

Final Diploma

FD4 Infringement and Validity

Specimen Mark Scheme

For first examination in October 2025

■ Patent
■ Examination
■ Board

Mark scheme provisional pending consultation

Marking FD4

The FD4 syllabus contains Learning Outcomes which specify what candidates must know, understand and be able to do. These Learning Outcomes reflect the generic Learning Outcomes for the Final Diploma set out in the Programme Specification. The examination specifically tests candidates' ability to meet these Learning Outcomes.

- 1 The Indicative Content for each task does not form the Mark Scheme. It is content that candidates may include in their answers, but is not exhaustive. Other responses that meet the task requirements may be acceptable. The Indicative Content is designed to help examiners to apply the Levels of Response criteria.
- 2 The four tasks should be marked separately and a mark awarded for each task, then the four marks totalled.
- 3 The Levels of Response grids are used to determine the mark to be awarded for each task. Read the candidate's response for the task, referring to the appropriate Levels of Response grid.
- 4 The level should be first determined by starting at the highest level and working down until the level that best matches the answer is reached. Then the mark within that level should be determined.
- 5 The row of criteria shown in **bold** must be met for that level to be awarded.
- 6 The highest marks within a level can only be awarded if all criteria (bold and otherwise) for that level are met. An answer should be awarded a lower mark in the level if most criteria (including the bold criteria) are met.
- 7 Once the level has been determined, a **best-fit** approach should be applied. Responses may contain both strengths and weaknesses and may be inconsistent in terms of the level achieved for different assessment criteria.

Learning Outcomes The successful candidate will:	Assessment Criteria The successful candidate can:	Task 1	Task 2	Task 3	Task 4
1. apply knowledge and understanding of patent law and practice	a. Apply the law and practice governing patentable inventions to a case		✓	✓	✓
	b. Construe a patent claim using relevant principles				
	c. Determine the prior art			✓	
	d. Apply the law and practice governing infringement to a case		✓		
2. critically analyse and evaluate information from a range of sources	a. Determine the acts relevant to infringement		✓		
	b. Apply the claim construction to the acts identified, using the principles from <i>Actavis v Eli Lilly</i> [2017] UKSC 48		✓		
	c. Apply the claim construction to the identified prior art and any other grounds of invalidity applying <i>Pozzoli SpA v BDMO SA</i> [2007] E WCA Civ 588 where relevant	✓		✓	
	d. Reach a conclusion as to the likelihood that the patent is valid	✓		✓	✓
	e. Reach a conclusion regarding whether there is infringement		✓		
	f. Assess possible amendments and amendment strategies to improve prospects of enforcement	✓		✓	✓
	g. Assess the implications of amending the patent			✓	✓
3. independently synthesise information and ideas to create a response to a problem	a. Provide an opinion on infringement and validity	✓	✓	✓	✓
	b. Identify and evaluate the available procedures for challenging the validity of the patent				✓
	c. Identify any other patent-related legal issues pertinent to the facts presented	✓	✓	✓	✓
	d. Summarise conclusions from the analysis	✓	✓	✓	✓
	e. Evaluate whether there are 'design around' possibilities to avoid the protection offered by a patent under consideration		✓	✓	✓
4. proficiently communicate the results of the analysis	a. Based on conclusions drawn, summarise the options for a lay client	✓	✓	✓	✓
	b. Recommend and justify action(s) to strengthen the client's legal position	✓	✓	✓	✓

