SPEC89 on IBM 550

	Ratio to VAX		**Time**		**Weighted Time**	
Program	**Before**	**After**	**Before**	**After**	**Before**	**After**
gcc	30	29	49	51	8.91	9.22
espreso	35	34	65	67	7.64	7.86
spice	47	47	510	510	5.69	5.69
doduc	46	49	41	38	5.81	5.45
nasa7	78	144	258	140	3.43	1.86
li	34	34	183	183	7.86	7.86
eqntott	40	40	28	28	6.68	6.68
matrix300	**78**	**730**	**58**	**6**	**3.43**	**0.37**
fpppp	90	87	34	35	2.97	3.07
tomcatv	33	138	20	19	2.01	1.94
	Geometric		Aritmetic		Weighted Arithmetic	
Mean	54	72	124	108	54.42	49.99
Ratio	1.33		1.16		1.09	

Real World Examples (Aug 1993)

Chip	Metal Layers	Line Width	Wafer Cost	Defect /cm^2	Area (mm^2)	Dies/ wafer	Yield	Die Cost
386DX	2	.9	900	1.0	43	360	71%	$4
486DX2	3	.8	1200	1	81	181	54%	$12
PowerPC 601	4	.8	1700	1.3	121	115	28%	$53
HP PA 7100	3	.8	1300	1	196	66	27%	$73
DEC Alpha	3	.7	1500	1.2	234	53	19%	$149
Super-SPARC	3	.7	1700	1.6	256	48	13%	$272
Pentium	3	.8	1500	1.5	296	40	9%	$417

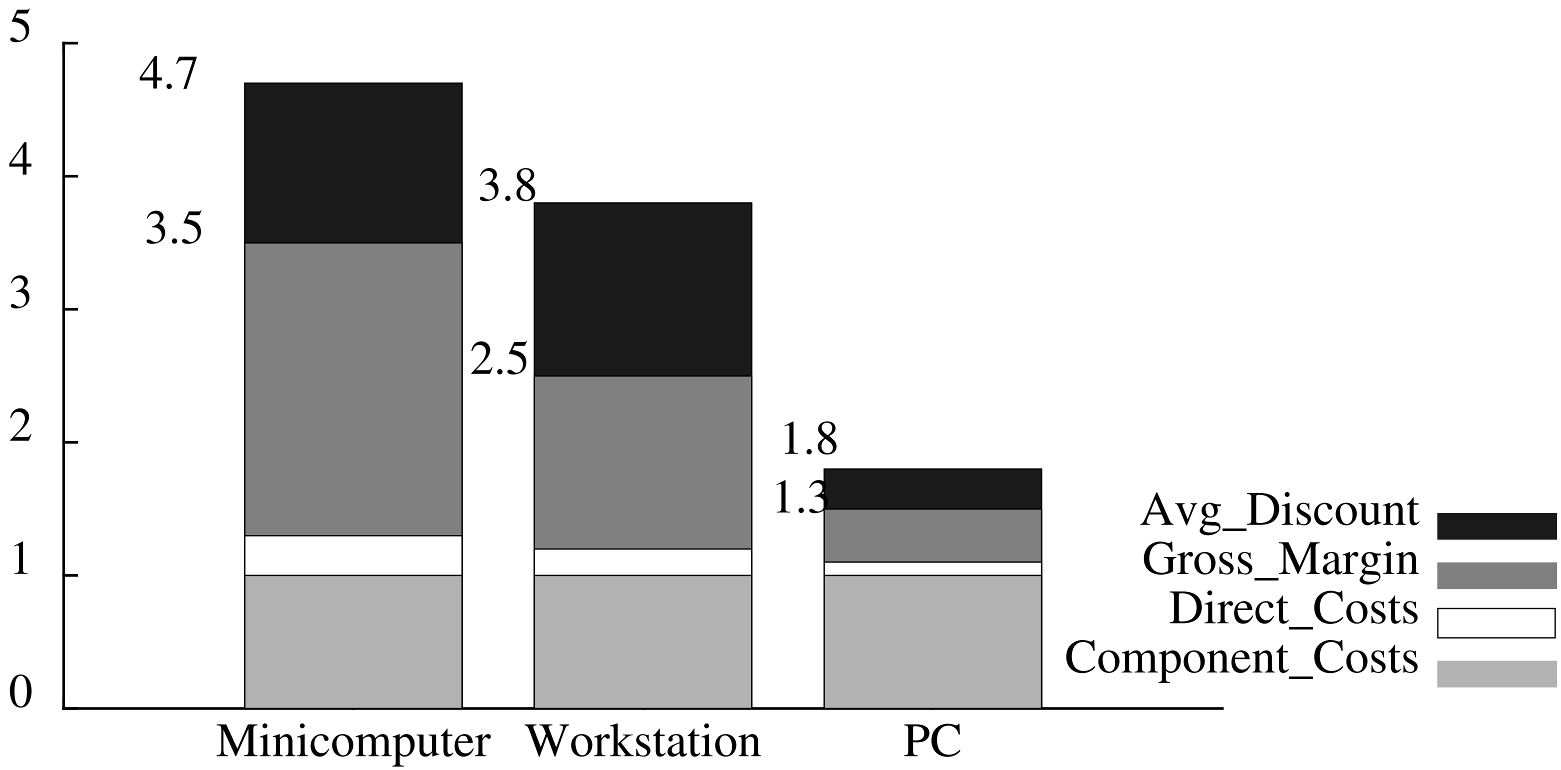
source: “Estimating IC Manufacturing Costs” Linley Gwennap _Microprocessor Report_ Aug 2 1993 p15

Chip Prices (Aug 1993) (10K units price)

Chip	Area (mm^2)	Mfg cost	Price	Multiplier	Comment
386DX	43	$9	$31	3.4	Intense Competition
486DX2	81	$35	$245	7.0	No Competition
PowerPC 601	121	$77	$280	3.6	
DEC Alpha	234	$202	$1231	6.1	Recoup R&D?
Pentium	296	$473	$965	2.0	Early in shipments

source: “Estimating IC Manufacturing Costs” Linley Gwennap _Microprocessor Report_ Aug 2 1993 p15

Margins



5
4
3
2
1
0
4.7
3.5
3.8
2.5
1.8
1.3
Minicomputer
Workstation
PC
Avg_Discount
Gross_Margin
Direct_Costs
Component_Costs

IC Cost

$$\text{IC Cost} = \frac{DieCost + TestingCost + PackagingCost}{FinalTestYield}$$

$$DieCost = \frac{WaferCost}{DiesPerWafer \times DieYield}$$

$$DiesPerWafer = \frac{\pi \times (WaferDiam/2)^2}{DieArea} - \frac{\pi \times WaferDiam}{\sqrt{2 \times DieArea}} - TestDies$$

$$DieYield = WaferYield \times \{1 + (DefectsPerUnitArea \times DieArea)/\alpha\}^{-\alpha}$$