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# **NIMS Stamping Level II Stamping II Preparation Guide**

## *Table of Contents*

<b>Overview</b>	page 2-6
• Introduction	page 2
• Who Wrote the Questions	page 2
• How to Prepare for the Certification Exam	page 3
• Areas of Knowledge Measured by the Exam	pages 4-6
• Before the Exam	page 7
• At the Testing Site	page 8
<b>Stamping Level II – Certification Preparation Exam</b>	pages 9-45
• Exam Content and Sample Question Overview	page 9
• Exam Specifications	page 10
• Task List	pages 11
• Sample Exam	pages 12-43
• Answer Key	pages 44-45

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## **Overview**

### ***Introduction***

This preparation guide (test advisor) is intended to help individuals study and prepare for the National Institute for Metalworking Skills (NIMS) written certification exam. The following sample exam will prepare individuals to take the actual certification exam. None of the questions are duplicated from the actual certification exam. However, this preparation guide is useful for reviewing the technical knowledge and identifying areas of strength and deficiency for adequate test preparation.

Achieving a NIMS certification is a means through which individuals involved in production stamping can prove their abilities to themselves, to their employers and to the customer. By passing the NIMS certification exam, you will earn a valuable and portable certificate. Because the exam is difficult, you will have the satisfaction of proving to yourself and others that you have reached a higher level of competency accepted nationally.

### ***Who Wrote the Questions***

A panel of technical experts from the stamping industry wrote the exam questions used on the certification exam. The panel of experts included company presidents, owners, engineers, quality personnel, tool and die makers and production stamping personnel. Exam questions are designed to evaluate the knowledge skills needed for experienced production stamping employees. They are written to deal with practical problems, computations, and decisions production-stamping personnel perform in their day-to-day work.

Development of the test questions follows a strict process. The technical experts must first validate the certification exam questions. Stamping professionals on several levels then validate the credentialing exam questions nationally before they become part of the certification exam. Rejected questions are then rewritten or discarded altogether.

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## ***How to Prepare for the Certification Exam***

Become familiar with the exam content and question format by utilizing the tools provided in this test preparation guide. The **Exam Specifications** portion of this guide contains a summary description of the content covered in the actual certification exam. The **Task List** describes competencies for each particular area for easier assessment.

Each question on the sample exam is linked to a particular task or set of tasks found in the **Task List**. Therefore, a review of the **Task List**, with an eye to judging whether you know how to perform each task listed, will provide you with valuable information as you prepare for the exam.

The questions are multiple choice. Note instructions that may accompany some questions. Be sure to read each question carefully, (twice, if necessary) so that you know exactly what is being asked. Check your answer or work since an error in computation or understanding may make a wrong answer appear correct.

The following four steps are suggested for effective preparation:

- Step 1: Study the content list for each exam you will attempt.
- Step 2: Carefully read the **Task List** for each area.
- Step 3: Go over the sample exam to become familiar with subject matter and question format. This is a very important step.
- Step 4: Review steps 1 through 3 and identify the knowledge area(s) where you need additional study. Use the preparation guide as a self-diagnostic tool.

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## ***Areas of Knowledge Measured by the Exam***

The knowledge and skills you will need to pass the certification exam are as follows:

**Exam Sections:** The certification exam is divided into three major areas. The three areas are:

- **Press Safety and Guarding**
- **Press Components and Controls**
- **Troubleshooting/Problem Solving**

The following is a list of basic knowledge areas assessed by the exam.

- **Coil Equipment and Coil Defects:** Competent coil fed press operators know the major components and functions of a feed line as well as the ability to identify various coil defects. Knowing how a coil is supported on a stock reel, the purpose of a straightener and the purpose of the uncoiling device enhance the operator's effectiveness in the pressroom. Operators must be able to identify common coil defects such as clock springing, camber, telescoping and squatting.
- **Die Components:** Many tool and die makers view the pressroom setup and operation personnel as the "first line of defense" for troubleshooting both the press and the tool. Pressroom personnel should know the basic components of a die assembly, components of a die that perform either a cutting or forming operation, function of a combination punch and what a piercing operation produces (slugs). Competent pressroom personnel will be able to define a press cycle and how a press cycle is measured.
- **Shearing Theory:** Wise punch operators and setup personnel will know the stages of the shearing process, characteristics of each stage and the proper sequence of the three stages of shearing. Competent personnel will be able to identify each part of a sheared edge as well as the proper terminology for multiple hole production per stroke (perforating) including the difference between blanking and notching.

- **Materials and Material Defects:** Understanding material characteristics and identifying material defects is an asset for every punch press operator and setup person. Personnel should know basic defects that can be identified visually and the essential checks that should be made before beginning production with a new lot of coil or strip stock. Competent pressroom personnel should be able to identify pitting and rust as well as understanding material lamination and material characteristic acronyms (i.e. AKDQ – aluminum killed draw quality).
- **Measurement and Tolerancing:** Comprehension of measurement and tolerancing is one of the core competencies of any metalworking activity. Pressroom operators must have the ability to read an outside micrometer, dial caliper and dial indicator. An understanding of how air pressure is measured is necessary to set or adjust components of a press or feed line requiring compressed air. Operators must be able to recognize when a part dimension is out of tolerance and the difference between an attribute and variable measurement.
- **Preventative Maintenance/Safe Start Up:** Good preventative maintenance and safe start up of press equipment assures productivity and minimal downtime. Operators should be familiar with specific company policy addressing press cleaning, lubrication, adjustment and minor repairs of equipment. Understanding fluid levels, air pressure required to run a press and feed equipment is important for proper setup and operation. Proper lubrication and lubrication techniques are other basic skills necessary for an operator's repertoire of skills. Personnel should also be familiar with safe start-up practices such as checking the equipment, inspecting the operation controls for functionality and visual inspection for excessive wear and fluid leaks.
- **Mode Selection:** Applying the proper mode in relation to the proper press function is important from both the safety and productivity standpoint. The press operator must know the function of the mode selector, how to activate the mode selector and the definition and application of the inch, single and continuous stroke modes. Operators and setup personnel must know the location of the mode of operation switch, ram adjustment control and the on-off button for the main motor.