Task 1 – Construction

	Level 4 (20-25 marks)	Level 3 (13-19 marks)	Level 2 (6-12 marks)	Level 1 (1-5 marks)
	Response is wide ranging and has a well-sustained focus on the scenario	Response has a mainly consistent focus on the scenario	Response is basic and partly focused on the task	Limited response shows minimal focus on the scenario
	Key areas of law and practice are applied accurately	Relevant areas of law and practice are identified and applied broadly	Some relevant areas of law and practice are identified but not always applied consistently	Some relevant law and practice is identified but application is limited and/or not relevant to the scenario
Scope of answer	Response attempts to construe all claims using relevant principles	Response attempts to construe all claims using relevant principles.	Response attempts to construe independent claims and some dependent claims using relevant principles.	Response attempts to construe independent claims using relevant principles.
Clarity of construction (What is the construction?)	The construction of all points can be clearly understood and readily applied to the infringement and prior art analysis	The construction of most points can be clearly understood and readily applied to the infringement and prior art analysis	The construction of some points can be understood and applied to the infringement and prior art analysis	The construction of some points can be understood and applied to the infringement and prior art analysis
Reasoning of construction (Why is this construction justified?)	Clear reasoning is provided for all points of construction, with relevant references in the patent being identified and discussed	Reasoning is provided for almost all points of construction, with relevant references in the patent being identified and discussed	Reasoning is provided for some points of construction. Some relevant references in the patent are identified.	Reasoning is provided for some points of construction
Key points of construction	Candidate provides a clear and well-reasoned construction of all key points (“elevated temperature”, “nitrogen-containing gas”, “no more than 900 Celsius”, “the balance being endothermic gas”, “about 850 Celsius”)	Candidate provides a construction of all key points (“elevated temperature”, “nitrogen-containing gas”, “no more than 900 Celsius”, “the balance being endothermic gas”, “about 850 Celsius”)	Candidate attempts a construction of most key points (“elevated temperature”, “nitrogen-containing gas”, “no more than 900 Celsius”, “the balance being endothermic gas”, “about 850 Celsius”)	Candidate attempts a construction of some key points (“elevated temperature”, “nitrogen-containing gas”, “no more than 900 Celsius”, “the balance being endothermic gas”, “about 850 Celsius”)

	Candidate does not adopt a construction of any point that is contradictory to the disclosure of the patent	Candidate adopts no, or very few, interpretations that are contradictory to the disclosure of the patent	Most points of construction are consistent with the disclosure of the patent	Some points of construction are consistent with the disclosure of the patent
Sufficiency	All potential sufficiency issues are identified and their effect on scope of claims is discussed	Some sufficiency issues are identified		
Amendment	Possible amendments and amendment strategies to address sufficiency issues, or reasoned explanation of why no good amendment is possible are discussed	Response includes some discussion of amendments to address sufficiency issues		
Further issues	Any further information needed from client to confirm construction is identified	Further information needed from client to confirm construction is identified		
Quality of communication	Communication is proficient	Communication is generally proficient	Some parts of response demonstrate proficient communication	Little evidence of proficient communication

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Task 1 Construction	
Indicative Content	
1. A method of heat treating a steel component, comprising:	(Doc D) Heat treatment = cooling (p. 6) surface properties are modified (p. 4 l. 1-5) Steel component e.g. a component made from an alloy of iron with carbon content of 0.002 – 2.1% (p. 5 third para); high and low carbon contents included Comprises = open wording so can contain other components
heating the steel component in a treatment atmosphere to an elevated temperature for a period of time sufficient to form a modified layer on the surface of the steel component;	Elevated temperature and period defined only by effect (“sufficient to ...”), no limit; a sufficient period of time for modification (carbonitriding) to take place “an elevated temperature” – carbonitriding temperature (because of definition of treatment atmosphere later in claim has both gases), e.g. 815-900° C (p. 4 last lines) (“elevated temperature” should not be limited to this specific range) elevated is a relative term Modified layer = physical or chemical properties different compared to properties of inner (i.e. unmodified) part of component (document D) Description describes 2 step process but claim not limited to this (p. 4 para 4)
wherein the treatment atmosphere comprises:	
a carbon-containing gas suitable for creating a carbon-enriched layer on the surface of the steel component; and	Carbon-containing not defined, description only mentions carbon-rich. Carbon-rich = “The carbon-rich environment can be a gas that dissociates to provide carbon atoms” p. 1 l. 24-30 e.g. Endothermic gas p. 4 para 5 carbon-enriched layer = carburized layer p. 4 para 4; p. 5 para 2
a nitrogen-containing gas suitable for creating a nitrogen enriched layer on the surface of the steel component.	Nitrogen-containing not defined, description mentions nitrogen-rich p. 4 l. 7-9, Nitrogen-rich = “The nitrogen- rich gas is a gas that dissociates to provide nitrogen atoms at the surface of the component” p. 4 l. 21-22 (therefore nitrogen (N ₂) not included) Ammonia p. 4 l. 21-22 Modified layer: nitrogen-rich case depth p. 5 second para
2. A method as claimed in claim 1, wherein the elevated temperature is no more than 900 Celsius.	No specific lower limit but still need to be sufficient for carbonitriding and consist with claim 1 Provides upper temperature limit of carbonitriding treatment 900 °C is part of the claimed range

