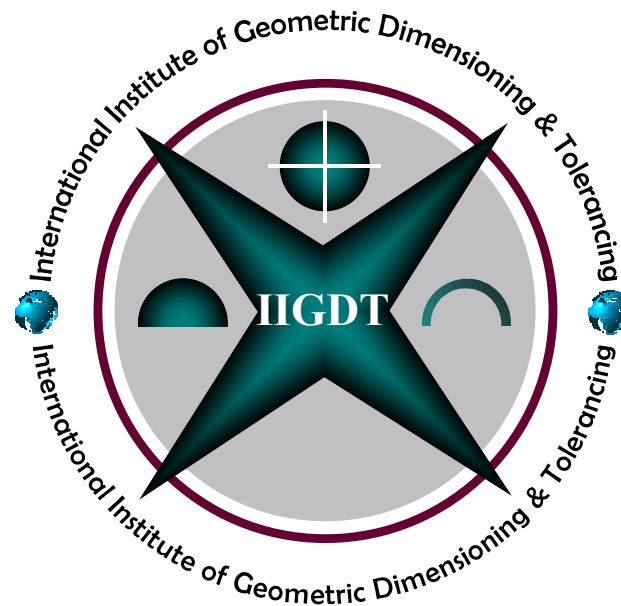


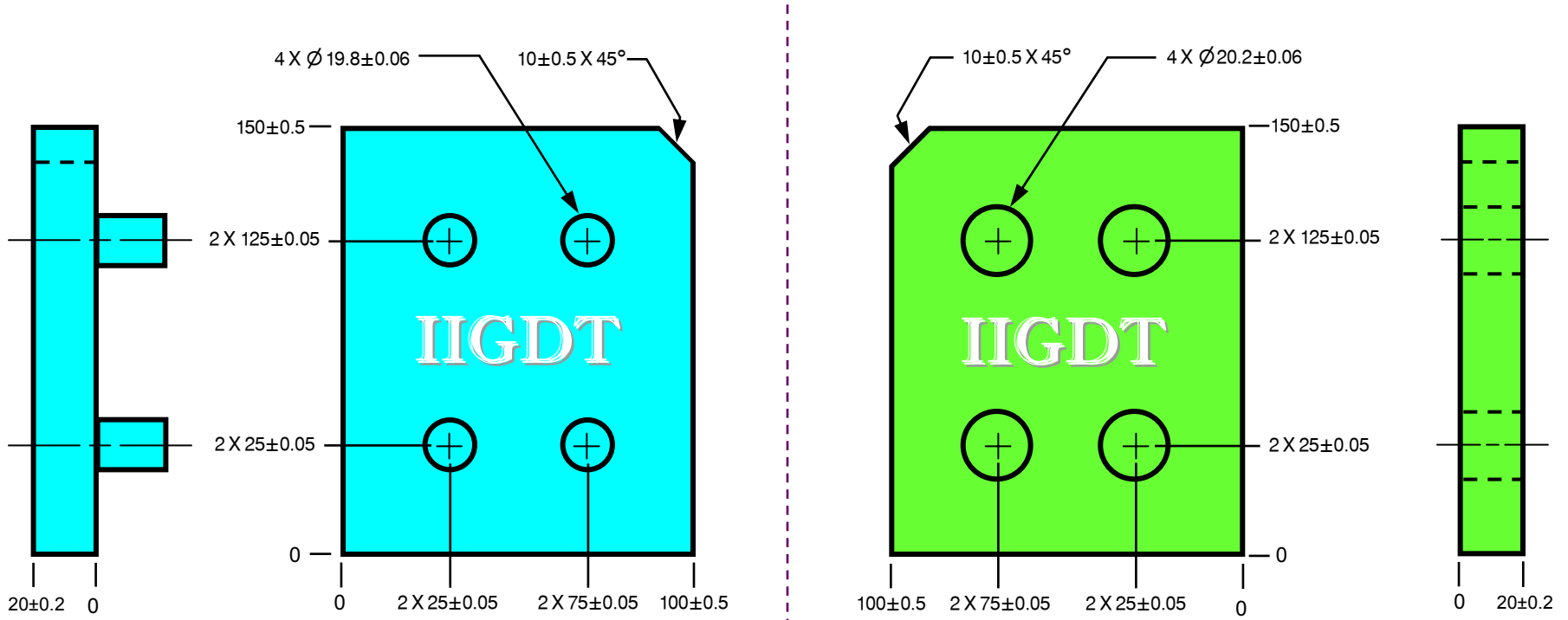


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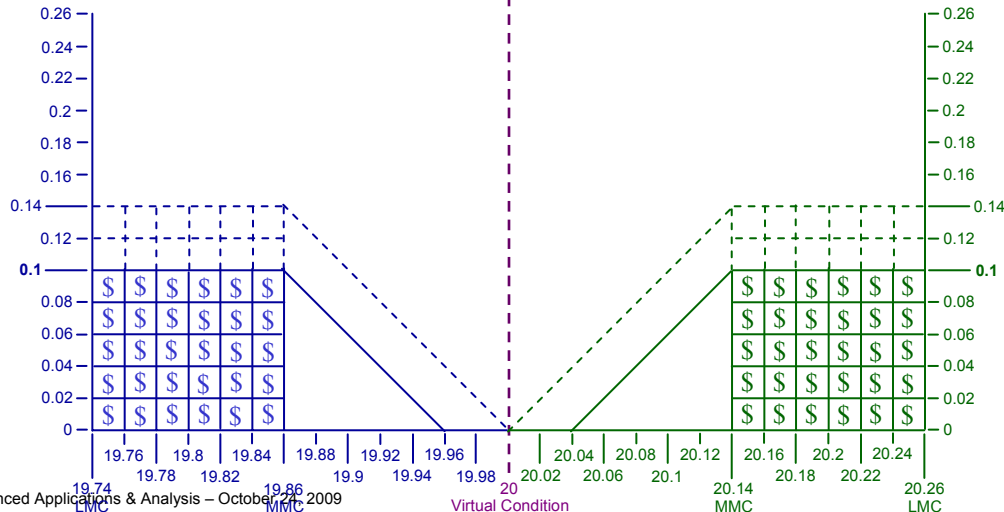


## *Tolerancing Transformation (Multiple Hole Pattern) Linear to $\phi\textcircled{S}$ , $\phi\textcircled{M}$ and $\phi\textcircled{M}$ @ Zero Tolerance*