- **Basic Press Terminology:** A basic understanding of press components and terminology is essential for the pressroom operator. Knowledge of terminology and acronyms such as top dead center (TDC), bottom dead center (BDC) and the stroke of the press are some basic knowledge components needed to effectively operate a punch press.
- **Lockout/Tagout:** Lockout/Tagout is a safety procedure used when making repairs or adjustments to tooling and the press itself. The objective of this process is to achieve zero energy, lock out the system and allow only the person who initiated the procedure to reactivate the power. Lockout/Tagout can be used for repairs as well as lubrication of gearboxes and other components of the press. Operators should never enter the point of operation until zero energy has been achieved.
- **Housekeeping:** Housekeeping promotes a safe and clean working environment. Although housekeeping procedures vary from company to company, many procedures such as the proper method for cleaning oil spills are the same. Slug control and scrap management are other important aspects of an effective housekeeping program.
- **Die Sets:** Pressroom personnel must be aware of the basic components of a die set. Knowledge of die set components such as the punch holder, die shoe, leader pins (guide pins), bushings and/or ball cages is essential from both the troubleshooting /problem solving aspect as well as basic die set maintenance. The main purpose of the die set is to align both the punch and die components for efficient cutting and forming.
- **Single Hit Tooling:** Operators and setup personnel must know the function and purpose for single hit tooling. Comprehension of tonnage requirements for each single hit operation will prevent overloading a press beyond its capacity. Knowledge of die shut height and part location is essential to prevent part location deviations. Thus usually occurs when part features other than critical dimensions and datum are used for part location.
- **Compound Dies:** Compound dies require part ejection on each stroke and are different from other types of dies. These dies have the punch on the die shoe and the die block on the punch holder component of the die set. Operators must be knowledgeable about the knockout bar, function of the knockout bar and knockout, knockout safety gap and burr side.

- **Progressive Dies:** Progressive dies are probably the most common type of die found in many stamping companies. Progressive dies rely on a strip or coil of material to pass through a die at even increments. At each increment, cutting or forming takes place to create a part. Progressive dies are capable of making either one or more parts per stroke. Efficient operators must know various fundamentals of progressive dies such as the advance (progression), pilot release, function of a pilot and the purpose of a coil loop. Competent operators will know and understand the importance of proper die and coil line alignment and the pass line.
- **Deep Draw Dies:** Draw dies can be either single hit dies or progressive dies. Deep draw dies produce shells that require two or more drawing stages or operations. Operators should know the function of the draw ring, knockout bar and air cushion for a draw die operation. Efficient operators will have knowledge of pressure producing devices such as nitrogen cylinders and various spring and rubber configurations. Basic draw troubleshooting knowledge is essential to understand the root cause behind splits and tears. A well-rounded operator will have knowledge of push-through draw dies, reverse drawing and redrawing.

## **Before the Certification Exam**

Try to be well rested for the exam. Being well rested will make you alert and efficient when taking the certification exam. Review any course material from your instructor. Review the test advisor information and sample exam. Bring at least two sharpened (#2) soft leaded pencils and an eraser. In addition, bring a calculator. You may also bring a copy of the *Machinery's Handbook* if you have access to one. Become familiar with the procedure for taking a Scantron or online test. If you wish to pace yourself, bring a watch, check the monitor (online testing) or be aware of the location of clocks at the test site. Make sure to bring some form of identification, any necessary paperwork from NIMS and arrive at the test site at least 10 to 15 minutes prior to the specified exam time.

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## **At the Testing Site**

When you arrive at the test center, wait in the assigned area until the proctor begins the test orientation and administration. The proctor will instruct you on how to fill out any information on the answer sheet. You will also be instructed on the amount of time allowed for the exam, calculator usage and reference materials.

Once the exam has begun, keep track of time. Do not spend too much time on any one question. Answer the questions you know the answers to and go back to questions you have difficulty with after you have gone through the whole certification exam. Repeat this process until you have answered all the questions or time has elapsed.

***It is to your advantage to answer every question. Do not leave any answers blank. Your score will be based on the number of correct answers.***



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# Exam Content and Sample Question Summary

## Exam Content and Sample Question Overview

The following material is designed to help individuals prepare for and obtain a NIMS certification in several areas of Stamping Level II – Single Hit Tooling, Compound Dies, Progressive Dies and Deep Draw Dies. This section begins with **Exam Specifications**. The **Exam Specifications** will list the main categories covered on the certification exams for Stamping Level II. It will also list the name of the topic and the number of questions pertaining to that topic. These questions are common for each certification area found at Stamping Level II. Each certification area designated in bold type (single hit tooling, progressive dies, compound dies and/or draw dies) will have its own set of questions specific to that type of tooling and press operation.

The **Task List** describes competencies an individual must attain in order to receive a certification for each component of Stamping Level II – Single Hit Tooling, Compound Dies, Progressive Dies and Deep Draw Dies. The **Task List** has a two-fold purpose. The first purpose is to prepare production-stamping employees for certification. The second purpose is for instructors to apply the **Task List** as a check and balance on their curricula.

The number of questions in each content area may not be equal to the number of tasks listed. Some of the tasks are more complex and broader in scope. This type of information may be covered by several questions. Other tasks are simple and narrow in scope and one question may cover several tasks. The main objective in listing the tasks is to describe accurately what is done on the job, not to make each task correspond to a particular test question.

Sample questions follow the **Task List**. Although these same questions will not appear on the actual exam, they are in the same format as the actual exam questions. All questions on the certification exam are in the multiple-choice format. Some concepts evaluated on the certification exam are assessed in greater depth with the sample exam questions. The sample exam questions are developed to test conceptual knowledge of punch press operation and different types of tooling rather than specific physical competencies.

Answers to the sample questions are located at the end of the sample exam. Work with your instructor to evaluate answers and identify weak areas. Use the sample exam as a study guide and diagnostic tool.

## Exam Specifications – Stamping Level II – Single Hit Tooling, Compound Dies, Progressive Dies and Deep Draw Dies

Content Area	No. of Questions	% of Test
Press Safety and Guarding	16	14.4%
Press Components and Controls	13	11.7%
Troubleshooting/Problem Solving	11	9.9%
Coil Equipment and Coil Defects	6	5.4%
Die Components	6	5.4%
Shearing Theory	5	4.6%
Material and Material Defects	4	3.6%
Measurement and Tolerancing	4	3.6%
Preventative Maintenance/Safe Start Up	4	3.6%
Mode Selection	4	3.6%
Basic Press Terminology	3	2.7%
Lockout/Tagout	3	2.7%
Housekeeping	3	2.7%
Die Sets	1	0.9%
<b>Single Hit Tooling</b>	<b>7</b>	<b>6.3%</b>
<b>Compound Dies</b>	<b>7</b>	<b>6.3%</b>
<b>Progressive Dies</b>	<b>7</b>	<b>6.3%</b>
<b>Deep Draw Dies</b>	<b>7</b>	<b>6.3%</b>
	<b>Total of 111</b>	<b>100 %</b>

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## Task List

### Stamping Level II – Single Hit Tooling, Compound Dies, Progressive and Deep Draw Dies

Reading this **Task List** will allow the individual to focus preparation on those subject areas that need attention. The instructor can use the **Task List** to fine-tune the curricula to meet the standards. If you feel comfortable with your knowledge about a particular task, you are probably ready to answer the questions on that subject. If, on the other hand, you have any doubts, you and your instructor can work on these areas to build up proficiencies. Many texts, notebooks, videotapes and other resources are available to provide information.

