

Fundamentals of Geometric Dimensioning and Tolerancing Using Critical Thinking Skills

3rd Edition

By Alex Krulikowski

Answers to Questions and Problems

Second Printing

Product #: 1103

Price: \$25.00

Copyright © 2012 Effective Training Inc. All rights reserved.



Effective Training Inc. • www.etinews.com

2118 S. Wayne Rd., Westland, MI 48186 • 1-734-728-0909

If errors or discrepancies are found in the answers provided, please contact Effective Training at 734-728-0909 or by emailing products@etinews.com.

Chapter 1

<i>True / False</i>	<i>Multiple Choice</i>	<i>Application Problems</i>
1. T	1. C	1. ASME Y14.5-2009
2. F	2. A	2. Yes; it may be used as part of a contract, to resolve product acceptance disputes, or to prove compliance with regulations
3. F	3. B	3. It will cost a company in the form of money, time, materials, or customer satisfaction
4. T	4. B	4. Tolerances affect process selection, tooling, and fixturing
5. T	5. A	
6. T		
7. T		

Chapter 2

<i>True / False</i>	<i>Multiple Choice</i>	<i>Application Problems</i>
1. F	1. A	1. 1, 2, 3, 4, 5 – All of the notes under the “NOTES” heading are general notes
2. T	2. A	2. THRU, THRU, 2 SURFACES, ELECTRO ETCH PART NUMBER AND REVISION LETTER HERE 3MM HIGH LETTERS
3. F	3. A	3. None – There are no flags (polygons) around the note numbers
4. T	4. D	4. As labeled: A and G
5. T	5. C	5. As labeled: B and E
6. T	6. A	6. As labeled: C and F
7. F		7. E, F, and G
8. F		8. $59 \pm 1, 12 \begin{smallmatrix} 0 & 32.4 \\ -0.1 & 32.0 \end{smallmatrix}$
9. F		9. Millimeters
10. F		10. Degrees
		11. No; cannot determine if decimal degrees

Chapter 3

<i>True / False</i>	<i>Multiple Choice</i>	<i>Application Problems</i>
1. F	1. D	1. A combination of coordinate tolerancing and GD&T
2. F	2. B	2. Not specified; most inspectors wouldn't report a location for the hole
3. T	3. B	3. None; there is no location relationship tolerance (geometric tolerance) for this hole
4. T	4. D	4. More difficult because coordinate tolerances cannot express many of the relationships required for this part to function, and coordinate tolerances are more vague specifications
5. F	5. C	
6. T	6. C	
7. T	7. B	
8. F	8. B	
9. F		

Chapter 4

True / False	Multiple Choice	Application Problems
1. F 2. F 3. T 4. F 5. T 6. F 7. T	1. D 2. A 3. C 4. B 5. A 6. A	

Chapter 5

True / False	Multiple Choice	Application Problems																		
1. T 2. F 3. T 4. T 5. T 6. F 7. T	1. C 2. A 3. B 4. B 5. A 6. C 7. A	1. Labels B, G, H, D, and N 2. Labels J and F 3. A. Two parallel planes B. MMC = 18.4, LMC = 17.4 C. Non-opposed 4. 2X with a position tolerance and all around with a profile tolerance 5. <table border="1"> <thead> <tr> <th>Dimension</th><th>MMC</th><th>LMC</th></tr> </thead> <tbody> <tr> <td>B</td><td>43.5</td><td>42.5</td></tr> <tr> <td>D</td><td>40.1</td><td>39.7</td></tr> <tr> <td>G</td><td>53.8</td><td>53.4</td></tr> <tr> <td>H</td><td>2.2</td><td>2.0</td></tr> <tr> <td>N</td><td>3.95</td><td>4.05</td></tr> </tbody> </table>	Dimension	MMC	LMC	B	43.5	42.5	D	40.1	39.7	G	53.8	53.4	H	2.2	2.0	N	3.95	4.05
Dimension	MMC	LMC																		
B	43.5	42.5																		
D	40.1	39.7																		
G	53.8	53.4																		
H	2.2	2.0																		
N	3.95	4.05																		

