Higher National Certificate/Diploma Assessment

Qualification	**Pearson BTEC Higher Nationals for England (2024)**
Unit number and title	**4014: Production Engineering for Manufacture**
Assignment title	Manufacturing Systems
Assessor	Engineering Team

Academic year	1	**Unit Code**	H/651/0729	**Assignment**	1 of 3

Internal Verifier	Dr Michael Shaw	**Verification Date**	1st September 2025.
Issue Date	1st September 2025	**Final Submission Date**	No later than 31st August 2026

Policy on the Use of Artificial Intelligence (AI)

- Students are required to acknowledge the use of AI in the preparation of any assignment.
- AI tools **may be** permissible for use as learning aids, subject to the AI Assessment Scale designation given below.
- AI cannot be used to generate the final, submitted work in its entirety.
- AI cannot be used to substitute for a student's own critical thinking, analysis, and original expression.
- Assignments must reflect the student's original thought and understanding.
- Assignments are checked automatically on submission for AI content, through Turnitin.
- Assignment grades are only confirmed following viva voce examination at the end of each unit.

Artificial Intelligence Assessment Scale (AIAS)

Full details of the Artificial Intelligence Assessment Scale (AIAS) are available at this link.

The AI Assessment Scale (AIAS)

Level	Description	Guidelines
1 **NO AI**	The assessment is completed entirely without AI assistance in a controlled environment, ensuring that students rely solely on their existing knowledge, understanding, and skills.	**You must not use AI at any point during the assessment. You must demonstrate your core skills and knowledge.**
2 **AI PLANNING**	AI may be used for pre-task activities such as brainstorming, outlining and initial research. This level focuses on the effective use of AI for planning, synthesis, and ideation, but assessments should emphasise the ability to develop and refine these ideas independently.	**You may use AI for planning, idea development, and research. Your final submission should show how you have developed and refined these ideas.**
3 **AI COLLABORATION**	AI may be used to help complete the task, including idea generation, drafting, feedback, and refinement. Students should critically evaluate and modify the AI suggested outputs, demonstrating their understanding.	**You may use AI to assist with specific tasks such as drafting text, refining and evaluating your work. You must critically evaluate and modify any AI-generated content you use.**
4 **FULL AI**	AI may be used to complete any elements of the task, with students directing AI to achieve the assessment goals. Assessments at this level may also require engagement with AI to achieve goals and solve problems.	**You may use AI extensively throughout your work either as you wish, or as specifically directed in your assessment. Focus on directing AI to achieve your goals while demonstrating your critical thinking.**
5 **AI EXPLORATION**	AI is used creatively to enhance problem-solving, generate novel insights, or develop innovative solutions to solve problems. Students and educators co-design assessments to explore unique AI applications within the field of study.	**You should use AI creatively to solve the task, potentially co-designing new approaches with your instructor.**

This assignment is based on the AIAS level indicated by the colour above.
Follow the instructions for that level.

If the submitted work falls outside the scope of the AIAS designation above, the assignment will be failed.

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References

- Prepare your references and correctly cite them within the body of your assignment using zbib.org.
- Use the Harvard referencing standard of any of the listed UK universities.
- In zbib.org, create a 'Link to this Version' and copy it into your References section.
- **Assignments will be rejected if this process is not followed correctly.**

Submission Format

All text elements of your submission should be word processed, mathematical solutions can be handwritten (neatly) and scanned into your document.

Word Limit

- The recommended word limit for the information pack is 2,000 words. Exceeding this limit will not result in penalties; however, concise and focused writing is encouraged.

Assignment Format

- **Organisation**: Use clear headings, paragraphs, and sub-sections, to ensure clarity and ease of reading. Refer to Task numbers or sections to make it clear which question you are answering. ***Assignment Structure***

Your assignment **MUST** include the following sections:

- **Cover Page**: Your Course, Name, Unit Name and Assignment number/name
- **Contents Page**: List tasks or questions with page numbers.
- **References**: Correctly cite and list all sources used, but do not use Wikipedia. Please see the detailed advice on page 1.

