical and mechanical properties, etc.

2019-DAT2C-Q7

(a) (i) Suggest a type of wood suitable for making the cot panel and give a reason for your choice. (2 marks)

Suggested Answer

Type of wood: Pine/ beech/ white birch
Reason: medium strength, durable, resist compression, non-discolouring

2019-DAT2C-Q9

(a) Suggest a suitable plastic material for making a case for the fan, and state one property of the material that makes it suitable for making the case. (2 marks)

Suggested Answer

(a) Plastic material and properties for making the case for the fan

- Example: Material: Polypropylene (PP) / Acrylonitrile Butadiene Styrene (ABS) / High Impact Polystyrene (HIPS)
- Properties: heat resistance/ hard/ light in weight

機械組織 Mechanisms

於 [ ] 內的項目表示學生只需指出其名稱及意識到其於設計和製造過程中的應用。
For items marked within [ ], students are only required to name and be aware of their application in the design and make processes.

- 凸輪和隨動件、齒條和齒輪、棘輪和棘爪、滑塊曲柄機構、連桿、槓桿、 正齒輪、傘齒輪、蝸桿和蝸輪、帶和滑輪、鏈輪和鏈條、簡單齒輪系、[複合齒輪系、同步帶和輪]

- cam and follower, rack and pinion, ratchet and pawl, slider crank, linkages, levers, spur gears, bevel gears, worms and worm wheels, belts and pulleys, sprockets and chains, simple gear trains, [compound gear trains, timing belts and pulleys]

機械組織

於[ ]內項目：
指出名稱及意識其應用

2019-DAT1-Q3(c)

改良燒烤架的設計，使燒烤架能執行下列操作。利用注釋草圖展示改良後的設計，並寫出所運用的機械結構名稱。改良後的設計必須方便使用者取出及放回燒烤桿。

(i) 六支直向燒烤桿以同一方向慢速轉動。 (6 分)

(ii) 橫向燒烤桿與題 (c)(i) 的六支直向燒烤桿同時轉動。 (4 分)

建議答案

(i) **六支直向燒烤桿同一方向慢速轉動：**

- 改良設計及機械結構名稱：(利用注釋草圖)
  - 令六支燒烤桿可同一方向轉動，例如利用滑輪及皮帶、鏈輪和鏈條
  - 令六支燒烤桿可以從馬達輸出的 120 rpm 減慢至合適的轉速，例如利用複合齒輪組、蝸輪及蝸桿

(ii) **橫直燒烤桿同時轉動：**

- 改良設計及機械結構名稱：(利用注釋草圖)
  - 改變轉動方向 90 度，例如利用傘齒輪組、蝸輪和蝸桿，
  - 令橫、直燒烤桿同時轉動，例如利用滑輪和皮帶、鏈輪和鏈條

Mechanisms

[ ] item: Name and be aware of its application

2019-DAT1-Q3(c)

Modify the design of the barbecue rack so that it can perform the operational procedures of the following. Using annotated sketches, show the modified design and name the mechanism adopted. The modified design must be convenient for users to easily remove and put back the skewers.

(i) The six straight skewers rotate slowly in the same direction. (6 marks)

(ii) The lateral skewer rotates simultaneously with the six straight skewers in (c)(i). (4 marks)

Suggested Answer

(i) **Six straight skewers rotate slowly in the same direction.**

- Modified design and the name of mechanisms: (use annotated sketches)
  - Driving the six straight skewers to rotate in the same direction, e.g. using pulleys and belts, sprockets and chains
  - Decreasing the rotational speed of the six straight skewers from 120 rpm to an appropriate level, e.g. using compound gear train, worm and worm wheel

(ii) **Lateral and straight skewers rotate simultaneously:**

- Modified design and the name of mechanisms: (use annotated sketches)
  - Change the rotation direction by 90 degrees, e.g. using bevel gear train, worm and worm wheel
  - Drive the lateral and straight skewers rotate simultaneously, e.g. using pulleys and belts, sprockets and chains

機械組織

參:《設計與應用科技課程及評估指引(中四至中六)》P.25 :利用簡單運算方式計算一個機械系統的...