<p>3. A method as claimed in claim 1 or 2, wherein the carbon-containing gas is endothermic gas, and the nitrogen-containing gas is ammonia.</p>	<p>“is” = closed wording so carbon-containing and nitrogen-containing gases must be as defined; “and” = both carbon-containing and nitrogen-containing” must be as defined Endothermic gas = produced by incomplete combustion of hydrocarbons in air, such as natural gas (methane) or propane P11 l. 30 - p. 12 l. 5 Note: the atmosphere may still contain components other than the carbon-containing gas and nitrogen-containing gas</p>
<p>4. A method as claimed in claim 3, wherein the treatment atmosphere contains up to 11% by volume ammonia, the balance being endothermic gas.</p>	<p>Up to = no specific lower limit but must be present, i.e. >0 and sufficient to achieve modification p. 4 para 6 up to 11% p. 5 final lines 10-11% at least 89% endothermic gas, depends on ammonia content “the balance” - no longer open wording, cannot contain components other than the carbon-containing gas and nitrogen-containing gas (all of the remaining gas is endothermic gas)</p>
<p>5. A method as claimed in any preceding claim comprising:</p>	
<p>heating the steel component in the carbon-containing gas at a temperature of 900 – 955 Celsius for a first period;</p>	<p>1st period not defined, examples give “about 2 hours” p. 6, l. 30 + 50% p. 6 penultimate para, but not limited to this example, sufficient to produce a <u>carburised</u> layer p. 6, ll. 28-31</p>
<p>introducing the nitrogen-containing gas; and</p>	<p>Suggests after 1st period p. 5, second para Introduction of nitrogen-containing gas provides the treatment atmosphere of claim 1</p>
<p>heating the steel component in the treatment atmosphere including the nitrogen-containing gas at a temperature of about 850 Celsius for a second period.</p>	<p>2nd period not defined, examples give “up to 3 hours” p. 6, l. 1-2 +50% p. 6 penultimate para, but not limited to this example “about 850” – some leeway, context of final para on page 4 suggests that this is at most 815-900 deg C. p. 6, l. 1-2 to produce a layer of adsorbed carbon and nitrogen</p>
<p>Sufficiency</p>	<p>Client’s letter suggests problems with sufficiency of patent p. 3 l. 13-17 Limits on temperature range for 2nd stage appear critical to creating the modified layer. Operating outside range leads to unpredictability. Patent suggests higher temperatures can be used (p.4, final lines). Need to ensure component temperature in 2nd stage would appear to need reasonable experimentation as the thermal mass will depend on the component being treated. Discussion of point</p>

	<p>Does operating outside temperature limits for 2nd stage mean complete failure or just inferior results?</p> <p>Explain patent does not cover any use of endothermic gas and ammonia</p>
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Task 2 – Infringement

	Level 4 (20-25 marks)	Level 3 (13-19 marks)	Level 2 (6-12 marks)	Level 1 (1-5 marks)
	Response is wide ranging and has a well-sustained focus on the scenario	Response has a mainly consistent focus on the scenario	Response is basic and partly focused on the task	Limited response shows minimal focus on the scenario
	Key areas of law and practice are applied accurately	Relevant areas of law and practice are identified and applied broadly	Some relevant areas of law and practice are identified but not always applied consistently	Some relevant law and practice is identified but application is limited and/or not relevant to the scenario
Identifying infringements	All potentially infringing acts and actors are correctly identified: <ul style="list-style-type: none"> • use and offer of GP process by Ferrocasa Ltd • DOIK of products obtained directly from GP process by Ferrocasa Ltd • use and keeping of products obtained directly from GP process by customer(s) 	Most potentially infringing acts and actors are correctly identified.	Some potentially infringing acts and actors are identified.	
Scope of answer	Candidate provides reasoned assessment of infringement for all claims.	Candidate provides reasoned assessment of infringement for most claims.	Candidate provides reasoned assessment of infringement for most claims.	Candidate provides reasoned assessment of infringement for some claims.
Reasoning	Candidate clearly identifies which features of infringements match features of claims, with reference to construction. Full reasoning is provided where the presence or absence of a feature is not immediately apparent by reference alone.	Candidate identifies which features of infringements match features of claims, with reference to construction. Some reasoning is provided where the presence or absence of a feature is not immediately apparent by reference alone.	Most features of infringement are matched accurately to features of claims, with reference to construction.	