# Tolerancing Consideration #1

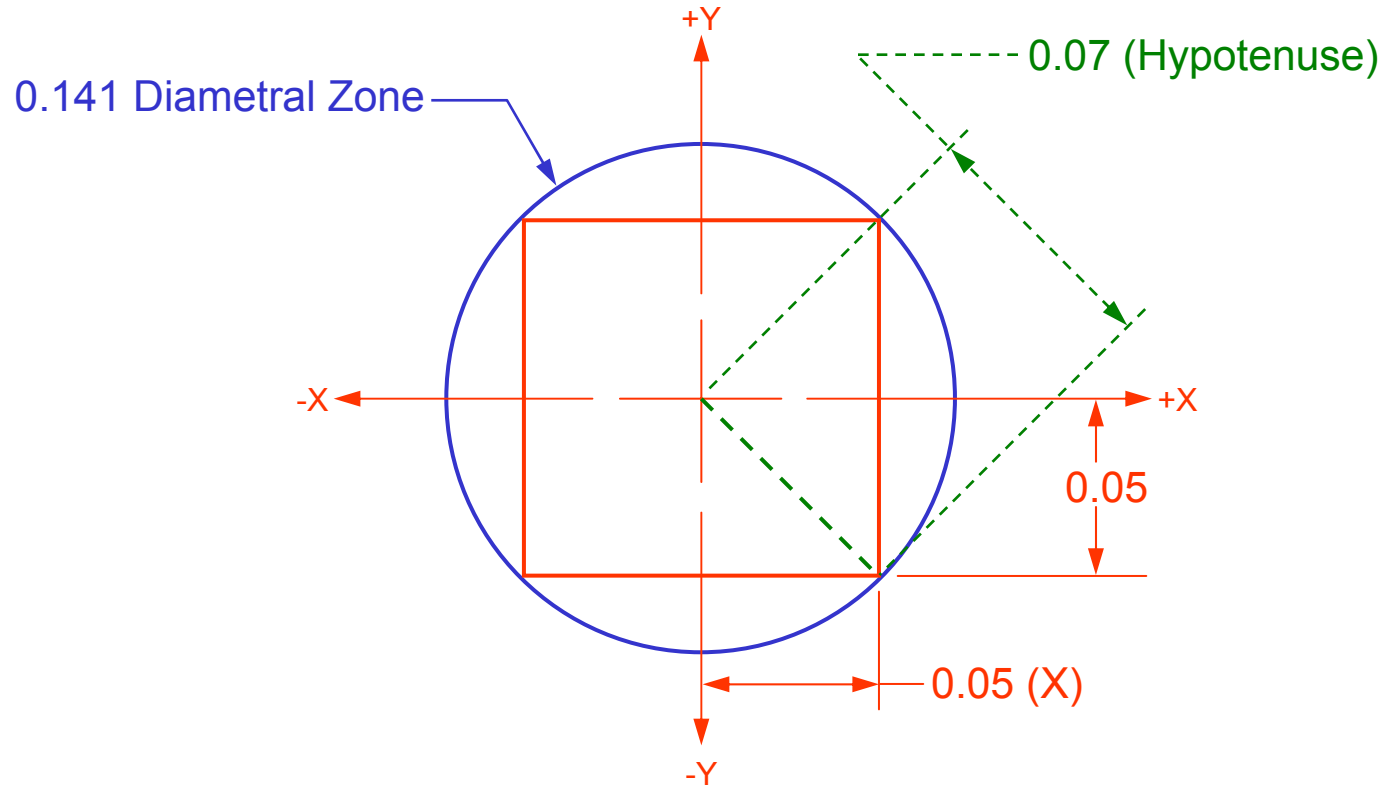


Only in Diagonals



Only in Diagonals

# Conversion of Square to