非[ ]項：需要提出理由或計算等方式解釋/支持答案

2019-DAT2C-Q8

(ii) 毛巾架水平部分屬什麼槓桿類別? (1分)

(iii) 圖四展示 P 部件在垂直鋁管上的鉸接安裝到較高位置。最大負載應該會增加、減少，還是不變？為什麼？ (3分)

建議答案

(ii) 槓桿類別
- 第三類槓桿

(iii) 最大負載的改變和原因
- 最大負載會增加
- P 部件與水平衣架角度增加，縱向分力增加，最大負載便會增加

Mechanisms

Reference "DAT C&A Guide (Secondary 4-6)" P.25: **Apply simple calculations to determine … of a mechanical system**

Non [ ] item – Need to give reasons, may also require to use calculations , etc. to explain/support the answers.

2019-DAT2C-Q8

(ii) What is the class of lever of the horizontal part of the towel hanger? (1 mark)

(iii) Figure 4 shows that the hinge of Part P at the vertical aluminum tube is to be installed at an upper position. Will the maximum load be increased, reduced or remain unchanged? Why? (3 marks)

Suggested Answer

(ii) Class of lever

- 3rd class of lever

(iii) The change of maximum load and reason

- the maximum load will be increased
- the angle between the part P and the horizontal frame increases, the vertical component of the forces will also be increased, therefore the maximum load of the towel hanger will be increased.

標準元件 Standard components

- 螺栓及螺帽、 螺釘、 墊圈、 釘、 鉸和閂鎖、 裝拆式配件、 鉚釘、 拉釘、 滾珠軸承、 滾子軸承、 銷/楔

- bolts and nuts, screws, washers, nails, hinges and latches, knock-down fittings, rivets, pop rivets, ball bearings, roller bearings, pins/keys

標準元件

非[ ]項：需要詳細展示如何應用標準元件於特定情況。

2019-DAT2C-Q7

(c) 利用注釋剖視圖或分散圖，建議適合於組裝圖一接合 X 的裝拆扣件，並逐步展示將面板及端板穩固地接合的步驟。 (4 分)

(e) 利用注釋草圖，展示如何把底板固定在牀框上。 (2 分)

建議答案

(c) 接合 X 的裝拆扣件及組裝
- 裝拆扣件的形狀
- 裝拆扣件的名稱 (三合一連接件+八卦輪或偏心輪、螺絲+橫孔螺帽)
- 螺絲頭 - 必須埋藏在端板內
- 螺絲帽 - 必須埋藏在端板內

(e) 底板與牀框接合
- 所選用的托架
- 將牀板安裝在床框的方法

Standard components

Non [ ] item – Need to show in detail how to apply standard components to a specific situation

2019-DAT2C-Q7

(c) Using an annotated sectional or exploded view, suggest one knock-down fitting suitable for assembling Joint X in Figure 1, and show step-by-step how to assemble the back panel to the side panel securely. (4 marks)

(e) Using annotated sketches show how to fix the base onto the cot panels. (2 marks)

建議答案 Suggested Answer

(c) Knock-down fitting and assembly for Joint X

- shape of the knock-down fitting
- name of the knock-down fitting (Cam and Dowel fitting, Cross Dowel fitting)
- screw head - must be embedded in the bed panel
- nut - must be embedded in the bed panel

(e) Fix the base onto the cot panels

- type of the bracket used
- method of attaching the base onto the bed panel

生產/製作程序
Manufacturing/Fabrication Processes

接合

- 暫時性和永久性固定、以不同的框架和骨架結構裝配及榫接、以不同 的黏結劑、溶劑及機械方式連接、硬焊和軟焊、鉚接和上螺釘、焊接

Joining

- temporary and permanent fixings, assembly and joint using a range of frame and carcase construction, joint with adhesives, solvents and mechanical methods, hard and soft soldering, riveting and screwing, welding

生產/製作程序
Manufacturing/Fabrication Processes

於 [ ] 內的項目表示學生只需指出其名稱及意識到其於設計和製造過程中的應用。
For items marked within [ ], students are only required to name and be aware of their application in the design and make processes.