#### Press Safety and Guarding

- The definition and purpose of barrier guards
- PPE for hearing protection
- PPE for eye protection
- The rationale for safety precautions addressing a rotating flywheel
- The single and most common cause of operator injury
- Purpose for point of operation safe guarding
- Purpose and effect of the yellow stop button on the press
- Purpose and effect of the red stop button on the press
- The function of a light curtain
- What occurs when an object breaks a light curtain beam
- The mode a press is set for hand feeding
- Items to check and inspect before starting a press equipped with a progressive die
- Definition of OSHA
- Recommended safety behavior for minimizing accidents
- Foot trip mechanisms are not an OSHA approved stand alone safety device

Sample questions:

- 1) The appropriate press mode for hand fed operations is the:
  - a) Inch mode
  - b) Single stroke mode
  - c) Continuous mode
  - d) Jog mode
  
- 2) What is the function of the yellow stop button on a punch press?
  - a) Stops the press immediately
  - b) Shuts down the power completely
  - c) Stops the servo feed mechanism while the press is running
  - d) Stops the press at top dead center (TDC) at the completion of the stroke
  
- 3) The purpose of a barrier guard is to:
  - a) Protect the operator from points of operation by physical obstruction
  - b) Keep scrap from falling into piece part bins
  - c) Keep the operator from changing the feed and strokes per minute
  - d) Serve as eye protection in lieu of safety glasses
  
- 4) The single biggest cause of operator injury is:
  - a) Heat fatigue
  - b) Not reading the control plan or router
  - c) Not using or bypassing the safety devices
  - d) Lighting and floor conditions on the production floor
  
- 5) Which one of the following will protect an operator's hearing from the noise produced by a punch press?
  - a) Cotton or pieces of rags
  - b) Ear plugs or muffs
  - c) Head phones used to hear music
  - d) Hard hat or motorcycle helmet

- 6) Standard checks to perform on a press before starting the press with a progressive die are:
- a) Safety devices are functional
  - b) Mode of operation
  - c) Lubrication reservoirs are checked and filled if necessary
  - d) All of the above
  - e) Only a and c
- 7) Which of the following types of PPE is best suited for protecting the eyes from flying metal or debris?
- a) Eye glasses having Z-87 lenses and side shields
  - b) Soft contact lens
  - c) Commercial sun glasses
  - d) Prescription eye glasses with side shields
- 8) What is the function of the red stop button on the punch press?
- a) Shuts down the power to the motor and press controller
  - b) Stops the press immediately
  - c) Stops the press at top dead center after one revolution of the press
  - d) Stops the press after a preset number of strokes (set on the controller)
- 9) Which press component has “stored energy” and may create a hazard because it continues to rotate for a while when the press motor has been turned off?
- a) The main motor
  - b) The bolster plate
  - c) The air cushion
  - d) The flywheel

- 10) What will occur when an object breaks the beams of light on a light curtain used as a barrier guard?
- a) The press cycle will stop immediately
  - b) The press will top stop
  - c) The press control will activate the lube system to lubricate the gibs on the press
  - d) The press will continue running, the light curtain checks part ejection
  - e) The motor will be thrown in reverse and the clutch will act as a brake
- 11) The acronym OSHA means:
- a) Office of Safety and Health Administration
  - b) Occupational Standards for Health Actions
  - c) Occupational Safety and Health Administration
  - d) Office of Safety and Hazards Alliance
- 12) Point of operation safeguarding devices are used to:
- a) Monitor short feeds and long feeds
  - b) Prevent the operator from entering into the point of operation
  - c) Facilitate double hits
  - d) Set the feed length and speed of the press
  - e) Separate scrap from good piece parts
- 13) Which of the following statements best describes appropriate safety behavior for minimizing accidents?
- a) Accident prevention is the responsibility of government enforcement
  - b) Accidents are always caused by fellow workers
  - c) Following standard operating procedures (SOPs) and using the appropriate safety devices
  - d) Accidents happen and operators must take their chances

- 14) Define a barrier guard:
- A top stop
  - A full revolution clutch
  - A physical means of separating workers from moving parts of equipment
  - Lubrication of the coil before it enters the die
- 15) The purpose of a light curtain is to:
- Protect the operator from entering the point of operation
  - Keep the coil loop at the appropriate length
  - Keep scrap from building up in die openings
  - Pull the operator's hands out of point of operation
- 16) Which of the following is not an OSHA approved safety device?
- Pullbacks
  - Light curtain sensing devices
  - Metal barriers
  - Foot trip mechanism
  - Two palm buttons

### **Press Components and Controls**

- Purpose of a bolster plate
- Purpose of the ram
- Purpose of the main motor
- Purpose of a tonnage monitor
- Purpose of the crankshaft
- Purpose of the operator palm buttons
- Purpose of the flywheel
- Component of the press that is turned by the flywheel when the clutch is engaged
- Two types of clutches found on mechanically powered presses

- The purpose of the clutch/brake assembly
- Location of the ram adjustment control, mode of operation switch and the on/off button for the main motor
- Operator reaction when the brake monitor system faults

Sample questions:

- 17) Which of the following statements best describes the function of the flywheel?
- a) Stores energy initiated by the motor to drive the press
  - b) Transforms rotary energy into reciprocating energy
  - c) Holds both the upper and lower die tools or components of the die set
  - d) Stops the press immediately when the light beams are interrupted
- 18) A tonnage monitor indicates:
- a) The rotation of the stroke in degrees
  - b) Proximity sensors that are active or inactive
  - c) Pressure exerted on the die at two or more points
  - d) Pressure needed to straighten the material prior to the feeding device
- 19) Which one of the following statements best describes the function of the crankshaft?
- a) Supplies electricity to the press
  - b) Provides power to rotate the flywheel
  - c) Converts rotary motion into reciprocating (up and down) movement
  - d) Supports the inside diameter of the coil of material
- 20) The purpose of the operator palm buttons is to:
- a) Change the mode of operation for various press functions
  - b) Stamp the proper label for routing or shipping
  - c) Check the shut height, oil pressure, air pressure and feed length
  - d) Make sure both hands are away from the point of operation and to begin the stroke of the ram