Diametral Zone



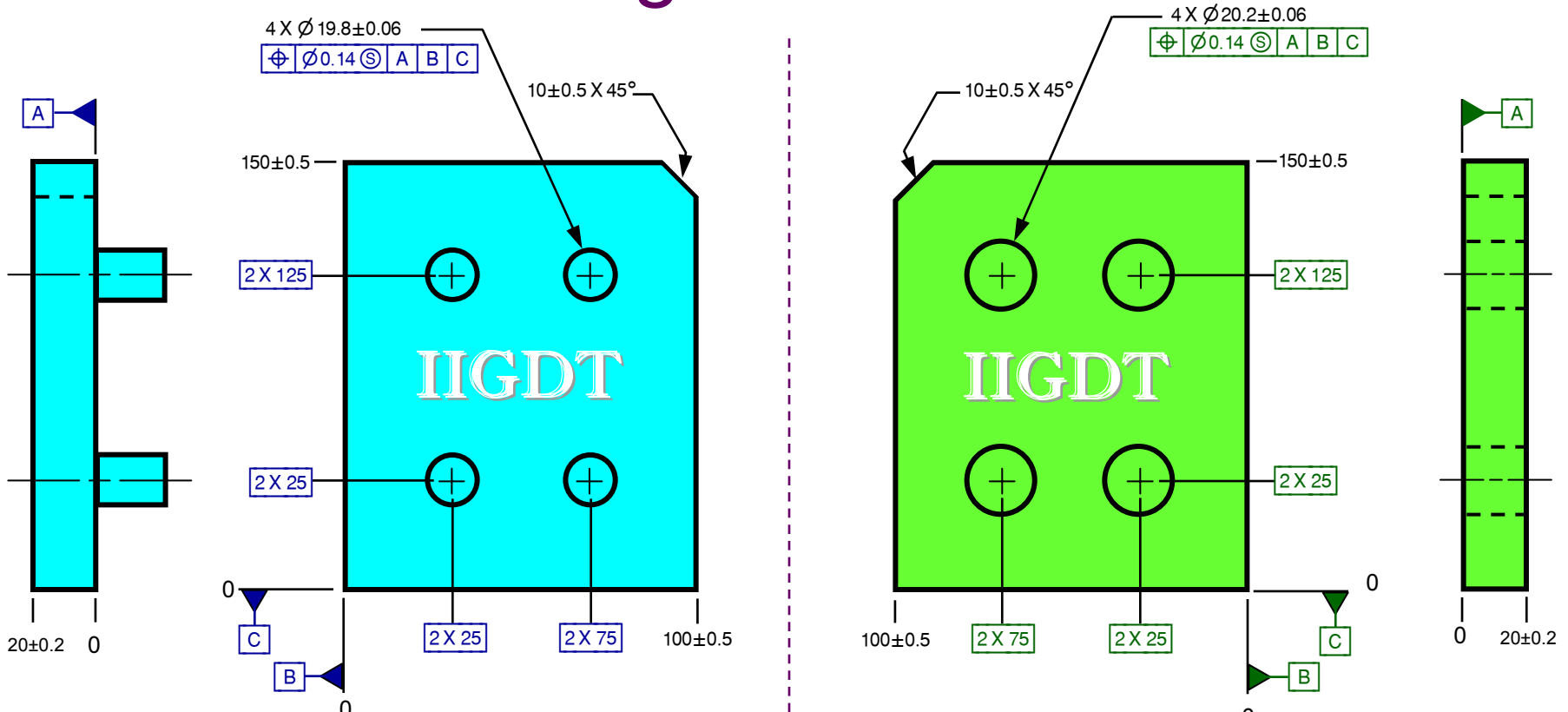
$$2\sqrt{\Delta X^2 + \Delta Y^2} = \text{Diametral } (\phi) \text{ Tolerance Zone}$$