成形

- 使用手工具切割、使用手工具成形、夾疊黏合成形、屈曲、真空成 形、注射成形法、吹塑、旋轉模製、鍛造、滾壓、衝壓、立體打印、燒結、[深衝、壓縮鑄造、擠壓、旋製]

Forming

- cutting by hand tools, shaping by hand tools, laminating, bending, vacuum forming, injection moulding, blow moulding, rotational moulding, forging, rolling, pressing, 3D printing, sintering, [deep drawing, compression moulding, extrusion, spinning]

生產/製作程序
Manufacturing/Fabrication Processes

於 [ ] 內的項目表示學生只需指出其名稱及意識到其於設計和製造過程中的應用。
For items marked within [ ], students are only required to name and be aware of their application in the design and make processes.

表面處理

- 拋光、塗層、上漆、陽極氧化、塗凡立水、砂紙打磨、鍍層、薄皮鑲合

機器加工

- 鑽孔、車削、鋸切、銑削、打槽、浸蝕、鐳射切割、[火花侵蝕、熔 化、水刀切割]

Finishing

- polishing, coating, painting, anodising, varnishing, sanding, plating, veneering

Machining

- drilling, turning, sawing, milling, routing, etching, laser cutting, [spark erosion, melting, water jet cutting]

生產/製作程序
Manufacturing/Fabrication Processes

於 [ ] 內的項目表示學生只需指出其名稱及意識到其於設計和製造過程中的應用。
For items marked within [ ], students are only required to name and be aware of their application in the design and make processes.

鑄造
- [砂模鑄造、壓鑄]

熱處理
- [退火、硬化、表面硬化、回火]

Casting
- [sand casting, die casting]

Heat treatment
- [annealing, hardening, case hardening, tempering]

生產/製作程序

參:《設計與應用科技課程及評估指引(中四至中六)》P.25 :挑選、解釋及執行適當的製造程序與技術

非[ ]項：需要詳細列出生產/製作程序的詳細步驟。

2019-DAT2C-Q7

(d) 利用注釋草圖，分別展示適用於圖二端板中接合 Y 及 Z 的榫接方法各一種，並寫出其榫接名稱。 (7 分)

建議答案 Suggested Answer

(d) Y 部分：

- 閉口不貫通雌雄榫 / 止方榫
- 組合方法

Z 部分：

- 轉角三缺榫 / 半開口明榫 / 木釘榫
- 組合方法

Manufacturing/ Fabrication Processes

Reference "DAT C&A Guide (Secondary 4-6)" P.25: Select, explain and execute appropriate manufacturing processes and techniques

Non [ ] item – Need to give step-by-step manufacturing/ fabrication process in detail.

2019-DAT2C-Q7

(d) Using annotated sketches, show a suitable type of joint for each of Joint Y and Z of the side panel shown in Figure 2 and name the joints. (7 marks)

Suggested Answer

(d) Joint Y

- blind Mortise and Tenon
- method of assembling

Joint Z

- corner bridle joint / haunch mortise and tenon / dowel joint
- method of assembling

生產/製作程序

非[ ]項：需要詳細列出生產/製作程序的詳細步驟。

2019-DAT2C-Q9

(b) 該風扇扇葉由熱塑性塑料製成。

(i) 寫出一個大量生產的方法以製造扇葉。並輔以注釋草圖，描述該生產方法的成型工序 (6分)

建議答案

(b) (i) 大量生產扇葉的方法

- 注塑成型法

工序

- 將粉末或粒狀塑料放置在漏斗上
- 利用螺絲桿將材料輸送往機筒
- 塑粒輸送至發熱裝置時受熱使其溶解
- 溶解的塑料注滿入模具內
- 冷卻後將模具打開取出部件

Manufacturing/ Fabrication Processes

Non [ ] item – Need to give step-by-step manufacturing/ fabrication process in detail.