	Candidate does not come to any conclusions on infringement that are contradictory to adopted construction	Candidate does not come to any conclusions on infringement that are fundamentally contradictory to adopted construction	Most points are consistent with construction	Some points are consistent with construction
Non-infringing acts/Defences	Defences and non-infringing acts are identified and discussed. Response identifies that Ferrocane's furnace could be used in a non-infringing manner	Some defences and non-infringing acts are identified		
Interim relief	Candidate discusses possibility and likelihood of interim relief being granted	Candidate identifies possibility of interim relief being granted		
Enforcement	Different forums for enforcement are considered and the most appropriate is selected	At least one appropriate option for enforcement is considered	Discussion of issues relevant to enforcement is limited	Options for enforcement unclear
Amendment	The impact of amendments is fully considered	There is recognition that amendments may have an effect on the outcome		

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Infringement Indicative Content	
Standard Gastride process not relevant for infringement: no carbon-containing gas (does not need full analysis of infringement as long as this point is noted) pre-dates patent, in use for over 10 years p.10, l. 10	
	Doc B Gastride Plus
1. A method of heat treating a steel component, comprising:	Present "steel nitriding" p.9 l.2-4
heating the steel component in a treatment atmosphere to an elevated temperature for a period of time sufficient to form a modified layer on the surface of the steel component;	Present "gas feed" p. 9, ll. 17-20, "duration" p. 9, l. 18 Enrichment of surface, compound layer, diffusion zone, p. 9, ll. 19-20 Elevated temperature 560°C-720°C p. p. 9, l. 21
wherein the treatment atmosphere comprises:	
a carbon-containing gas suitable for creating a carbon-enriched layer on the surface of the steel component; and	Present Endothermic gas p. 9, l. 4-7, 17-22
a nitrogen-containing gas suitable for creating a nitrogen enriched layer on the surface of the steel component.	Present Ammonia p. 9, l. 4-7, 17-22
	Infringed
2. A method as claimed in claim 1, wherein the elevated temperature is no more than 900 Celsius.	Sensible answer depending on construction e.g. Present - Max temp mentioned is 720 °C so less than 900 Celsius p. 9, l. 21 e.g. Not present if construction includes 815 C lower limit
	Infringed or Not Infringed (depending on construction of "elevated")
3. A method as claimed in claim 1 or 2, wherein the carbon-containing gas is endothermic gas, and the nitrogen-containing gas is ammonia.	Present Endothermic gas p. 9, ll. 25-28 Ammonia p. 9, ll. 25-28
	Infringed/not infringed (depending on conclusion for claim 2 dependency)
4. A method as claimed in claim 3, wherein the treatment atmosphere contains up to 11% by volume ammonia, the balance being endothermic gas.	Not present p. 9, ll 25-28, ammonia = 50%
	Not infringed
5. A method as claimed in any preceding claim comprising:	
heating the steel component in the carbon-containing gas at a temperature of 900 – 955 Celsius for a first period;	Not present No separate endothermic gas, no carburising step/layer No heating at 900 – 955 Celsius

