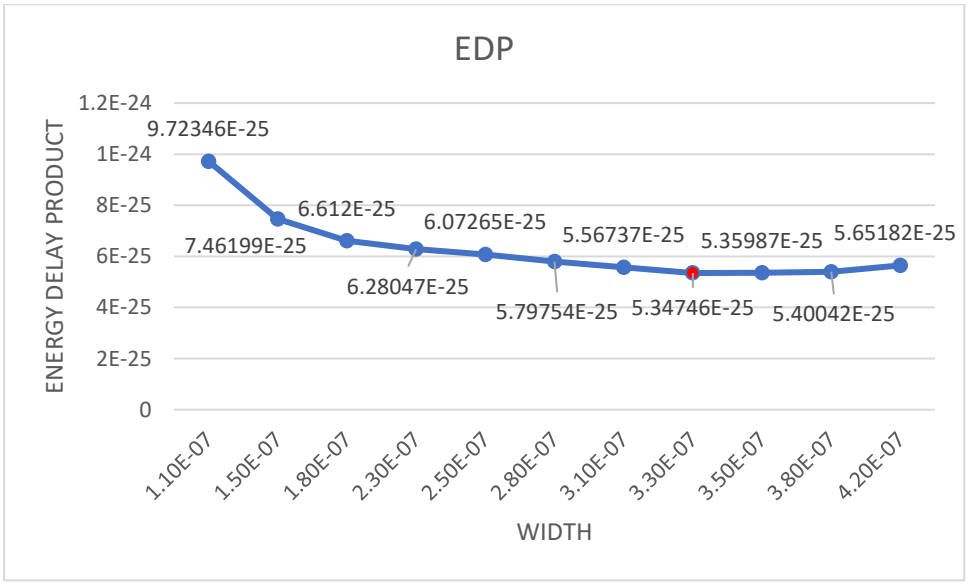
EFFICIENT SAFF DESIGN

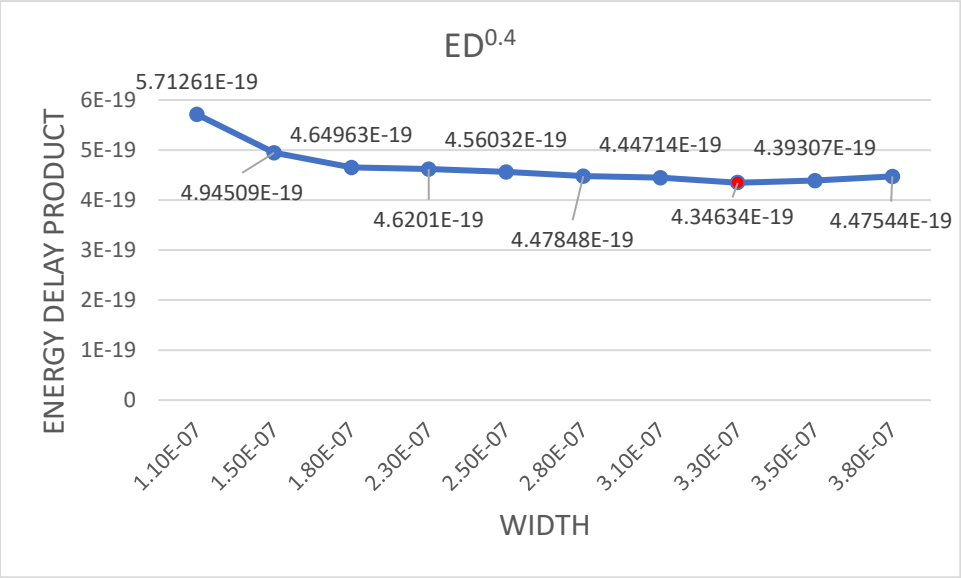
OBSERVING RISE TRANSITION AT OUTPUT SIDE