Submission Requirements

By submitting your assignment, you confirm the following:

- **Originality**: The work is your own, with all sources properly cited.
- **Plagiarism**: You acknowledge that plagiarism and collusion are forms of academic misconduct and are strictly prohibited.
- **Plagiarism Detection**: Your assignment will be submitted to TurnItIn, a plagiarism detection service, that compares your work against databases, online sources, and other students' work.
- **False Declaration**: Making a false declaration is academic misconduct.

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Vocational Scenario or Context	You are a newly appointed Production Engineer in a soft drink manufacturing plant. Your Engineering Manager has informed you that you are required to complete various tasks regarding production engineering before you are assigned to active production projects. Your manager has therefore set you tasks to determine your level of knowledge and understanding. Compile a short technical engineering report based on the following tasks.
Task 1	(a) Produce a simple schematic diagram of a modern manufacturing system of your choice. (b) Describe each element used within your system and their role in manufacturing operations.
Task 2	(a) Briefly discuss the roles and responsibilities of a production engineer in a manufacturing environment that you have chosen. Your discussion should include the influence that you can have on the design process and your ability to refine products, services, and systems. (b) Review existing manufacturing techniques and describe how the application of quality system tools can support the optimisation and cost effectiveness of production operations.
Task 3	Your line manager has informed you the manufacturing plant will be modernised to accommodate contemporary engineering practices. (a) Discuss how Production Engineers use data-driven decision making to inform the development of new commercial strategies. (b) Evaluate the different techniques that can be applied to support the transition to modern manufacturing methods, by considering how to optimise engineering processes. (c) Referring to your manufacturing system in **Task 1**, explain how the appropriate selection and layout of equipment can help support the financial goals of the organisation.

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Sources of information to support you with this Assignment	• Baudin M. and Netland T. (2023) *Introduction to Manufacturing: An Industrial Engineering and Management Perspective*. 1st Ed. Routledge. • Burduk A., Batako A.D.L., Machado J., Wyczolkowski R., Dostatni E. and Rojek I. (Editors (2023) *Intelligent Systems in Production Engineering and Maintenance III – Lecture Notes in Mechanical Engineering* (Paperback). Springer. • Davim J.P. (Editor) (2016) *Design of Experiments in Production Engineering*. Springer International Publishing Switzerland. • Durakbasa N.M. and Gencyilmaz M.G. (Editors) (2021) *Digitizing Production Systems: Selected Papers from ISPR2021 – Lecture Notes in Mechanical Engineering* (Paperback). Springer. • Grote K.H. and Hefazi H. (Editors) (2021) *Springer Handbook of Mechanical Engineering*. Springer Nature. • Groover M.P. (2020) *Fundamentals of Modern Manufacturing: Materials, Processes, and Systems*. John Wiley & Sons. • Machado C. and Davim J.P. (Editors) (2022) *Green Production Engineering and Management*. 1st Ed. Woodhead Publishing. • Mair G. (2019) *Essential Manufacturing*. Wiley. • Phanden R.K., Kumar R., Pandey P.M., and Chakraborty A. (Editors) (2023) *Advances in Industrial and Production Engineering: Select Proceedings of FLAME 2022 – Lecture Notes in Mechanical Engineering* (Paperback). Springer.

Relevant Learning Outcomes and Assessment Criteria

	Pass	Merit	Distinction
LO1	***Illustrate the role and purpose of production engineering and its relationship with the other elements of a manufacturing system.***		
P1	Illustrate multiple elements of a modern manufacturing system.	**M1** Assess how the production engineer can influence the design process and refine products, services and systems, taking into account optimisation and cost effectiveness.	**D1** Analyse how the production engineer supports the development of operational strategies to achieve production and financial objectives.
P2	Explain the role of the production engineer within a manufacturing system.		

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