introducing the nitrogen-containing gas into the treatment atmosphere; and	
heating the steel component in the treatment atmosphere including the nitrogen-containing gas at a temperature of about 850 Celsius for a second period.	Not present Temperature 560-720, p. 9, ll. 20-22 No "second period", not a 2 step process
	Not infringed
Conclusions (may be found in advice section, give marks here)	Conclusions including consistency and dependencies, and discussion of non-infringing use of furnace p. 9, ll. 30-32 suggests potential to be configured in infringing way. Article is from 2022 and says that GP being used in long term contract. This seems to be evidence of at least C1 being infringed. Point remains valid for non-infringed claims. Is <i>Actavis</i> needed for non-infringed claims? Explain why e.g. does the patent suggest that strict compliance with the literal meaning of the relevant claim is an essential requirement of the invention?
Advice	Respond to question from client to explain outline of options for enforcing patent: IPEC, HC, enforce against Ferrocasa for method. How about other parties dealing in treated products? Discuss possibility of interim relief (unlikely, why?) Credit may be given for other matters pertinent to answering the client's questions Explain patent does not cover any use of endothermic gas and ammonia, not infringed + problems with validity Explain furnace can be used in a non-infringing manner so operator will not inevitably infringe Put Ferrocasa on notice in case furnace can be configured to perform the claimed method But do not to threaten (how?)
Possible defence to infringement	Ferrocasa began developing Gastride Plus in "early" 2019. Need to find out if this is before filing date. Even if not public, may have prior use defence under S. 64

Section 3 – Novelty

	Level 4 (20-25 marks)	Level 3 (13-19 marks)	Level 2 (6-12 marks)	Level 1 (1-5 marks)
	Response is wide ranging and has a well-sustained focus on the scenario	Response has a mainly consistent focus on the scenario	Response is basic and partly focused on the task	Limited response shows minimal focus on the scenario
	Key areas of law and practice are applied accurately	Relevant areas of law and practice are identified and applied broadly	Some relevant areas of law and practice are identified but not always applied consistently	Some relevant law and practice is identified but application is limited and/or not relevant to the scenario
Identifying prior art	Date(s) for assessment of novelty are correctly noted and used; priority issues are discussed All prior art relevant to novelty is correctly identified. Any further information needed from client is identified (i.e. nature/timing of Gastride Plus development)	Date(s) for assessment of novelty are correctly used All prior art clearly relevant to novelty is correctly identified	Some prior art relevant to novelty is correctly identified	Some prior art relevant to novelty is correctly identified
Scope of answer	Novelty of all claims is assessed	Novelty of infringed claims is assessed	Novelty is assessed for some claims	Novelty is assessed for one claims
Reasoning	Novelty is assessed using claim construction. Construction is applied consistently for all claims using relevant principles. Full reasoning is provided where the presence or absence of a feature is not immediately apparent by reference alone. Implicit/inherent disclosures are identified and discussed. All features missing from prior art are accurately identified	Novelty is assessed using claim construction. Construction is applied consistently for all claims using relevant principles. Reasoning is provided for the most significant features	Novelty is assessed based primarily on claim construction. Reasoning is provided for the most significant features of independent claims	Novelty assessment makes some reference to claim construction. Some reasoning is provided.

	Candidate does not come to any conclusions on novelty that are contradictory to adopted construction	Candidate does not come to any conclusions on novelty that are fundamentally contradictory to adopted construction	Most findings on novelty are consistent with construction	Some findings on novelty are consistent with construction
Amendments	Amendments to restore novelty are considered The impact of amendments is considered. Different procedures for making amendments to restore novelty are identified and the most appropriate is selected	Amendments to restore novelty are considered. At least one procedure for making amendments to restore novelty is identified		