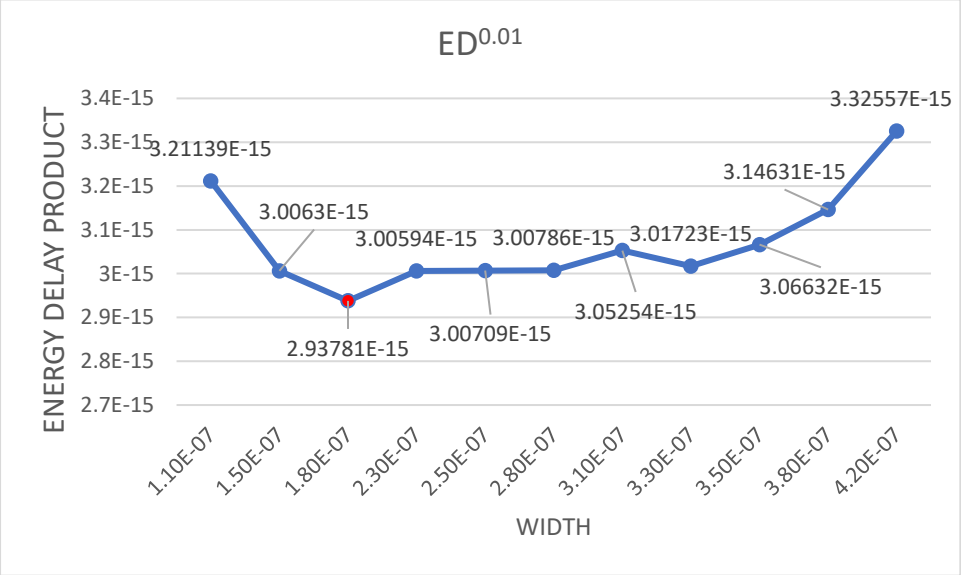
SETUP	CLK-Q	D-Q	POWER	EDP	WIDTH	ENERGY
-6.00E-12	2.49E-10	2.43E-10	1.65E-05	9.72346E-25	1.10E-07	4.00723E-15
-4.00E-12	2.03E-10	1.99E-10	1.89E-05	7.46199E-25	1.50E-07	3.75884E-15
-3.00E-12	1.83E-10	1.80E-10	2.04E-05	6.612E-25	1.80E-07	3.67685E-15
-2.00E-12	1.69E-10	1.67E-10	2.26E-05	6.28047E-25	2.30E-07	3.76494E-15
-1.00E-12	1.62E-10	1.61E-10	2.34E-05	6.07265E-25	2.50E-07	3.76767E-15
-1.00E-12	1.55E-10	1.54E-10	2.45E-05	5.79754E-25	2.80E-07	3.77041E-15
4.00E-12	1.41E-10	1.45E-10	2.63E-05	5.56737E-25	3.10E-07	3.82855E-15
2.00E-12	1.39E-10	1.41E-10	2.68E-05	5.34746E-25	3.30E-07	3.78537E-15
3.00E-12	1.36E-10	1.39E-10	2.76E-05	5.35987E-25	3.50E-07	3.84749E-15
4.00E-12	1.33E-10	1.37E-10	2.89E-05	5.40042E-25	3.80E-07	3.94859E-15
7.00E-12	1.28E-10	1.35E-10	3.08E-05	5.65182E-25	4.20E-07	4.17397E-15

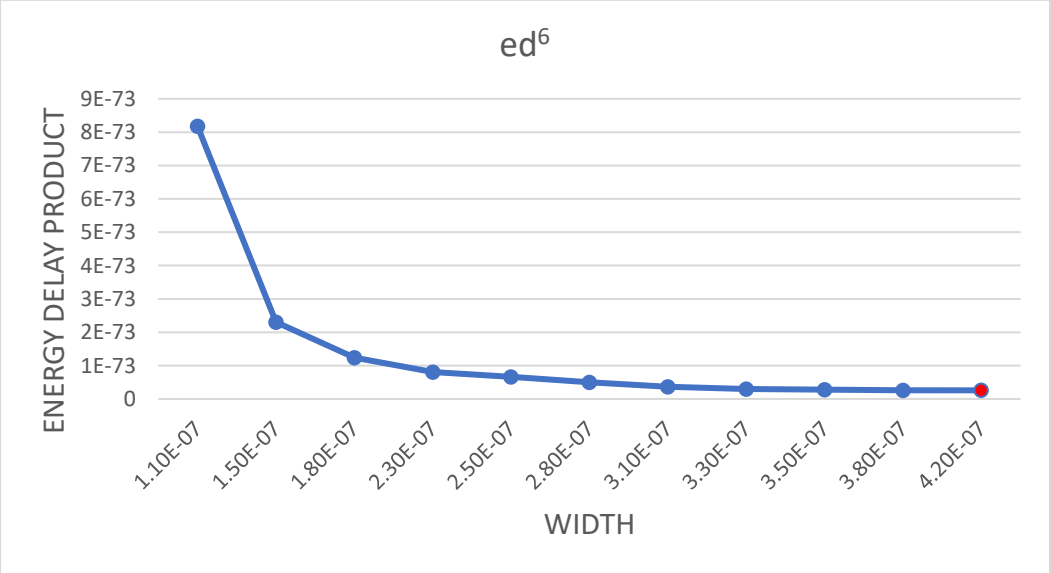
In minimum edp product the delay:139ps, Power: 2.68-05