$$2\sqrt{0.05^2 + 0.05^2} = 2(0.07) = \phi 0.14 \text{ Tolerance Zone}$$

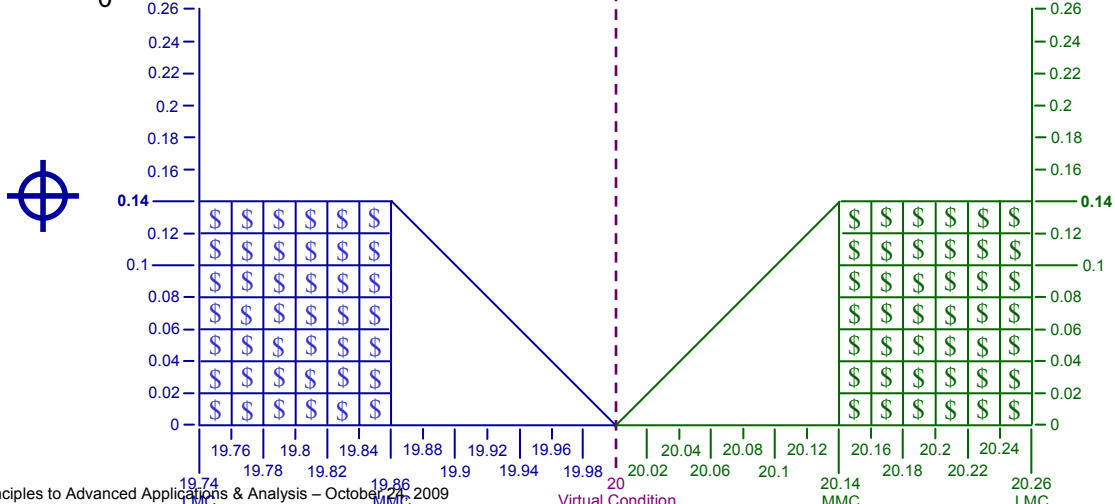
Benefits of Changing Square Tolerance Zone to Diametral Tolerance Zone:

1. Increases Position Tolerance by 57%
2. Allows usage of Material Condition Principles (MMC, LMC & RFS)
3. Better Represents Majority of Design Applications

# Tolerancing Consideration #2

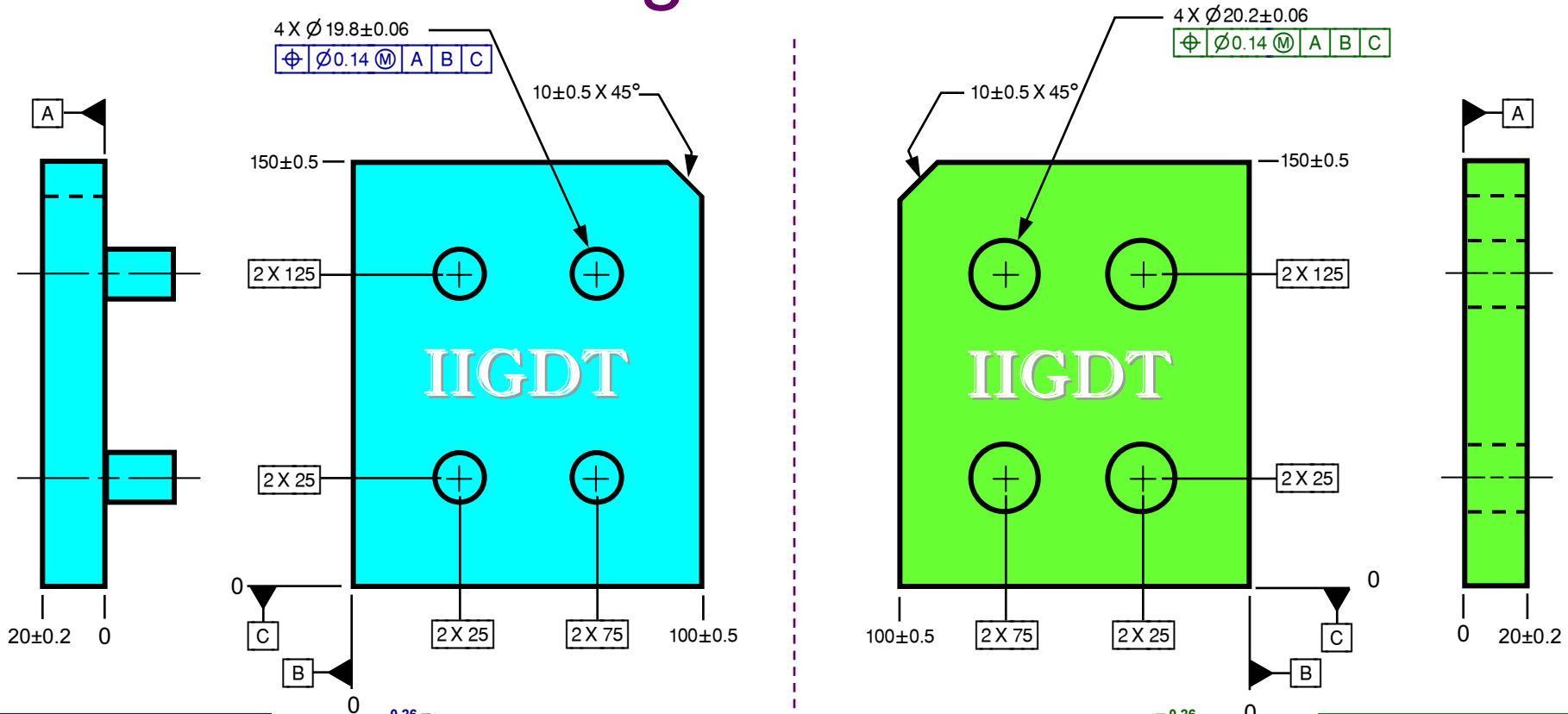


AMS	$\Delta_{RFS}$	$\phi$	VC $\phi$
19.86	0.00	0.14	NA
19.84	0.00	0.14	NA
19.82	0.00	0.14	NA
19.80	0.00	0.14	NA
19.78	0.00	0.14	NA
19.76	0.00	0.14	NA
19.74	0.00	0.14	NA