Mark scheme provisional pending consultation

Novelty Indicative Content		
Date for assessing novelty: Filing Date Prior Art: Doc D, Doc E Ferrocasa began developing Gastride Plus in "early" 2019. Need to find out if this is before filing date. Was this public? If so, may be prior art.		
	Doc D	Doc E
1. A method of heat treating a steel component, comprising:	Present P11 L15-24	Present p. 13, ll. 2-3
heating the steel component in a treatment atmosphere to an elevated temperature for a period of time sufficient to form a modified layer on the surface of the steel component;	Identify features consistent with construction P11 L15-24	Identify features consistent with construction of "elevated" p. 13, ll. 8-10 explicit temperature not given but e.g. "Carbonitriding is used primarily to impart a hard, wear-resistant case layer, generally from 0.08 to 0.8 mm deep." p. 13, ll. 13-14
wherein the treatment atmosphere comprises:		
a carbon-containing gas suitable for creating a carbon-enriched layer on the surface of the steel component; and	Present P11 L32-34	Present "gas carburizing atmosphere" p 13, l. 4
a nitrogen-containing gas suitable for creating a nitrogen enriched layer on the surface of the steel component.	Not present (nitrogen in endothermic gas is not a nitrogen-containing gas as defined in the claim)	Present Ammonia, p. 13, ll. 3-4
	Novel	Not Novel
2. A method as claimed in claim 1, wherein the elevated temperature is no more than 900 Celsius.	Present: upper limit temp. of claim is same as lower limit temp. of range disclosed on p.12, l. 6-7	Not Present (not enough information) No explicit temperature given. P13L7-8 refers to lower temperature than carburizing, but doc D suggests carburizing may be done up to 950 deg C (P12L6-7), so no unambiguous disclosure of required range.
		Novel

3. A method as claimed in claim 1 or 2, wherein the carbon-containing gas is endothermic gas, and the nitrogen-containing gas is ammonia.	Not present Endothermic gas but no ammonia	Not Present Ammonia p. 13, l. 3 but does not mention endothermic gas. Doc D says number of gases used in carburizing p. 11, l. 30 so not implicit
		Novel
4. A method as claimed in claim 3, wherein the treatment atmosphere contains up to 11% by volume ammonia, the balance being endothermic gas.	Not present No ammonia	Not present no mention of amount of ammonia in atmosphere
		Novel
5. A method as claimed in any preceding claim comprising:		
heating the steel component in the carbon-containing gas at a temperature of 900 – 955 Celsius for a first period;	Present: 900-650 deg C disclosed on p.12, l. 6-7 Must be consistent with claim 2 for this reason	Not Present (not enough information) No explicit temperature given. Doc D suggests 900-950 P12L6-7, but p. 13. ll. 7-8 says lower temperature so may be outside this range Must be consistent with claim 2 for this reason
introducing the nitrogen-containing gas into the treatment atmosphere; and	Not present No nitrogen-containing gas	Present: Ammonia p. 13, ll. 3-5
heating the steel component in the treatment atmosphere including the nitrogen-containing gas at a temperature of about 850 Celsius for a second period.	Not present No two-step process No mention of temperature at this level	Not present Temperature not explicit. 850 is lower than CGK carburizing temperature so possibly not present Doc E mentions "lower processing temperature" but does not give details No mention of 2 nd period, "add nitrogen to the carburized surface case layer as it is being produced" suggests single step
Amendments	Any amendment to improve novelty position. e.g. Amending claim 1 to a 2 stage process (p. 5, ll. 19-23) resolves these issues but makes infringement position worse. Amendment to endothermic gas and ammonia (claim 3) gets novelty and infringement.	

Section 4 – Inventive Step

	Level 4 (20-25 marks)	Level 3 (13-19 marks)	Level 2 (6-12 marks)	Level 1 (1-5 marks)
	Response is wide ranging and has a well-sustained focus on the scenario	Response has a mainly consistent focus on the scenario	Response is basic and partly focused on the task	Limited response shows minimal focus on the scenario
	Key areas of law and practice are applied accurately	Relevant areas of law and practice are identified and applied broadly	Some relevant areas of law and practice are identified but not always applied consistently	Some relevant law and practice is identified but application is limited and/or not relevant to the scenario
Identifying prior art	Date(s) for the assessment of inventive step is correctly identified; priority issues are discussed All prior art relevant to inventive step is correctly identified. An appropriate document representing the state of the art is selected for each claim.	Date(s) for the assessment of inventive step is correctly identified Prior art relevant to inventive step is identified with reasoning An appropriate document representing the state of the art is selected for each assessed claim.	Prior art relevant to inventive step is identified	Some relevant prior art is considered
Scope of answer	Inventiveness of all claims is assessed	Inventiveness of infringed claims is assessed	Inventiveness is assessed for some claims	Inventiveness is assessed for one claim
Overall reasoning	Inventive step is assessed using claim construction Inventive step is assessed using relevant <i>Pozzoli</i> principles Reasoning is provided for all conclusions	Inventive step is assessed using claim construction Inventive step is assessed using relevant <i>Pozzoli</i> principles Reasoning is provided for main conclusions	Inventive step is assessed with some reference to claim construction Inventive step is assessed with some reference to relevant <i>Pozzoli</i> principles	

