



Metrology Lab 1 : MDP 387
Assignment No. 2

Q1: In a dimensioning system, what do understand by each of the Fundamental deviation. Grade of tolerance. Tolerance zone.

Q2: State and explain Taylor's principle for the design of limit gauges.

Q3: A 100 mm g8 shaft is to be checked by a "Go" "No-Go" snap gauge. Assuming 5% wear allowance and 10% gauge maker's tolerance (% of tolerance of the shaft), design the required gauges. (The tolerance according to IT8 = 50 microns, The fundamental deviation for G = 10 microns).

W. P information:

Nominal Size	
Tolerance grade	
Tolerance value	
Fit Type	
Fundamental dev	
Min size	
Max size	

Nominal size

Gauges information:

	Min	Max



Q4: A 100 mm F8 hole is to be checked by a “Go” “No-Go” snap gauge. Assuming 5% wear allowance and 10% gauge maker’s tolerance of tolerance of the hole, design the required gauges. (The tolerance according to IT8 = 50 microns, the fundamental deviation for F = 10 microns).

	Gage type	Min Size	Max Size
Workshop	Go		
	No Go		
Inspection	Go		
	No Go		

Discuss the acceptance status of the following 10 shafts

100.011	100.012	100.015	100.025
100.030	100.055	100.058	100.060

if they are checked using the two limit gauges 100.059 and 100.013 mm

Dimension				
100.011				
100.012				
100.015				
100.025				
100.030				
100.055				
100.058				
100.060				

Q5: Design the required gauges to check a 120 mm H5. Assuming 5% wear allowance and 10% gauge maker’s tolerance, the tolerance according to IT5 and IT6 are 40 and 60 micron for 100 mm and 50 and 80 micron for 120mm

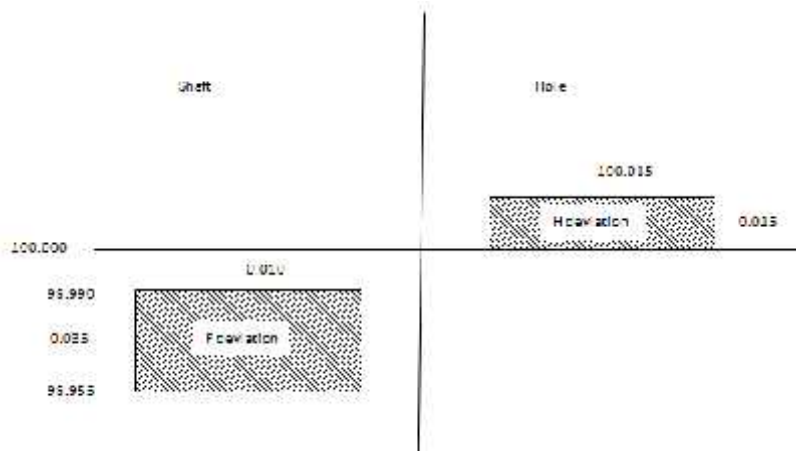
- Calculate the dimension of the workshop limit gauges in its best case; reject Min. No. of accepted hole WP.
- Calculate the dimensions of the workshop limit gauges in its worst case; reject Max. No. of accepted hole WP.
- Discuss the acceptance status of the following 8 holes

120.000	120.012	120.025	120.073
120.006	120.016	120.068	120.080

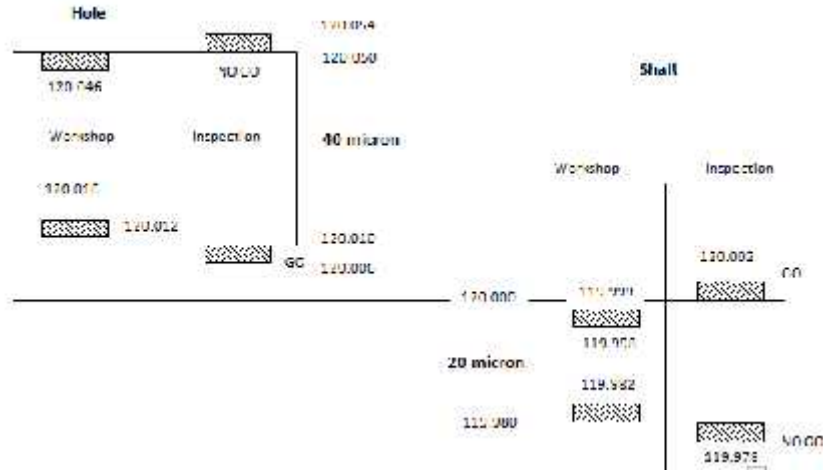
if they are checked using the following workshop limit gauges 120.066 and 120.015 mm