Chapter 6

True / False	Multiple Choice	Application Problems
1. T 2. F 3. T 4. F 5. F 6. T 7. T 8. T	1. B 2. B 3. B 4. B 5. C	1. C 2. D 3. C 4. A 5. A 6. A

Chapter 7

True / False	Multiple Choice	Application Problems
1. T	1. D	1. Yes; ASME Y14.5-2009 is specified
2. T	2. B	2. Dimensions B, C, and D
3. F	3. D	3. Dimension B: 35.3mm cylinder; dimension C: 2 parallel planes 57mm apart; dimension D: 8mm cylinder
4. F	4. B	4. Title block tolerance
5. F	5. A	5. Dimension A: the independency symbol is specified
6. F	6. A	
7. F		
8. T		
9. T		

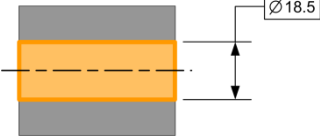
Chapter 8

True / False	Multiple Choice	Application Problems
1. T	1. C	1. 2 parallel planes 65.5mm apart; Rule #1 MMC boundary = outer boundary
2. T	2. A	2. 18.2mm cylinder; Rule #1 MMC boundary = outer boundary
3. T	3. D	3. 17.2 and a 17.3mm cylinder; Rule #1 MMC boundary and a virtual condition relative to datum A
4. F	4. A	4. 2; Rule #1 MMC boundary and a virtual condition
5. F	5. B	5. 0.3
6. F	6. D	

Chapter 9

True / False	Multiple Choice	Application Problems
1. F	1. C	1. A
2. T	2. B	2. C
3. T	3. B	3. Yes
4. T	4. C	4. Yes
5. T	5. C	5. Yes
6. F	6. A	6. 0.4
		7. 1) ASME Y14.5-2009
		2) Feature of size
		3) Yes
		4) 8.3-wide virtual condition boundary
		5) 0.9
		6) Not applicable
		7) Form

Chapter 10

True / False	Multiple Choice	Application Problems															
1. F 2. F 3. T 4. T 5. T 6. F 7. F 8. F	1. A 2. D 3. B 4. D 5. B 6. C	1. F and C 2. A, B, and D 3. 2 parallel lines 0.5mm apart 4. 0.4 5. 0.6 6. <div style="text-align: center;">  </div> 7. Using an optical comparator 8. <ol style="list-style-type: none"> 1) ASME Y14.5-2009 2) Line elements of 18.2 diameter 3) Yes 4) 2 parallel lines 0.05mm apart 5) 0.05 6) Not applicable 7) Form 9. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Straightness Tolerance</th><th style="text-align: center;">Standard- Compliant</th><th style="text-align: center;">Explanation</th></tr> </thead> <tbody> <tr> <td style="text-align: center;">Ⓐ</td><td style="text-align: center;">Yes</td><td></td></tr> <tr> <td style="text-align: center;">Ⓑ</td><td style="text-align: center;">No</td><td>Tolerance value is not less than the size tolerance at each end point of the cone.</td></tr> <tr> <td style="text-align: center;">Ⓒ</td><td style="text-align: center;">Yes</td><td></td></tr> <tr> <td style="text-align: center;">Ⓓ</td><td style="text-align: center;">Yes</td><td></td></tr> </tbody> </table>	Straightness Tolerance	Standard- Compliant	Explanation	Ⓐ	Yes		Ⓑ	No	Tolerance value is not less than the size tolerance at each end point of the cone.	Ⓒ	Yes		Ⓓ	Yes	
Straightness Tolerance	Standard- Compliant	Explanation															
Ⓐ	Yes																
Ⓑ	No	Tolerance value is not less than the size tolerance at each end point of the cone.															
Ⓒ	Yes																
Ⓓ	Yes																

Chapter 11

True / False	Multiple Choice	Application Problems
1. T 2. T 3. F 4. F 5. F 6. T	1. C 2. A 3. C 4. B 5. B 6. D	1. Yes 2. 0.4 3. 2 concentric circles 0.02 radial distance apart 4. No; the diameter symbol is not allowed 5. <ol style="list-style-type: none"> 1) ASME Y14.5-2009 2) Each circular cross section 3) Yes 4) 2 concentric circles 0.02 radial distance apart 5) 0.02 6) Not applicable 7) Form