PSA	Suitable skilled person identified for all claims, with good reasoning All relevant common general knowledge of the skilled person is identified, with reasoning.	Suitable skilled person identified for assessed claims. Relevant common general knowledge of the skilled person is identified.	Suitable skilled person identified for assessed claims. Some common general knowledge of the skilled person is identified.	Some attempt is made to identify the skilled person.
Inventive Concept	A sensible inventive concept is identified for each claim, with good reasoning and reference to the patent	An sensible inventive concept is identified for each assessed claim	An inventive concept is identified for each assessed claim	Some attempt is made to identify an inventive concept
Differences	All differences between the inventive concept and prior art representing the state of the art are clearly identified.	Differences between the inventive concept and prior art representing the state of the art are identified.	Some differences between the claims and the prior art are identified.	Some attempt is made to identify differences from the prior art
Amendments	Amendments to restore inventive step are considered. Impact of amendments is considered. Different procedures for making amendments to restore inventive step are identified and the most appropriate is selected	Amendments to restore inventive step are considered. At least one procedure for making amendments to restore inventive step is identified.		

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Inventive Step	
Date for assessment of IS = Filing Date	
PSA = engineer skilled in heat treatment processes for use on steel	
CGK = Principles of gas carburizing P11L25-P12L11, (Doc C is not CGK despite age); Prior art = Doc. D, Doc. E	
Claim 1	
Concept	Give basis from patent e.g. Heat treat steel using carbon and nitrogen containing gases to allow use of lower temperatures and reduce distortion P4L7-12
State of the art	Doc E
Difference	As claimed: none. Description suggests 2 stage process but claim not limited to this OR: temp range (Doc E does not explicitly mention 2 stage process)
Obviousness	e.g. If novel because of temperature range – this is known in the CGK therefore not inventive
Claim 2	
Concept	Provide carbonitrided case while maintaining carburization p. 6, ll. 1-3
State of the Art	Doc E
Difference	Specific temperature limit (≤ 900 Celsius)
Obviousness	Doc E says “lower processing temperature” p. 13, ll. 7-9 in comparison to carburization. Lower range for carburization is 900 C from CGK (P12L6-7). Therefore ≤ 900 C is obvious.
Claim 3	
Concept	Using ammonia and endothermic gas to produce hardening by carburizing and carbonitriding p. 5, ll. 7 – 9
State of the art	Doc E
Difference	Use of endothermic gas
Obviousness	Obvious selection from CGK P11L30-31
Claim 4	
Concept	To avoid decomposition of too much ammonia in gas and dilution of carburizing atmosphere P4L28-30
State of the art	Doc E
Difference	Concentration of ammonia not mentioned
Obviousness	Claim is only an upper limit. e.g. Doc E mentions lower temperature and shorter times. Nothing to suggest 11% limit is unusual but no teaching in Doc E or CGK as to what amount of ammonia is used
	Not obvious
Claim 5	
Concept	Produce carburized layer with a harder layer of carbon and nitrogen on top for use with low carbon steels p. 5, ll. 7-9

State of the art	Doc E
Difference	2 stage process, change of atmosphere, change of temperature
Obviousness	CGK does not include knowledge of a 2 stage process, or the idea of producing two distinct layers. Low carbon steels are mentioned at P11L19-21 but for carburization only Doc E mentions higher carbon content steel P13L22-24
	Not obvious
Amendment	Any amendment to improve inventive step position. e.g. Amending claim 1 to a 2 stage process (p. 4, ll. 13-17) resolves these issues but makes infringement position worse. Amendment to endothermic gas and ammonia has no inventive step.

Mark scheme provisional pending consultation