- 21) Which of the following statements best describes the function of the ram?
- a) Stores energy to drive the press
  - b) Engages the clutch and the brake
  - c) Selects the proper press mode
  - d) Holds the upper press tool (upper portion of the die set)
- 22) Which of the following statements best describes the function of the bolster plate?
- a) Holds the bottom tool or die shoe (lower portion of the die set)
  - b) Provides air for clutch activation
  - c) Maintains counterbalance pressure
  - d) Supports the width of material (cradles)
- 23) What component turns the flywheel when the clutch is engaged?
- a) The ram
  - b) The crankshaft
  - c) The main motor
  - d) The counterbalance
- 24) Which of the following statements best describes the function of the main motor?
- a) Changes rotary motion into reciprocating motion
  - b) Determines the mode of operation
  - c) Provides power to rotate the flywheel
  - d) Provides air pressure to regulate the counterbalance
- 25) Which of the following statements best describes the function of a counterbalance?
- a) Prevents the operator from entering the point of operation
  - b) Counters the weight of the upper die set or die tool
  - c) Counters the rotation of the flywheel to aid in braking
  - d) Provides air pressure to regulate the air clutch

- 26) Identify the two types of clutches found on mechanical punch presses:
- Full and partial revolution clutches
  - Forward and reverse clutches
  - Double and full revolution clutches
  - Hybrid and brake clutches
- 27) Define the function of the clutch-brake assembly:
- Regulates the amount of pressure exerted by the straightening rollers
  - To start and stop the crankshaft
  - To start and stop the ram
  - Regulates the amount of tonnage needed for cutting and forming operations
- 28) What course of action should an operator take if the brake monitor system faults?
- Reset and continue operation
  - Disconnect the brake monitor and continue running
  - Notify the setup person or supervision
  - Change the settings for the brake itself
- 29) Where are the ram adjustment control, on/off button for the main motor and the mode of operation switch located?
- On the decoiler operations panel
  - On the sensor interface box
  - On the control panel
  - On the straightener panel

### **Troubleshooting/Problem Solving**

- Indicators of dull tooling
- Definition of a double hit
- Cause of a double hit
- Indications of broken or damaged tooling

- Action to take if a part is consistently sticking to the punch or die
- Lack of lubrication for a forming operation may result in galling
- First step in problem solving
- Action to take when an operator hears unusual noises coming from the press
- Definition of “die slugging”
- Possible root causes for a stripper that is sticking

Sample questions:

- 30) What is the first step in a problem solving procedure?
- a) Identify the problem
  - b) Develop a solution to the problem
  - c) Validate corrective actions
  - d) Determine the root cause of the problem
- 31) Stamping two parts in the same stroke at the same station meant only for one part is called a?
- a) Single hit
  - b) Die crash
  - c) Lean stamping manufacturing
  - d) Double hit
- 32) Galling found in a forming operation may be caused by:
- a) Camber in the material
  - b) Lack of lubrication
  - c) Over lubrication
  - d) Forms with too much clearance
- 33) Which of the following statements is a root cause for double hits?
- a) Using spring pins to break “oil seals”
  - b) The shut height set to the proper height
  - c) Piece part sticking to the punch on the previous stroke
  - d) Excessive pressure on the counterbalance

- 34) What should an operator do if the part is consistently sticking to the punch?
- a) Stop production and report the problem
  - b) Change the timing on the feed unit so the advancing strip will eject the part
  - c) Slow down the press and decrease the shut height
  - d) Decrease lubricant spray to the area where the part is sticking
- 35) A burr, increasing in size during a production run is a good indication of:
- a) Dull tooling
  - b) Mistimed spring pad
  - c) Missing features
  - d) Burnishing action of a sub-liner on a stripper
- 36) Which one of the following statements indicates broken or damaged tooling?
- a) Large burrs
  - b) Missing features
  - c) Distorted forms
  - d) Incomplete features
  - e) All of the above
  - f) Only b and d
- 37) How should an operator react when they see or hear anything unusual while operating or monitoring the press operation?
- a) Stop the press, cut the strip, restart the press and continue to make parts
  - b) Ignore the problem, segregate the good and bad parts and continue to run the job
  - c) Stop the press, cut the strip, turn over the material, restart the press and segregate the parts
  - d) Stop the press immediately and notify both the supervisor and maintenance personnel

- 38) A die block that is “slugged or slugging” means that the:
- a) Counterbalance is set correctly
  - b) Die block has excessive taper
  - c) Scrap is failing to leave the die block
  - d) Punch is excessively sharp
- 39) Which of the following would **not** be a possible cause of a spring stripper having a sticking problem?
- a) Dull tooling
  - b) Even spring pressure exceeding 20% of the required tonnage
  - c) Broken springs
  - d) Lack of lubrication
  - e) Galled stripper guide pins
- 40) What will happen if a second part is formed in a forming station without removing the first part?
- a) Double hit
  - b) Double the production
  - c) Deep draw
  - d) Compound reverse action

### **Coil Equipment and Coil Defects**

- Purpose of an uncoiling device
- Purpose of a straightener
- Defining and identifying squatting
- Defining and identifying clock springing
- Defining and identifying camber
- Defining and identifying telescoping
- Component of a stock reel supporting the inside diameter of the coil
- Type of uncoiling device that supports the width of the coil

Sample questions:

41) Which of the following statements best describes the function of a straightener?

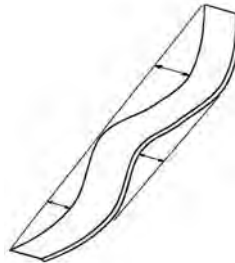
- a) A straightener levels the material
- b) A straightener removes coil set
- c) A straightener determines feed angle and feed length
- d) A straightener is used to mount the coil of material

42) The mandrels on a stock reel support the \_\_\_\_\_ of the coil.

- a) Width
- b) Length
- c) Inside diameter
- d) Outside diameter

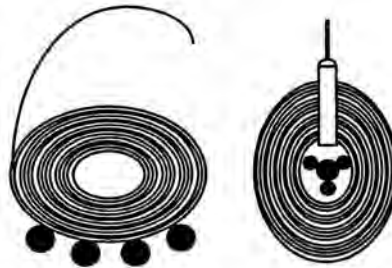
43) What type of defective material condition is shown in the following illustration?

- a) Camber
- b) Clock springing
- c) Coil set
- d) Crown



44) What type of defective material condition is shown in the following illustration?