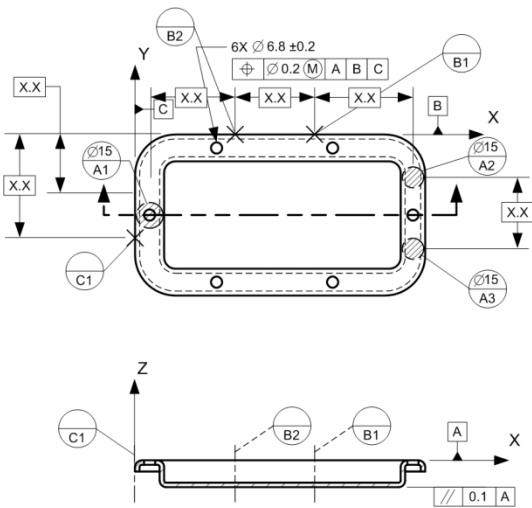
Chapter 12

True / False	Multiple Choice	Application Problems
1. F 2. F 3. T 4. F 5. F 6. F 7. F	1. B 2. A 3. A 4. B 5. C 6. B	1. No; must be applied to a cylindrical surface 2. Yes; circularity can be applied to each circular element of a cone 3. C 4. D 5. 1) ASME Y14.5-2009 2) 18.2 diameter cylindrical surface 3) Yes 4) 0.3 radial space between 2 coaxial cylinders 5) 0.3 6) Not applicable 7) Form

Chapter 13

True / False	Multiple Choice	Application Problems																																																												
1. T 2. F 3. T 4. T 5. F 6. T 7. F 8. T 9. F	1. B 2. A 3. C 4. D 5. C 6. A 7. D	1. None; datum features are not referenced in the feature control frames 2. Datum feature A 3. A minimum of three points of contact 4. Three degrees of freedom 5. Nothing is specified; a general angular tolerance would apply 6. Translation along the X, Y, and Z axes and (u, v, w) rotation around the X, Y, and Z axes 7. a. 3 b. 2 c. 1 8. Translation along the X axis 9. Translation along the Y axis and (w) rotation around the Z axis 10. Datum reference frame symbol 11. Datum feature symbol 12.																																																												
		<table><tr><th>Dimension Number</th><th>Dimension measured from datum reference frame ABC</th><th>Dimension is not related to a datum reference frame</th><th>Describe how the part is held to measure the dimension</th></tr><tr><td>①</td><td></td><td>X</td><td>Set on datum feature B</td></tr><tr><td>②</td><td></td><td></td><td></td></tr><tr><td>③</td><td></td><td>X</td><td>Set on datum feature C</td></tr><tr><td>④</td><td></td><td>X</td><td>Size measurement normal to opposed surface elements</td></tr><tr><td>⑤</td><td></td><td></td><td>Part rests on datum feature A primary and B secondary (partial datum reference frame)</td></tr><tr><td>⑥</td><td></td><td></td><td>Basic dimensions are not measured (they define true position)</td></tr><tr><td>⑦</td><td></td><td></td><td>Basic dimensions are not measured (they define true position)</td></tr><tr><td>⑧</td><td></td><td>X</td><td>Size measurement normal to opposed surface elements</td></tr><tr><td>⑨</td><td></td><td></td><td>Basic dimensions are not measured (they define true position)</td></tr><tr><td>⑩</td><td></td><td>X</td><td>Size measurement normal to opposed surface elements</td></tr><tr><td>⑪</td><td>X</td><td></td><td>Set on datum feature A primary, datum feature B secondary, and datum feature C tertiary</td></tr><tr><td>⑫</td><td></td><td></td><td>Part rests on datum feature A only (partial datum reference frame)</td></tr><tr><td>⑬</td><td></td><td>X</td><td>High to low point measurement normal to reference plane</td></tr><tr><td>⑭</td><td></td><td>X</td><td>Size measurement normal to opposed surface elements</td></tr></table>	Dimension Number	Dimension measured from datum reference frame ABC	Dimension is not related to a datum reference frame	Describe how the part is held to measure the dimension	①		X	Set on datum feature B	②				③		X	Set on datum feature C	④		X	Size measurement normal to opposed surface elements	⑤			Part rests on datum feature A primary and B secondary (partial datum reference frame)	⑥			Basic dimensions are not measured (they define true position)	⑦			Basic dimensions are not measured (they define true position)	⑧		X	Size measurement normal to opposed surface elements	⑨			Basic dimensions are not measured (they define true position)	⑩		X	Size measurement normal to opposed surface elements	⑪	X		Set on datum feature A primary, datum feature B secondary, and datum feature C tertiary	⑫			Part rests on datum feature A only (partial datum reference frame)	⑬		X	High to low point measurement normal to reference plane	⑭		X	Size measurement normal to opposed surface elements
Dimension Number	Dimension measured from datum reference frame ABC	Dimension is not related to a datum reference frame	Describe how the part is held to measure the dimension																																																											
①		X	Set on datum feature B																																																											
②																																																														
③		X	Set on datum feature C																																																											
④		X	Size measurement normal to opposed surface elements																																																											
⑤			Part rests on datum feature A primary and B secondary (partial datum reference frame)																																																											
⑥			Basic dimensions are not measured (they define true position)																																																											
⑦			Basic dimensions are not measured (they define true position)																																																											
⑧		X	Size measurement normal to opposed surface elements																																																											
⑨			Basic dimensions are not measured (they define true position)																																																											
⑩		X	Size measurement normal to opposed surface elements																																																											
⑪	X		Set on datum feature A primary, datum feature B secondary, and datum feature C tertiary																																																											
⑫			Part rests on datum feature A only (partial datum reference frame)																																																											
⑬		X	High to low point measurement normal to reference plane																																																											
⑭		X	Size measurement normal to opposed surface elements																																																											