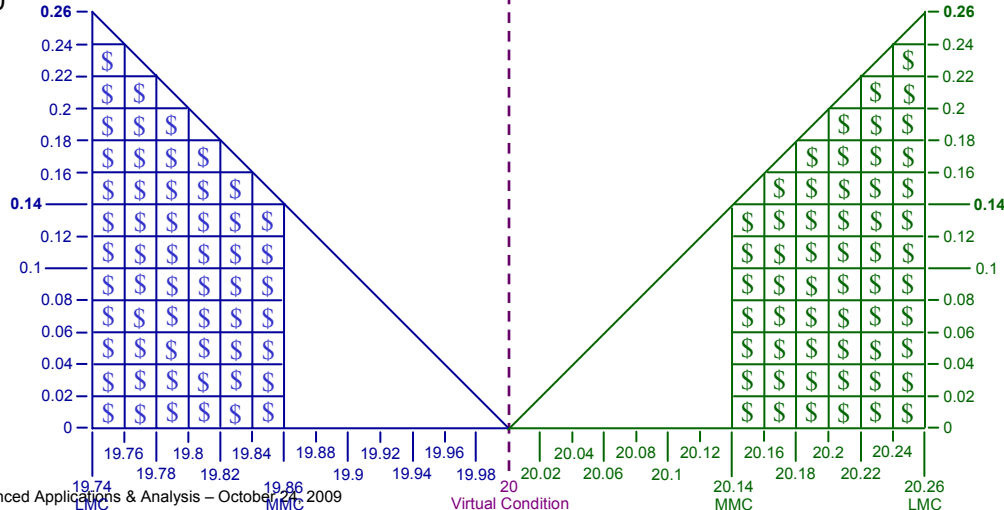


AMS	$\Delta_{RFS}$	$\phi$	VC $\phi$
20.14	0.00	0.14	NA
20.16	0.00	0.14	NA
20.18	0.00	0.14	NA
20.20	0.00	0.14	NA
20.22	0.00	0.14	NA
20.24	0.00	0.14	NA
20.26	0.00	0.14	NA