- a) Cross bow
- b) Pitting
- c) Coil set
- d) Squatting

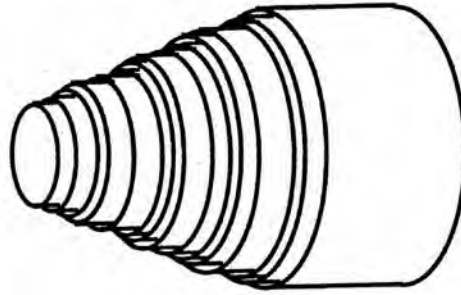


45) Identify the purpose for having an uncoiling device in a press line:

- a) Straightens the coil stock
- b) Counts the number of strokes
- c) Unwinds the coil stock
- d) Sets the feed length, feed speed and feed angle for the material

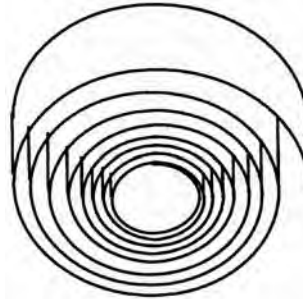
46) What type of defective material condition is shown in the following illustration?

- a) Crown
- b) Camber
- c) Telescoping
- d) Clock springing



47) What type of defective material condition is shown in the following illustration?

- a) Coil set
- b) Clock springing
- c) Crown
- d) Telescoping



48) Which type of uncoiling device supports the width of the coil?

- a) Pallet decoiler
- b) Vertical tandem decoiler
- c) Cradle decoiler
- d) Strip decoiler

## Die Components

- Basic components of a die assembly
- Purpose of a die stop block (bumper)
- The name of the press operation that produces slugs
- The components of a die that actually perform the cutting and/or forming process
- Two functions of a punch
- Type of punch that removes material from the blank
- Type of punch that both cuts and forms the material

Sample questions:

- 49) What is the name of the press operation that produces slugs?
- a) Forming
  - b) Piercing
  - c) Blanking
  - d) Drawing
- 50) What are the basic components of a die assembly?
- a) Punch and die
  - b) Punch and die set
  - c) Die and bolster plate
  - d) Ram and punch
- 51) Which one of the following statements best describes the function of a die stop block (bumper)?
- a) Sets the length of feed on an air feed
  - b) Prevents the top half of the die from entering too deep
  - c) Used to set the feed angle and pilot release point for feeding material
  - d) Prevents a die set from separating when a die set is transported
- 52) What are the two basic components of a die that actually perform the cutting and/or forming process in a die?
- a) Punch and die
  - b) Forming pad and guide rails
  - c) Stripper and punch holder
  - d) Backup plate and die shoe
- 53) What type of punch removes material from a blank or strip?
- a) Draw punch
  - b) Blanking punch
  - c) Pilot
  - d) Piercing or notching punch



54) What type of punch will both cut and form material?

- a) Embossing punch
- b) Shave punch
- c) Form punch
- d) Combination punch
- e) Piercing punch

55) What are two basic purposes of a punch?

- a) Cut and transfer
- b) Form and pilot
- c) Cut and form
- d) Guide the stripper and cut

### **Shearing Theory**

- Name of the press operation when several holes are pierced at once
- Stage that occurs first in the shearing process
- Parts of a sheared edge
- Name of the piercing operation that produces a notch or a square opening
- Definition of blanking

Sample questions:

56) Which shearing stage occurs first during the shearing process?

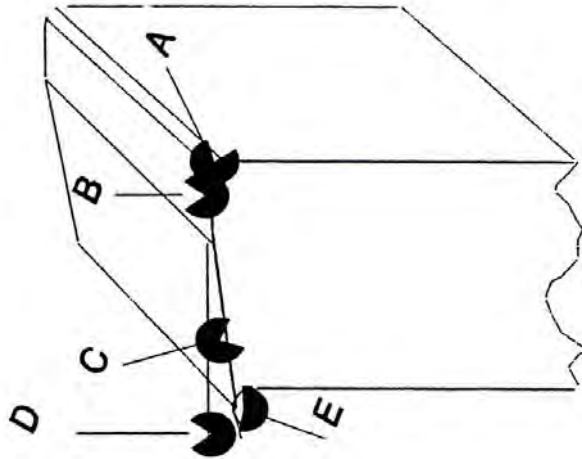
- a) Plastic deformation (end radius)
- b) Cut band
- c) Break
- d) Burr

57) When several holes are pierced at once in a single station or multiple stations, what is the operation called?

- a) Drawing
- b) Perforating
- c) Embossing
- d) Blanking

- 58) What shearing operation cuts a shape out of the strip with the remainder of the strip becoming scrap?
- a) Perforating
  - b) Drawing
  - c) Embossing
  - d) Blanking
  - e) Shear forming

Use the following illustration to answer questions 58 through 60:



- 59) What portion of the sheared edge is identified by the letter A?
- a) Burr
  - b) Break
  - c) Radius
  - d) Cut band
- 60) What portion of the sheared edge is identified by the letter B?
- a) Radius
  - b) Burr
  - c) Break
  - d) Cut band

- 61) What portion of the sheared edge is identified by the letter C?
- a) Burr
  - b) Cut band
  - c) Break
  - d) Radius

### **Materials and Material Defects**

- Type of material defect that cannot be identified through visual attribute inspection (lamination)
- First check that should be made when beginning production with new material
- Defining the acronym DQ for steel
- Definition of material lamination
- Possible root causes of rust on material
- Defining and identifying material pitting

Sample questions:

- 62) A visual attribute inspection by an operator on a coil or strip of material will **not** identify:
- a) Lamination
  - b) Rust
  - c) Pitting
  - d) Scratches
  - e) Edge burrs
- 63) An operator is starting a new production run with a new batch of raw coil material. What is the first check that should be made?
- a) Check the material vendor for billing purposes
  - b) Check to see if the incoming inspector checked the material
  - c) Check the ID tag, router and/or control plan to verify material correctness (type, width and thickness)
  - d) Weigh the material

- 64) What do the letters **D.Q.** represent with steel materials?
- a) Draw quality
  - b) Domestic quarantine
  - c) Double quantity
  - d) Deep queue
- 65) Which of the following best describes a cause of rust on coil stock material?
- a) Moisture on wood pallets or condensation
  - b) Sulfur based lubricants
  - c) Deposits of chromium
  - d) Plastic wrapping from the steel distributor
- 66) Which of the following is a visible defect on a blank or strip?
- a) Camber
  - b) Clock springing
  - c) Lamination
  - d) Pitting
  - e) Telescoping
- 67) Define the material defect called lamination:
- a) A variation in the thickness of material across the width
  - b) Coil set found in all coils
  - c) Separation of material due to impurities in the chemistry
  - d) Marks caused by dirt on the rollers of the feed unit or straightener