2019-DAT2C-Q9

(b) The blade of the fan is made of thermoplastics.

(i) State one mass production method for making the blade. Describe, with the aid of annotated sketches, the forming processes of the production method. (6 marks)

Suggested Answer

(b) (i) Mass production method of the blade

- injection moulding

Procedures

- pour the plastic granules into the funnel
- feed the granules to the barrel by turning the screw
- the granules are melted by the heater while feeding
- inject the molten plastics into the mould
- when it is cool, open the mould and eject the part.

於[　　]內的項目表示學生只需指出其名稱及意識到其於設計和製造過程中的應用。

For items marked within [　　], students are only required to name and be aware of their application in the design and make processes.

校本評核
School-based Assessment(SBA)

學生可於校本評核中應用[　　]項目以發展出多樣式/最合適的設計方案

Students can apply [　　] items in their SBA to develop various/the most appropriate design solution.

設計與應用科技 校本評核準則修訂本(2021)(摘錄)
SBA Assessment Criteria Revised Version(2021)(extract)

評核準則 **Assessment Criterion**	描述 **Description**
4(a). 將設計意念發展成 最後設計方案: 設計意念發展的質量	• 能深入詳盡地運用材料和工序的專業知識以改進設計及提供替代方案， 並提出完備的理據。
4(a) . Developing design ideas into a final solution: Quality of design development	• Provides refinement and alternatives to designs with sound justifications that are informed by the in-depth application of technical knowledge of materials and processes.

設計與應用科技 校本評核準則修訂本(2021)(摘錄)
SBA Assessment Criteria Revised Version(2021)(extract)

評核準則 **Assessment Criterion**	描述 **Description**
4(a). 將設計意念發展成 最後設計方案: 最後設計方案的質量	• 制定最後設計方案， 包括詳盡和相關的材料、尺寸、表面處理和製造技術細節, 這些細節明顯地能顧及設計規格的所有要求。
4(b) . Developing design ideas into a final solution: Quality of final design solution	• Develops a final design solution, with comprehensive and relevant details regarding materials, dimensions, finishes and fabrication techniques which clearly address all requirements of the design specifications.

應用碳纖維材料製作結構
Using CFRP to Make Structures

於校本評核中應用[　]項目(例子)
Use [ ] items in their SBA (Example)

設計與應用科技 校本評核準則修訂本(2021)(摘錄)
SBA Assessment Criteria Revised Version(2021)(extract)

評核準則 **Assessment Criterion**	描述 **Description**
5(b). 製作最後原型: 製作的材料、工 具、設備和程序	• 應用合適的科技包括材料、系統、組件 和程序，並提出很好的選用理據;顯示對材料特性有極佳和深入的理解。 • 熟練地使用合適的工具、機械和設備 (包括數碼設計和製造)，並具備高技巧水平。
5(b). Making the final prototype: Materials, tools, equipment and processes for making	• Applies appropriate technology including materials, systems, components and processes with good justifications; shows an excellent, in-depth understanding of material properties. • Uses appropriate tools, machinery and equipment skillfully (including digital design and manufacture), and works with a high level of skill.

應用水刀切割金屬材料
Using Waterjet to Cut Metals

於校本評核中應用[　]項目(例子)
Use [ ] items in their SBA (Example)

介紹補充資料的內容
Introduction to the Content of the Supplementary Notes

樣本試題
Sample Examination Questions

13.3.2021
《設計與應用科技課程及評估指引(中四至中六)—補充資料》簡介會(新辦)
Briefing Session on the "Design and Applied Technology (DAT) Curriculum and Assessment Guide (Secondary 4 to 6) Supplementary Notes" (New)