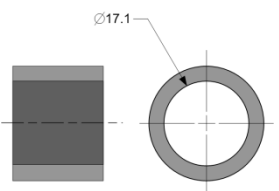
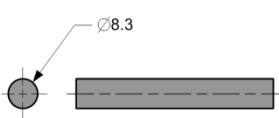
Chapter 14

True / False	Multiple Choice	Application Problems
1. F 2. T 3. T 4. F 5. T 6. F	1. D 2. B 3. C 4. C 5. C	1. C 2. B 3. A 4. D 5.  6. Translation along the X, Y, and Z axes and rotation around the X, Y and Z axes (u, v, w) 7. Translation along the Z axis and rotation around the X and Y axes (u, v) 8. Yes, the position tolerance uses a complete datum reference frame constraining all 6 degrees of freedom; the part will make the same part to gage contact every time 9. No; The parallelism tolerance does not reference a complete datum reference frame. Therefore, all size degrees of freedom are not constrained and the part to gage setup will not be repeatable.

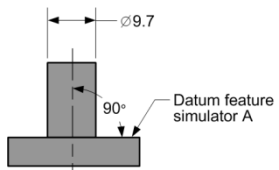
Chapter 15

True / False	Multiple Choice	Application Problems
1. T 2. F 3. F 4. T 5. T 6. T	1. B 2. B 3. D 4. B 5. A	1. B 2. C 3. C 4. D 5. C 6. Translation along the X and Y axes and rotation around the X and Y axes (u, v) 7. Translation along the X, Y, and Z axes and rotation around the X and Y axes (u, v) 8. Translation along the X, Y, and Z axes and rotation around the X and Y axes (u, v)

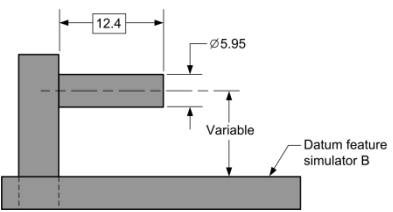
Chapter 16

True / False	Multiple Choice	Application Problems
1. F 2. T 3. T 4. F 5. T 6. T 7. T 8. F	1. A 2. B 3. B 4. B 5. B	1. A – zero B – 0.7 (18.2-17.5) C – 0.4 (18.2-17.8) D – Zero between holes; 0.7 hole pattern location, and 0.8 orientation of hole pattern 2. A pin with a 17.8 diameter 3. A pin with a 17.5 diameter 4.  5. 