### **Measurement and Tolerancing**

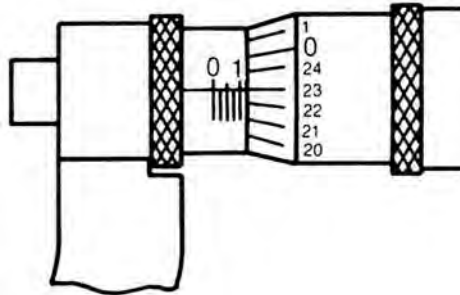
- Measurement units for air pressure
- Reading a measurement taken with an outside micrometer
- Action to take if finished parts do not meet the quality standards
- Understanding a bilateral tolerance presentation
- Understanding a unilateral tolerance presentation
- Purpose of an attribute gage

Sample questions:

- 68) Air pressure is measured in:
- a) Strokes per minute (SPM)
  - b) Pounds per square inch (PSI)
  - c) Inches per second (IPS)
  - d) Miles per hour (MPH)

- 69) Determine the reading shown in the following diagram of an outside micrometer:

- a) 0.148 inches
- b) 0.024 inches
- c) 0.123 inches
- d) 0.127 inches



- 70) What course of action should an operator take if finished parts do not meet quality standards?
- a) Separate the bad parts from the good parts and continue to run
  - b) Shut down the press and notify supervision
  - c) Segregate the bad parts from the good parts and mix the bad parts in with good parts to hide bad product
  - d) Perform adjustments to the press, cut the strip, restart the strip and continue to segregate good and bad product
- 71) Given a dimension of  $.525 +.005/-.000$ , which of the following dimensions would be out of tolerance (specification)?
- a) .527
  - b) .525
  - c) .523
  - d) .529

- 72) Which one of the following statements best describes the purpose of an attribute gage?
- a) An attribute gage will indicate if the dimension being checked is either good or bad
  - b) An attribute gage will indicate the actual measurement of the dimension being checked
  - c) An attribute gage will determine the capability index of the dimension being inspected
  - d) An attribute gage will check the fit and function of a piece part
  - e) Only a and d
- 73) The specification for a dimension on a print is stated as  $.160 \pm .003$ . Which of the following measurements is out of tolerance?
- a) .165
  - b) .160
  - c) .162
  - d) .157

### **Preventative Maintenance/Safe Start Up**

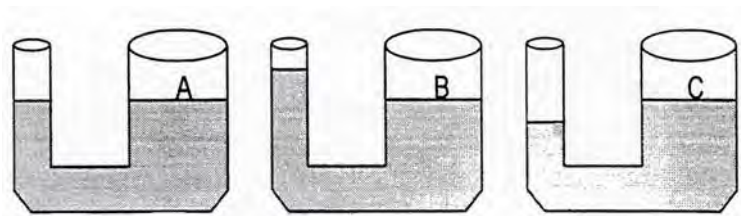
- Components of a preventative maintenance program for press operators
- Main purpose for oiling and lubricating pressroom equipment components
- Items a press operator should check at the beginning of a shift as a preventative maintenance program
- Reading correct oil and fluid levels
- Parameter that is the most detrimental to any lubricant (heat)
- Acceptable air pressure required to operate metal stamping equipment

Sample questions:

- 74) What duties should a press operator perform at the beginning of the shift?
- a) Check the operation of essential controls
  - b) Visually inspect the machine for fluid leaks
  - c) Listen to the operation of the press for unusual noises
  - d) Make sure the product from the last shift is properly controlled
  - e) All of the above

- 75) Oiling and lubricating equipment components is performed to:
- Activate the clutch and brake
  - Reduce friction and wear
  - Fulfill a quality requirement set by quality assurance
  - Justify the expense of oil and lubricants to management
- 76) Which of the following is **not** a component of a preventative maintenance program for a punch press?
- Basic repairs
  - Lubrication
  - Basic adjustments
  - Basic inspection of equipment
  - Control plan and inspection sheet
- 77) What is the standard air pressure requirement for metal stamping equipment?
- 10-30 PSI
  - 150-200 PSI
  - 60-100 PSI
  - 5-25 PSI
- 78) Which one of the following is the most detrimental for any lubricant?
- Lubricant standing idle for a period of time
  - Heat
  - Slow reciprocating motion
  - Temperatures from 40°F to 90°F
- 79) Which illustration shows the correct oil level?

- View A
- View B
- View C
- All of the above



## Mode Selection

- Purpose of a mode selector
- Device used to activate the mode selection panel
- Application for the single stroke mode on the mode selection panel
- Application for the inch mode on the mode selection panel

Sample questions:

- 80) The mode selector found on most press controllers is activated with a:
- a) Wrench
  - b) Key
  - c) Software code
  - d) Hardware lock on the CPU
- 81) What is the function of a mode selector?
- a) Sets the material handling specifications
  - b) Sets the stroke per minute (speed of the press)
  - c) Selection of the proper type of press operation
  - d) Starts the main motor in the reverse mode
- 82) The inch mode on the mode selection device is used:
- a) When setting up the press
  - b) Only under continuous production
  - c) To approve the first piece part
  - d) To adjust the length of the feed
- 83) The single stroke mode on the mode selection device is used:
- a) For transfer press operations
  - b) For continuous production
  - c) When starting or restarting a new coil
  - d) Only with coil fed operations and never with single parts



## Basic Press Terminology

- Crankshaft rotation and how it is measured
- How and where to find information on the stroke of the press
- Definition and acronym for top dead center and bottom dead center

Sample questions:

- 84) Information on the stroke length of a press can be found:
- a) On the inspection recording sheet
  - b) On the control plan and floor router
  - c) In the Machinery's Handbook for Press Working
  - d) On the specification plate mounted on the press
- 85) What does the acronym TDC represent?
- a) Total die completion
  - b) Top dead center
  - c) Top die counterbalance
  - d) Total depth comparison
- 86) From the following statements, determine the statement that best describes where a press cycle begins and ends:
- a) Bottom dead center (BDC) to top dead center (TDC)
  - b) Top dead center (TDC) to top dead center (TDC)
  - c) Top dead center (TDC) to bottom dead center (BDC)
  - d) Top dead center (TDC) to 90° past top dead center (TDC)
- 87) What does the acronym BDC represent?
- a) Bottom dead center
  - b) Basic die correlation
  - c) Bumper die center
  - d) Bottom depth comparison