# Tolerancing Consideration #3

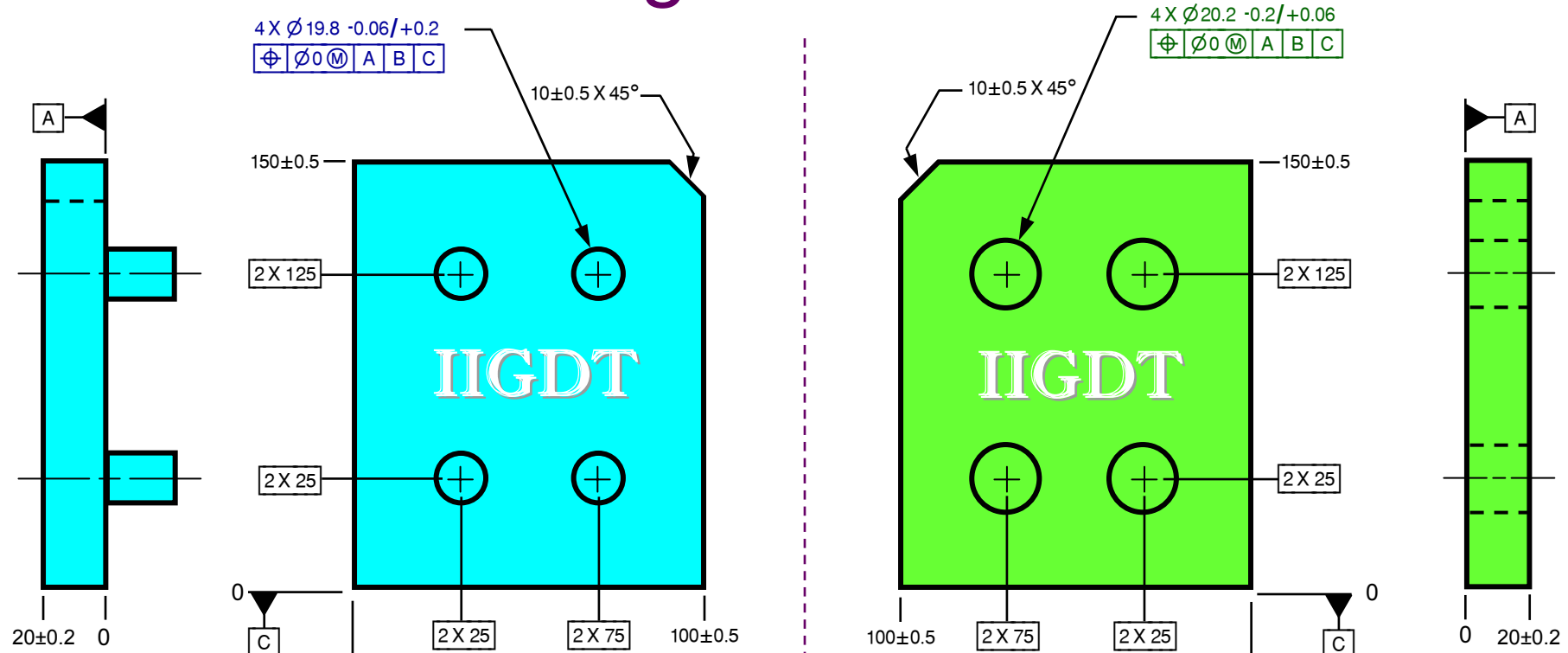


AMS	△MMC	⊕	VC⊕
19.86	0.00	0.14	20.00
19.84	0.02	0.16	20.00
19.82	0.04	0.18	20.00
19.80	0.06	0.20	20.00
19.78	0.08	0.22	20.00
19.76	0.10	0.24	20.00
19.74	0.12	0.26	20.00

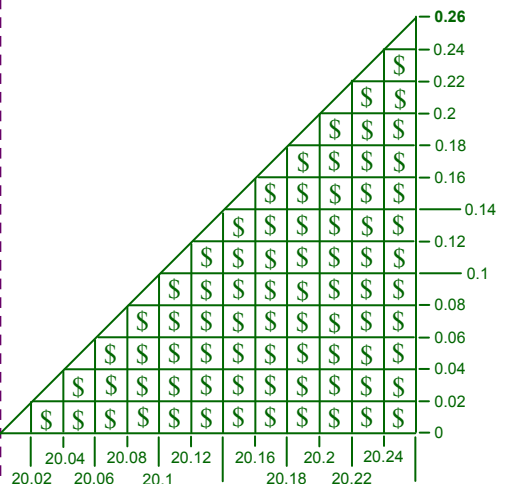
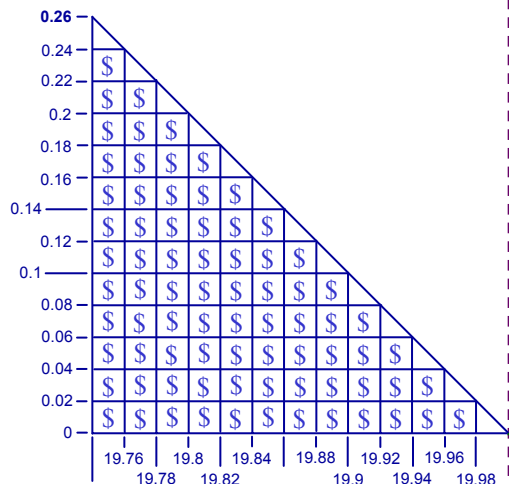


AMS	△MMC	⊕	VC⊕
20.14	0.00	0.14	20.00
20.16	0.02	0.16	20.00
20.18	0.04	0.18	20.00
20.20	0.06	0.20	20.00
20.22	0.08	0.22	20.00
20.24	0.10	0.24	20.00
20.26	0.12	0.26	20.00