Chapter 17

True / False	Multiple Choice	Application Problems
1. F 2. T 3. F 4. T 5. T 6. T	1. C 2. C 3. D 4. B 5. A 6. B	1. C 2. C 3. C 4. A 5. 1) ASME Y14.5-2009 2) Surface E 3) Yes 4) 2 parallel planes 0.1mm apart 5) 0.1 6) 2 gage surfaces perpendicular to each other 7) Orientation and form 6. A. Yes B. No, cannot be applied to a pattern C. Yes D. Yes E. No, the MMC modifier is not allowed with a surface application F. No, the diameter symbol is not allowed with a surface application 7. 

Chapter 18

True / False	Multiple Choice	Application Problems
1. T 2. T 3. F 4. F 5. F 6. F	1. B 2. A 3. C 4. B 5. A 6. A	1. A No; the tolerance value must be less than the size tolerance B No; the hole is not parallel to datum feature A C Yes D Yes E No; the surface is not parallel to datum feature A F No; the tolerance feature and the datum feature cannot be the same feature 2.  3. 1) ASME Y14.5-2009 2) VC acceptance boundary of the hole 3) Yes 4) 5.9 diameter virtual condition boundary 5) 0.9 6) Two gage surfaces perpendicular to each other 7) Orientation 4. A 5.9 diameter gage pin parallel to both datum feature simulators A and B, but adjustable in location 5. Use a dial indicator and a height gage. Rest the part on datum simulator C and zero the indicator on the surface and move it around. The full indicator reading must be equal or less than 0.3mm 6. For a hole, a best fit gage pin is pushed into the hole and a dial indicator is used to measure the deviation of the gage pin

Chapter 19

True / False	Multiple Choice	Application Problems
1. T 2. F 3. T 4. F 5. T 6. F	1. A 2. B 3. D 4. D 5. C	1. B 2. The tangent plane must be within the tolerance zone and the low points of the surface do not. 3. 2 parallel planes 0.3 apart 45° to datum plane A and perpendicular to datum plane B 4. D 5. Yes 6. Yes 7. No; a datum reference is required 8. Yes 9. 1) ASME Y14.5-2009 2) All surface elements of the surface 3) Yes 4) 2 parallel planes 0.1 apart at 30° from datum plane A 5) 0.1 6) A surface plate planar gage surface 7) Orientation and form 10. 1) ASME Y14.5-2009 2) The axis of the hole 3) Yes 4) 0.2 diameter cylinder 5) 0.2 6) A surface plate or planar gage surface 7) Orientation

Chapter 20

True / False	Multiple Choice	Application Problems																									
1. T 2. F 3. F 4. F 5. T 6. T	1. B 2. B 3. B 4. A 5. A	1. C 2. A 3. C 4. C 5. <table border="1"><thead><tr><th></th><th>Spacing</th><th>Location</th><th>Coaxiality</th><th>Symmetrical Relationship</th></tr></thead><tbody><tr><td>A</td><td></td><td></td><td>X</td><td></td></tr><tr><td>B</td><td></td><td></td><td></td><td>X</td></tr><tr><td>C</td><td></td><td>X</td><td></td><td></td></tr><tr><td>F</td><td>X</td><td></td><td></td><td></td></tr></tbody></table>		Spacing	Location	Coaxiality	Symmetrical Relationship	A			X		B				X	C		X			F	X			
	Spacing	Location	Coaxiality	Symmetrical Relationship																							
A			X																								
B				X																							
C		X																									
F	X																										
		6. A Illegal – position tolerances require a datum reference except for coaxial relationships B Legal C Illegal – position tolerances must be applied to a feature of size D Illegal – basic dimensions must be used to define true position relative to the datums referenced																									