## Lockout/Tagout

- When to use Lockout/Tagout
- Important concept to remember when reactivating power to any component of a press or feed line after a Lockout/Tagout procedure
- The person that usually removes a lock from a Lockout/Tagout event

Sample questions:

- 88) After work has been done on a machine, what person removes the lock and tag to restore power to the equipment?
- a) The plant manager
  - b) The person who put on the lock and tag
  - c) The manufacturing engineer
  - d) Press room supervisor
  - e) Pressroom shift foreperson
- 89) The most important concept to remember before removing a lock and tag and restoring electrical, hydraulic and/or air power to the punch press is:
- a) Never place hands inside the operating area
  - b) Make sure all affected personnel are aware that the press is going to have power
  - c) All the safety devices and guards are in place and operating
  - d) All of the above
- 90) Lockout/Tagout procedures are used when lubricating:
- a) Open worm gears
  - b) Gear boxes
  - c) Moving components of the equipment
  - d) All of the above
  - e) Only a and c

## Housekeeping

- Timing for cleaning up an oil spill

Sample question:

- 91) What is the correct procedure for cleaning oil spills?
- a) Cover the oil spill with sand and clean up at break time
  - b) Clean up the oil spill immediately
  - c) Throw rags on the oil spill and clean up at the end of the shift
  - d) Border off the area and call maintenance

## Die Sets

- The purpose of leader pins or guide posts
- Proper lubrication techniques for guide post bushings and ball cages

Sample questions:

- 92) What is the proper lubrication for ball cages?
- a) Lithium grease
  - b) Heavy draw oil
  - c) No lubrication
  - d) Light oil
- 93) What is the proper lubrication for guide bushings?
- a) Lithium grease
  - b) No lubrication
  - c) Graphite powder
  - d) Light oil
- 94) The main function of the guide posts (leader pins) on a die set is:
- a) Nest the part in the die block
  - b) Align the ram of the press to the bolster plate
  - c) Keep both halves of the die set aligned
  - d) Act as stop blocks for correct shut height adjustment

**The following section is categorized by type of tooling and NIMS certification area!**

### **Single Hit Tooling**

- Basics of part location
- Possible root cause of overload on a single-hit press
- Position of a single hit tool in an OBI press
- OSHA ruling on clamping the shank of the punch holder (die set)
- Mode of operation for single hit tooling
- Burr side
- Function of oil pins on a punch

Sample questions:

- 1A) To locate a nest of blanks for a secondary operation, the blank should be located on:
- a) Datums or critical surfaces
  - b) Any convenient edge
  - c) The break portion of the sheared edge on the blank
  - d) None of the above
- 2A) Which one of the following events could cause a single-hit press to overload?
- a) The tonnage required for the operation exceeds the tonnage capacity of the press
  - b) The clutch and brake are worn out
  - c) The counterbalance is set too low
  - d) The servo feed is advancing the material too quickly
- 3A) The best position for a single-hit tool in an OBI press with a connecting arm (pitman) is:
- a) On the left side of the centerline of the ram
  - b) On the right side of the centerline of the ram
  - c) In-line with the centerline of the ram
  - d) In front and to the left of the centerline of the ram

- 4A) What is the proper press mode for single hit operations?
- a) Continuous mode
  - b) Single stroke mode
  - c) Inch mode
  - d) E-stop mode
- 5A) What is the function of oil pins on a punch?
- a) To break an oil seal and release the blank or slug
  - b) To align the blank for a secondary operation
  - c) Direct lubrication to the cutting portion of the punch
  - d) Clamp the strip to the die block before shearing
- 6A) According to OSHA, which of the following statements is **false** concerning clamping the top half of the die set to the press ram?
- a) The top half of the die set can be clamped with the shank and screws or clamps
  - b) The top half of the die set can only be clamped with the shank of the die set
  - c) Clamps and riser blocks must be located to distribute clamping pressure equally
  - d) Both parts of the die set must be securely clamped to the proper component of the press
- 7A) For the burr on a pierced hole to be on the same side as the burr on the blank, the blank must be located with the burr side facing the:
- a) Die block
  - b) Punch
  - c) Feed unit
  - d) Ram

## Compound Dies

- Location of the punch and die components
- Method of part ejection
- Burr side of parts made on a compound die
- Purpose of the knockout bar
- Difference between an inverted die and a compound die
- Verification factors for press startup
- Basic knowledge of the shedder safety gap

Sample questions:

- 1B) The punch of a compound die is located on the:
- a) Stripper
  - b) Die block
  - c) Top half of the die set (punch holder)
  - d) Bottom half of the die set (die shoe)
- 2B) What should an operator verify before starting a press equipped with a compound die?
- a) The correct mode of operation is set
  - b) The material is properly located and the feed works smoothly
  - c) The safety devices are operating properly
  - d) The material and material thickness match the information on the work order or router
  - e) All of the above
  - f) Only a and d
- 3B) Which one of the following statements best describes part ejection with a compound die?
- a) The part is ejected on each stroke from the top half of the die
  - b) The part is ejected on every other stroke from the bottom of the die through the die block
  - c) The part is ejected from the punch by oil pins
  - d) The part is ejected through a die opening and varies from two to four press strokes for ejection

- 4B) What is the purpose of a knockout bar?
- a) Performs a cutting operation
  - b) Performs a drawing operation
  - c) Strips the part from the upper die set near TDC
  - d) Knocks parts off the punch and through the bolster plate at TDC
- 5B) What is the difference between an inverted die and a compound die?
- a) An inverted die has the die block on the die shoe of the die set and a compound die has the die block on the punch holder portion of the die set
  - b) A compound die blanks and pierces a part while an inverted die will only create blanks
  - c) A compound die has a shedder pad and an inverted die does not
  - d) The burr side for a blank is opposite the burr side for a pierced hole for a part created on a compound die while a part created on an inverted die has no burr at all
- 6B) A blanked part with several holes is created on a compound die. The burr side for the blanked edge and the pierced openings will be on:
- a) Opposite sides
  - b) The same side
  - c) No burr will be evident on either the blanked edge or pierced opening
  - d) None of the above
- 7B) The safety gap on the shedder is used to:
- a) Provide a space for parts that are not ejected on each stroke
  - b) Allow for dirt to accumulate during the production run
  - c) Leave room for excessive burrs caused by a dull tool
  - d) Allow a space for slugs to accumulate

## Progressive Dies

- Definition of a progression, pitch or advance
- Function of pilots
- Function of the pilot release
- Purpose of the coil loop for a progressive die
- Importance of die and coil line alignment
- Difference between a progressive die and a transfer die
- Definition of the press pass line