# Tolerancing Consideration #4

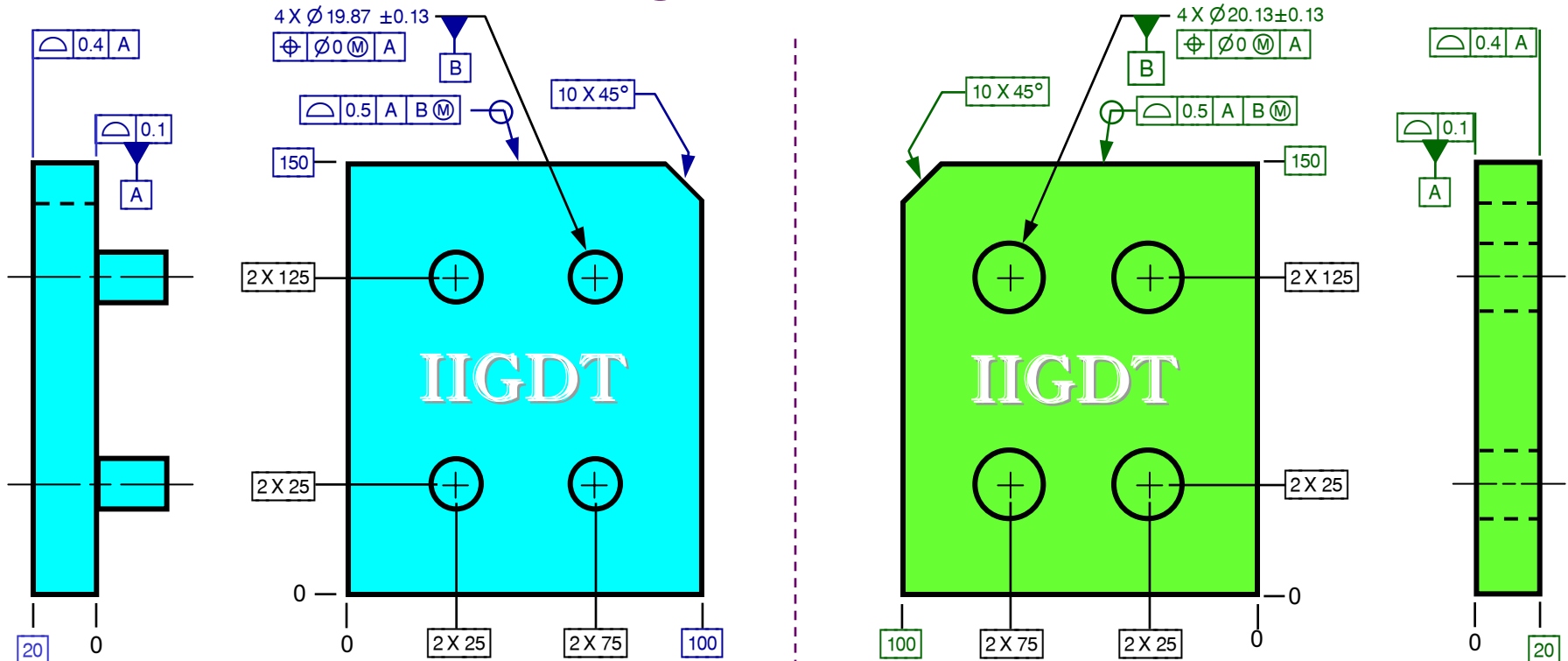


AMS	△MMC	ϕ	VCϕ
20.00	0.00	0.00	20.00
19.98	0.02	0.02	20.00
19.96	0.04	0.04	20.00
19.94	0.06	0.06	20.00
19.92	0.08	0.08	20.00
19.90	0.10	0.10	20.00
19.88	0.12	0.12	20.00
19.86	0.14	0.14	20.00
19.84	0.16	0.16	20.00
19.82	0.18	0.18	20.00
19.80	0.20	0.20	20.00
19.78	0.22	0.22	20.00
19.76	0.24	0.24	20.00
19.74	0.26	0.26	20.00

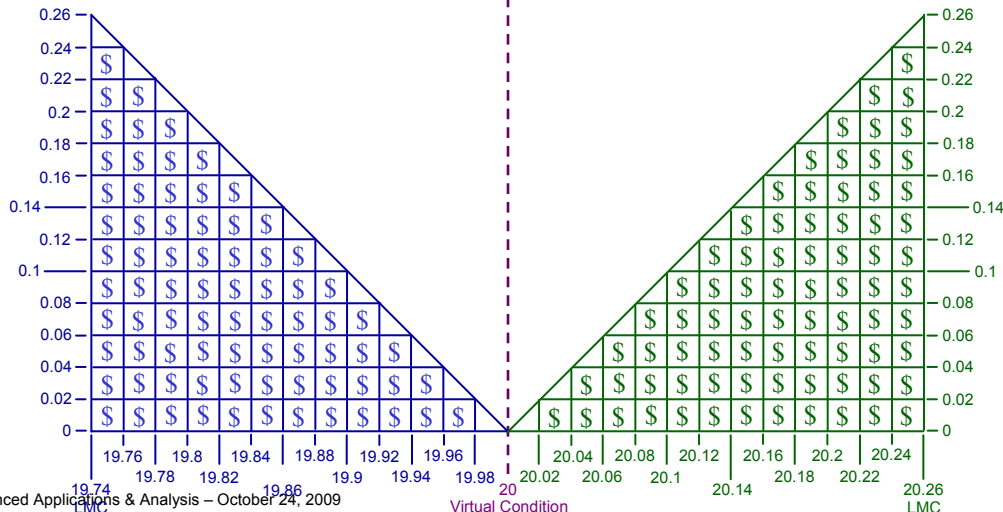


AMS	△MMC	ϕ	VCϕ
20.00	0.00	0.00	20.00
20.02	0.02	0.02	20.00
20.04	0.04	0.04	20.00
20.06	0.06	0.06	20.00
20.08	0.08	0.08	20.00
20.10	0.10	0.10	20.00
20.12	0.12	0.12	20.00
20.14	0.14	0.14	20.00
20.16	0.16	0.16	20.00
20.18	0.18	0.18	20.00
20.20	0.20	0.20	20.00
20.22	0.22	0.22	20.00
20.24	0.24	0.24	20.00
20.26	0.26	0.26	20.00