Solved Example

- 1- Find the maximum or minimum (clearance or interference) for a 100 H5/f7. Also identify dimensions of hole and shaft; nominal, minimum and maximum. (fill the results in the following table) (Note: the tolerance according to IT5 and IT7 are 15 and 35 micron, the fundamental deviation = 10 micron; . Design the required gauges to check a 120 mm h5/F6 pair using limit gauges. Assuming 5% wear allowance and 10% for gauge tolerance, the tolerance according to IT5 and IT6 are 20 and 40 micron, the fundamental deviation for $f = 10$ microns

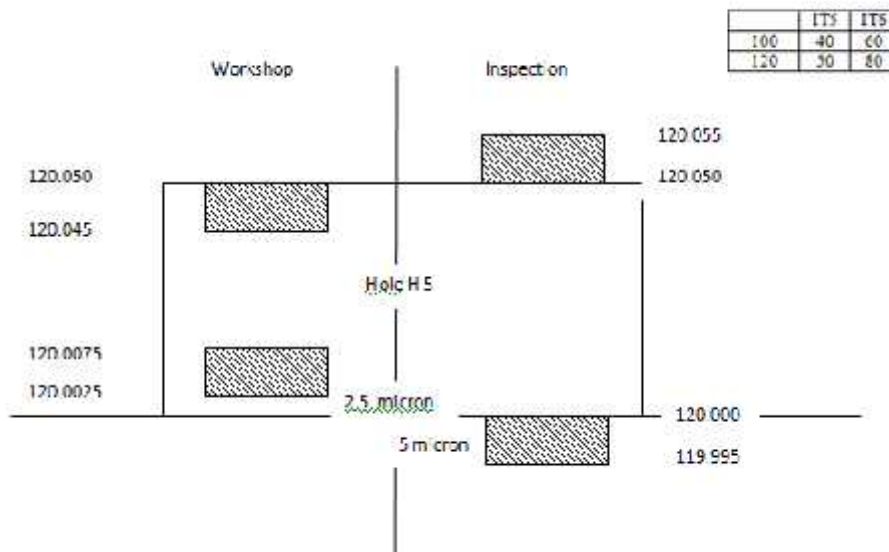


	Hole	Shaft
Nominal Size	100.000 mm	
Max Dimension	100.015 mm	99.990
Min Dimension	100.000 mm	99.955
Tolerance grade	IT 05	IT 07
Tolerance Value	0.015 mm	0.035 mm
Fit	H	F
Fundamental deviation	0.000	0.010
Max clearance	$100.015 - 100.955 = 0.060$ mm	
Min clearance	$100.000 - 99.990 = 0.010$ mm	
Max interference	$99.900 - 100.000 = -0.010$	zero
Min interference	$99.955 - 100.015 = -0.060$	zero
Interference type	No interference	



	Limit Type	Gauge type	Max	Min
Hole	Workshop	Go	120.016 mm	120.012 mm
		No Go	120.050 mm	120.046 mm
	Inspection	Go	120.010 mm	120.006 mm
		No Go	120.054 mm	120.050 mm
Shaft	Workshop	Go	119.999 mm	119.997 mm
		No Go	119.982 mm	119.980 mm
	Inspection	Go	120.002 mm	120.000 mm
		No Go	119.980 mm	119.978 mm

2. Design the required gauges to check a 120 mm H5. Assuming 5% wear allowance and 10% gauge maker's tolerance, the tolerance according to IT5 and IT6 are 40 and 60 micron for 100 mm and 50 and 80 micron for 120mm.





- Calculate the dimension of the workshop limit gauges in its best case; reject Min. No. of accepted hole WP.

	Go	No Go
Dims	120.0025	120.050

- Calculate the dimensions of the workshop limit gauges in its worst case; reject Max. No. of accepted hole WP.

	Go	No Go
Dims	120.0075	120.045

- Calculate the dimension of the inspection limit gauges in its best case; Accept Min. No. of rejected hole WP.

	Go	No Go
Dims	120.000	120.050

- Calculate the dimensions of the inspection limit gauges in its worst case; Accept Max. No. of rejected hole WP.

	Go	No Go
Dims	119.995	120.055

- Discuss the acceptance status of the following 8 holes if they are checked using the following workshop limit gauges 120.004 and 120.048 mm.

119.995	120.000	120.002	120.003
120.005	120.047	120.050	120.055

WP	Direct measurement decision	Limit gauges			Decision Correctness
		Go status	No Go status	Limit decision	
119.995	Reject	N	N	Reject	Correct
120.000	Accept	N	N	Reject	Incorrect
120.002	Accept	N	N	Reject	Incorrect
120.003	Accept	N	N	Reject	Incorrect
120.005	Accept	G	N	Accept	Correct
120.047	Accept	G	N	Accept	Correct
120.050	Accept	G	G	Reject	Incorrect
120.055	Reject	G	G	Reject	Correct