Chapter 21

<i>True / False</i>	<i>Multiple Choice</i>	<i>Application Problems</i>
1. T	1. B	1. C
2. F	2. C	2. A
3. T	3. B	3. A
4. F	4. C	4. 1) ASME Y14.5-2009
5. F	5. D	2) 38.0-38.6 width
6. F		3) Yes
7. T		4) 39.0 wide VC boundary
8. F		5) 1.3
		6) A – a plane, B – 11.7 wide VC boundary perpendicular to datum plane A
		7) Location and orientation
		5. 1) ASME Y14.5-2009
		2) $\varnothing 12$ hole
		3) Yes
		4) A $\varnothing 11.4$ VC boundary
		5) 0.8
		6) C – a plane, A – a plane perpendicular to datum plane C, and B – 11.7 wide boundary
		7) Location and orientation
		6. 1) ASME Y14.5-2009
		2) $\varnothing 4$ hole
		3) Yes
		4) $\varnothing 3.9$ cylindrical VC boundary
		5) 0.2
		6) C – a plane, F – a $\varnothing 11.75$ VC boundary perpendicular to datum plane C, and A – a plane parallel to datum F and perpendicular to datum C
		7) Location and orientation

Chapter 22

<i>True / False</i>	<i>Multiple Choice</i>	<i>Application Problems</i>
1. T	1. B	1.
2. T	2. B	1) ASME Y14.5-2009
3. T	3. A	2) Four $\varnothing 4.0$ -4.4 holes
4. F	4. B	3) Yes
5. F	5. B	4) Four $\varnothing 3.8$ cylindrical boundaries
6. F	6. B	5) 0.6
7. T		6) A plane primary and a variable cylinder secondary
8. T		7) Orientation and location
		2.
		1) ASME Y14.5-2009
		2) A pattern of 2 holes
		3) Yes
		4) Two opposed lines 9.8 wide and two opposed lines 9.4 high
		5) 0.8 horizontal, 0.2 vertical
		6) Plane – primary; variable planes – secondary, plane – tertiary
		7) Orientation and location
		3. 0.6
		4. 0
		5. A. $\varnothing 1.0$
		B. $\varnothing 0.5$
		C. $\varnothing 0.2$
		D. $\varnothing 0.2$

Chapter 23

<i>True / False</i>	<i>Multiple Choice</i>	<i>Application Problems</i>
1. F	1. D	1. 0.7 clearance hole; 0.7 threaded hole
2. T	2. D	2. 0.35 clearance hole; 1.05 threaded hole
3. F	3. B	3. 1.4; 1.4
4. F	4. B	
5. F		