Sample questions:

- 1C) What is the function of pilots in a progressive die?
- a) Pierce holes in the strip
  - b) Align the strip to the proper location before the spring stripper or punches clamp the part to the die block
  - c) Cut the scrap into manageable lengths
  - d) Clamp the strip in place before the die block enters the strip
- 2C) What is the difference between a progressive die and a transfer die?
- a) A progressive die carries the piece part in a strip and a transfer die cuts off the piece part blank in the first station separating the blank from the strip
  - b) A transfer die carries the piece part in a strip and a progressive die cuts off the piece part blank in the first station separating the blank from the strip
  - c) A transfer die does not have any punches and a progressive die has punches
  - d) A progressive die has only one station and ejects the part from the top of the die while a transfer die has two or more stations and carries the piece part in a strip



- 3C) Define a progression, pitch or advance (all terms are used to represent the same thing):
- a) The shut height of the die; the distance from the bottom of the punch holder (die set) to the top of the die shoe (die set)
  - b) The working length of the pilot
  - c) The distance the punch enters the die block
  - d) The distance the strip is fed for each stroke of the press
- 4C) Define a press pass line:
- a) The distance from one pilot hole to the next adjacent pilot hole in the direction of the feed
  - b) The height of the material strip above the press bolster plate
  - c) The portion of the lower die cutting edge left vertical with no taper angle
  - d) Loop produced by a coil of steel between the straightener and the decoiler
- 5C) What is the function of the pilot release mechanism?
- a) Insures the material is fed accurately with each stroke of the press
  - b) Uncoils the material and introduces inverted coil set
  - c) Releases pressure of the feed rollers to provide time for the pilots to align the strip
  - d) Ejects parts from the die block onto a conveyor
- 6C) What is the purpose of the coil loop for a press with a progressive die?
- a) Releases the feed pressure ahead of the pilot pickup point
  - b) Releases the binding pressure on the stock guides caused by camber in the material
  - c) Insures that material is available for the feed to pull from since the press feeds at a faster rate than the decoiler
  - d) Allows for excessive lubrication to drip into an oil sump

- 7C) What may happen when the dereeler, straightener and feed are not aligned with the die and the press?
- a) The strip will feed normally and the pilots will compensate for misalignment
  - b) The material will bind on the die stock guides causing improper feeding
  - c) The counterbalance will need an additional 30 PSI to compensate for binding
  - d) The roll feed pressure will need to be increased 50% to drive the material into the die

### **Deep Draw Dies**

- Definition of a deep draw
- Function of the draw ring
- Definition of reverse deep drawing
- Function of the knockout bar
- Function of the air cushion
- Pressure produced through nitrogen, springs or rubber
- Root causes of splits and tears

1D) The function of the draw ring is to:

- a) Control metal flow
- b) Reduce stripper travel
- c) Cut the part from the carrier strip
- d) Gage hole diameters

2D) The main function of the air cushion is to:

- a) Control metal flow
- b) Provide resistance
- c) Remove dirt from the die and piece part
- d) Knock slugs from the die blocks

- 3D) What can an operator do to control or alleviate “splits or tearing”?
- a) Sprinkle an oil absorbent material inside the die to prevent excessive lubrication
  - b) Increase the pressure of the air cushion
  - c) Feed more stock per stroke to allow material to flow to thin areas
  - d) Increase the amount of lubrication
- 4D) The function of a nitrogen cylinder on a draw die is to:
- a) Gage the inside diameter of a drawn shell
  - b) Provide resistance pressure for drawing
  - c) Straighten the material after a progressive draw operation
  - d) Check material thickness and lubrication rates
- 5D) Which statement best represents the definition of a deep draw?
- a) A drawn piece part that requires only one drawing operation
  - b) When the outer edges of a blank are drawn entirely past the draw radius
  - c) A drawn shell that must be ejected with one knockout pin
  - d) A piece part that requires two or more drawing operations before completion
- 6D) Reverse deep drawing is best defined as:
- a) A drawn piece part that requires only one draw
  - b) A drawing process that draws the part in the opposite direction of the previous draw
  - c) A piece part that requires two or more drawing operations before completion in the same direction
  - d) A process where the blank is loaded burr up
- 7D) The main function of a knockout bar is to:
- a) Reduce pressure on the material to allow material flow
  - b) Reduce air flow through the die
  - c) Strip the part from the upper die member at TDC
  - d) Adjust the air pressure in the die cushion

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**Stamping Level II**  
**Single Hit Tooling, Compound Dies,**  
**Progressive Dies and Deep Draw Dies**  
**Sample Test Answers**

- |       |       |       |       |
|-------|-------|-------|-------|
| 1) B  | 18) C | 35) A | 52) A |
| 2) D  | 19) C | 36) E | 53) D |
| 3) A  | 20) D | 37) D | 54) D |
| 4) C  | 21) D | 38) C | 55) C |
| 5) B  | 22) A | 39) B | 56) A |
| 6) D  | 23) C | 40) A | 57) B |
| 7) A  | 24) C | 41) B | 58) D |
| 8) B  | 25) B | 42) C | 59) C |
| 9) D  | 26) A | 43) A | 60) D |
| 10) A | 27) B | 44) D | 61) C |
| 11) C | 28) C | 45) C | 62) A |
| 12) B | 29) C | 46) C | 63) C |
| 13) C | 30) A | 47) B | 64) A |
| 14) C | 31) D | 48) C | 65) A |
| 15) A | 32) B | 49) B | 66) D |
| 16) D | 33) C | 50) A | 67) C |
| 17) A | 34) A | 51) B | 68) B |

- |       |       |       |
|-------|-------|-------|
| 69) C | 89) D | 1C) B |
| 70) B | 90) D | 2C) A |
| 71) C | 91) B | 3C) D |
| 72) E | 92) D | 4C) B |
| 73) A | 93) A | 5C) C |
| 74) E | 94) C | 6C) C |
| 75) B | 1A) A | 7C) B |
| 76) E | 2A) A | 1D) B |
| 77) C | 3A) C | 2D) A |
| 78) B | 4A) B | 3D) D |
| 79) A | 5A) A | 4D) B |
| 80) B | 6A) B | 5D) D |
| 81) C | 7A) A | 6D) B |
| 82) A | 1B) D | 7D) C |
| 83) C | 2B) E |       |
| 84) D | 3B) A |       |
| 85) B | 4B) C |       |
| 86) B | 5B) B |       |
| 87) A | 6B) B |       |
| 88) B | 7B) A |       |