# Tolerancing Consideration #5

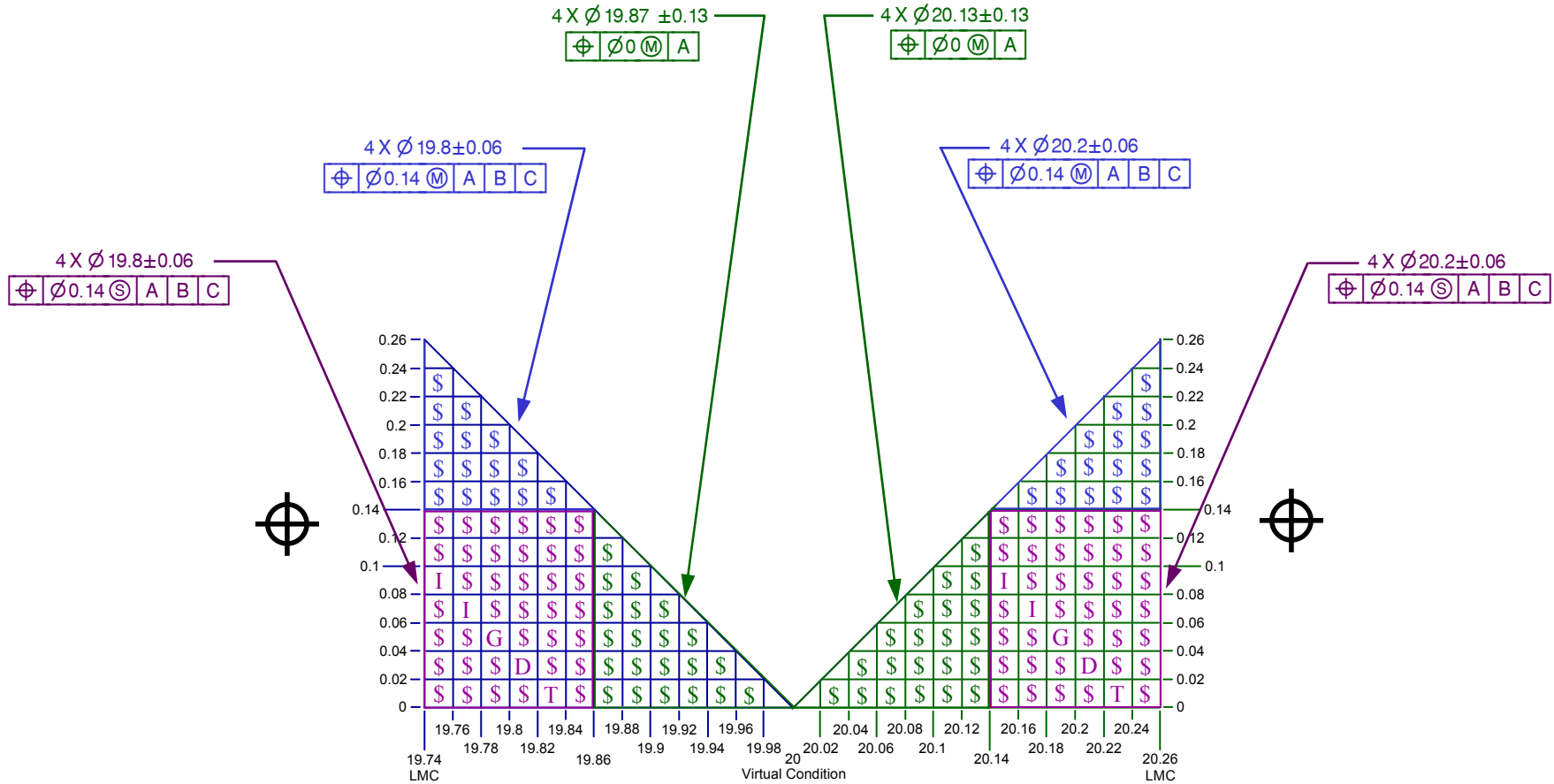


AMS	△MMC	Φ	VCφ
20.00	0.00	0.00	20.00
19.98	0.02	0.02	20.00
19.96	0.04	0.04	20.00
19.94	0.06	0.06	20.00
19.92	0.08	0.08	20.00
19.90	0.10	0.10	20.00
19.88	0.12	0.12	20.00
19.86	0.14	0.14	20.00
19.84	0.16	0.16	20.00
19.82	0.18	0.18	20.00
19.80	0.20	0.20	20.00
19.78	0.22	0.22	20.00
19.76	0.24	0.24	20.00
19.74	0.26	0.26	20.00



AMS	△MMC	Φ	VCφ
20.00	0.00	0.00	20.00
20.02	0.02	0.02	20.00
20.04	0.04	0.04	20.00
20.06	0.06	0.06	20.00
20.08	0.08	0.08	20.00
20.10	0.10	0.10	20.00
20.12	0.12	0.12	20.00
20.14	0.14	0.14	20.00
20.16	0.16	0.16	20.00
20.18	0.18	0.18	20.00
20.20	0.20	0.20	20.00
20.22	0.22	0.22	20.00
20.24	0.24	0.24	20.00
20.26	0.26	0.26	20.00

# Tolerancing Implication Summary





# Exercise