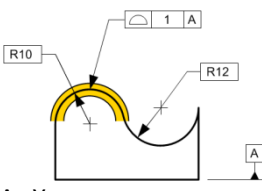
Chapter 24

True / False	Multiple Choice	Application Problems																				
1. T 2. T 3. T 4. F 5. F 6. T 7. T 8. F 9. T 10. F	1. D 2. A 3. C 4. B 5. B 6. A 7. B 8. B	1. 1) ASME Y14.5-2009 2) Both $\varnothing 6.0$ -6.4 3) Yes 4) Two coaxial circles separated by 0.3 5) 0.3 6) A single variable diameter cylinder 7) Coaxiality, parallelism, and circularity 2. 1) ASME Y14.5-2009 2) $\varnothing 12.4$ -12.6 3) Yes 4) Two coaxial cylinders separated by 0.1 5) 0.1 6) A single variable diameter cylinder 7) Coaxiality, parallelism, and cylindricity 3. A Yes B Yes C No; cannot use the \textcircled{M} modifier D No; cannot use the \varnothing modifier 4. <table border="1"> <thead> <tr> <th rowspan="2">QUESTION</th><th colspan="2">APPLIES TO</th></tr> <tr> <th>DIA F</th><th>DIA G</th></tr> </thead> <tbody> <tr> <td>The size of the diameter is limited to. . .</td><td>$\varnothing 12.6$ 12.4</td><td>$\varnothing 36.5$ 36.0</td></tr> <tr> <td>The circularity of the diameter is limited to. . .</td><td>0.1</td><td>0.6</td></tr> <tr> <td>The maximum offset between the diameter axis and datum axis A is. . .</td><td>0.05</td><td>0.6</td></tr> <tr> <td>Describe the tolerance zone for the runout tolerance applied to the surface.</td><td>Two coaxial cylinders 0.1 apart</td><td>Two coaxial circles 1.2 apart</td></tr> <tr> <td>What is the outer boundary of this diameter?</td><td>$\varnothing 12.7$</td><td>$\varnothing 37.7$</td></tr> </tbody> </table> 5. B Yes C Yes D No; the \textcircled{S} modifier is not used in Y14.5-2009 E No; the \textcircled{P} modifier cannot be applied to runout tolerances F No; runout tolerances must be reference a datum axis	QUESTION	APPLIES TO		DIA F	DIA G	The size of the diameter is limited to. . .	$\varnothing 12.6$ 12.4	$\varnothing 36.5$ 36.0	The circularity of the diameter is limited to. . .	0.1	0.6	The maximum offset between the diameter axis and datum axis A is. . .	0.05	0.6	Describe the tolerance zone for the runout tolerance applied to the surface.	Two coaxial cylinders 0.1 apart	Two coaxial circles 1.2 apart	What is the outer boundary of this diameter?	$\varnothing 12.7$	$\varnothing 37.7$
QUESTION	APPLIES TO																					
	DIA F	DIA G																				
The size of the diameter is limited to. . .	$\varnothing 12.6$ 12.4	$\varnothing 36.5$ 36.0																				
The circularity of the diameter is limited to. . .	0.1	0.6																				
The maximum offset between the diameter axis and datum axis A is. . .	0.05	0.6																				
Describe the tolerance zone for the runout tolerance applied to the surface.	Two coaxial cylinders 0.1 apart	Two coaxial circles 1.2 apart																				
What is the outer boundary of this diameter?	$\varnothing 12.7$	$\varnothing 37.7$																				

Chapter 25

<i>True / False</i>	<i>Multiple Choice</i>	<i>Application Problems</i>
1. T 2. F 3. T 4. T 5. T 6. F 7. F 8. T	1. C 2. C 3. A 4. C 5. C 6. B 7. C 8. A	1. 1) ASME Y14.5-2009 2) The median points of the 56mm diameter 3) Yes 4) 0.15mm diameter cylinder 5) 0.15 6) A variable size cylinder contracted about the high points of the surface 7) Location and orientation 2. C 3. D 4. B 5. A. No; a datum reference is required B. No; the MMC and MMB modifiers are not allowed C. No; symmetry cannot be applied to a diameter D. No; the LMC modifier is not allowed E. No; the tolerance feature is not symmetrical to the datum feature referenced F. No; the projected tolerance zone modifier is not allowed G. Yes H. Yes J. No; the toleranced feature is not symmetrical to the datum features referenced

Chapter 26

<i>True / False</i>	<i>Multiple Choice</i>	<i>Application Problems</i>
1. F 2. T 3. F 4. F 5. T 6. F 7. T 8. F	1. D 2. D 3. A 4. C 5. B 6. B 7. A 8. C	1.  2. A Yes B Yes C Yes D No, the MMC modifier is not allowed in the tolerance portion of the feature control frame

Chapter 27

<i>True / False</i>	<i>Multiple Choice</i>	<i>Application Problems</i>
1. T 2. F 3. F 4. T 5. T 6. F 7. F	1. A 2. A 3. B 4. C 5. A 6. B 7. C 8. D	1. A Location, orientation, and form B Location and form (circularity) C Orientation and form 2. 1) ASME Y14.5-2009 2) The spherical diameter surface elements 3) Yes 4) 0.1 radial space between 2 concentric hemispheres 5) 0.1 6) Cylinder of variable size (i.e. chuck or collet) and planar surface perpendicular to primary simulator 7) Location, form and size 3. A Form B Orientation and form C Orientation and form D Location relative to datum C E Orientation, form, size of radius and location relative to datum B F Location relative to datum B G Orientation relative to datum A, form and size of radius H Location relative to datum B I Orientation relative to datum C and location relative to datum A J Size and form 4. Only the one with a single geometric tolerancing symbol and multiple tolerance segments; as labeled: H-I-J 5. Those with multiple geometric feature control frames attached as one tolerance; as labeled: D-E and F-G