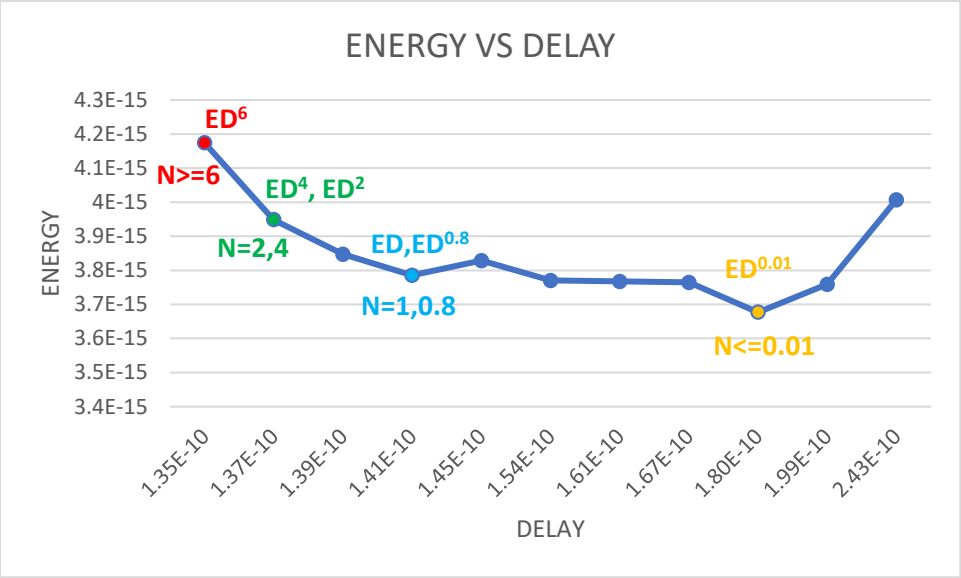
Other cost function graph:







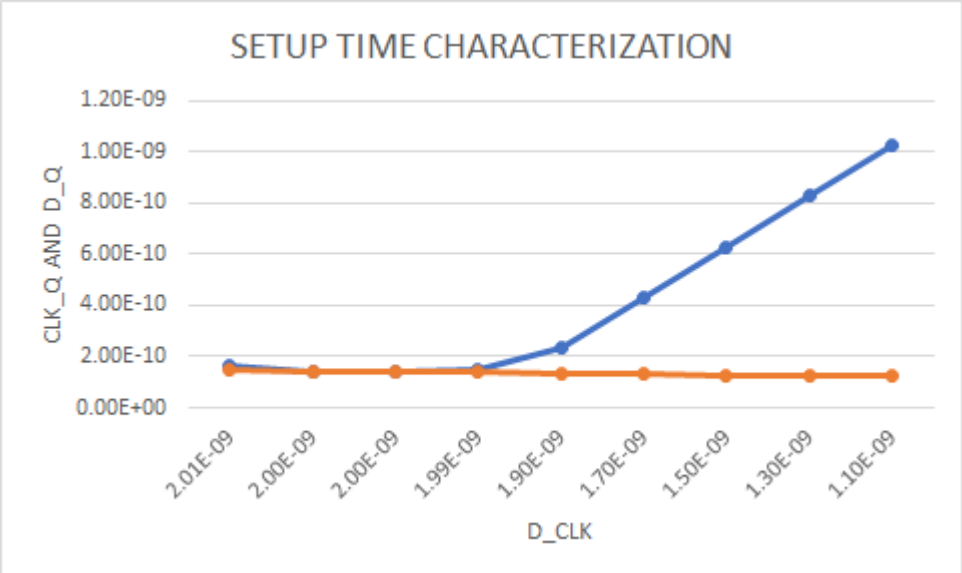
ENERGY wrt DELAY



SETUP TIME CHARACTERIZATION:

RISE TIME SETUP CHARACTERISTICS

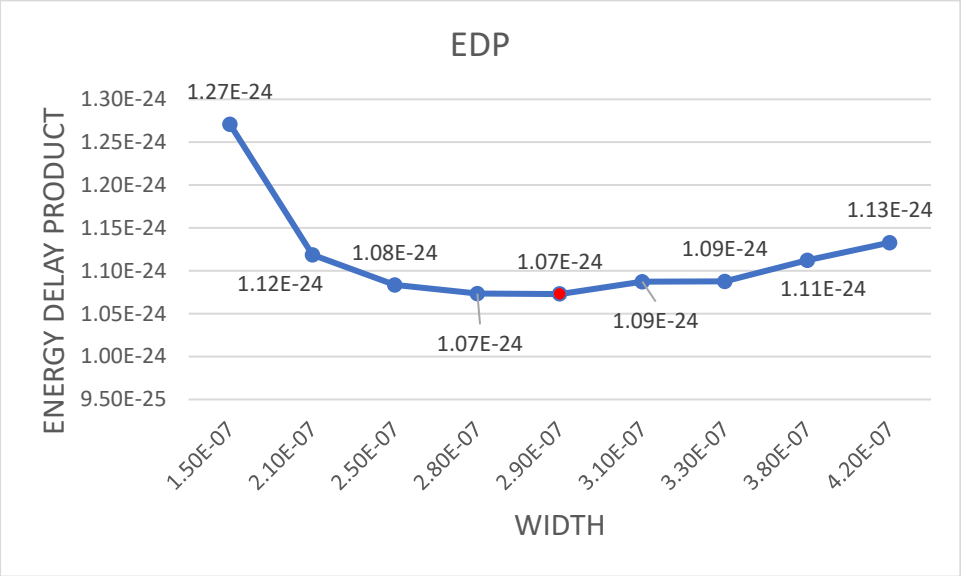
D_CLK	SETUP	CLK_Q	D_Q
2.01E-09	-1.00E-11	1.53E-10	1.63E-10
2.00E-09	-1.00E-12	1.41E-10	1.40E-10
2.00E-09	2.00E-12	1.39E-10	1.41E-10
1.99E-09	1.00E-11	1.38E-10	1.48E-10
1.90E-09	1.00E-10	1.37E-10	2.37E-10
1.70E-09	3.00E-10	1.33E-10	4.33E-10
1.50E-09	6.26E-10	1.26E-10	6.26E-10
1.30E-09	7.00E-10	1.26E-10	8.26E-10
1.10E-09	9.00E-10	1.26E-10	1.03E-09



OBSERVING FALL TRANSITION AT OUTPUT SIDE:

SETUP	CLK-Q	D-Q	POWER	EDP	WIDTH	ENERGY
-7.00E-12	2.49E-10	2.42E-10	2.17E-05	1.27E-24	1.50E-07	5.24922E-15
-1.00E-12	2.12E-10	2.11E-10	2.51E-05	1.12E-24	2.10E-07	5.30177E-15
-1.00E-12	2.00E-10	1.99E-10	2.73E-05	1.08E-24	2.50E-07	5.44316E-15
-1.00E-12	1.93E-10	1.92E-10	2.90E-05	1.07E-24	2.80E-07	5.58078E-15
-1.00E-12	1.91E-10	1.90E-10	2.96E-05	1.07E-24	2.90E-07	5.63285E-15
-1.00E-12	1.90E-10	1.89E-10	3.06E-05	1.09E-24	3.10E-07	5.76597E-15
-1.00E-13	1.85E-10	1.85E-10	3.17E-05	1.09E-24	3.30E-07	5.86958E-15
1.00E-12	1.79E-10	1.80E-10	3.45E-05	1.11E-24	3.80E-07	6.19407E-15
2.00E-12	1.74E-10	1.76E-10	3.67E-05	1.13E-24	4.20E-07	6.45132E-15

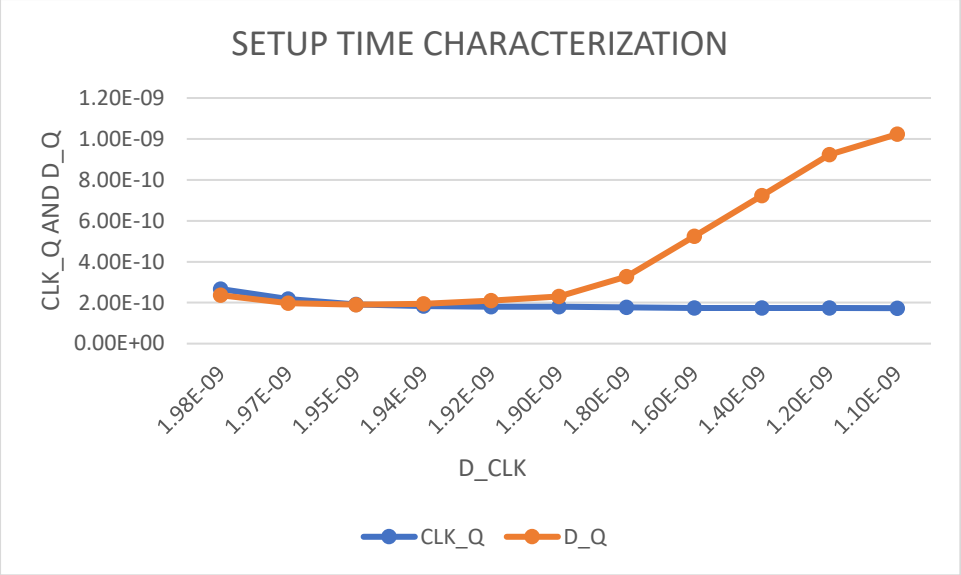
ENERGY DELAY PRODUCT GRAPH



In minimum edp product the delay:190ps, Power:2.96E-05

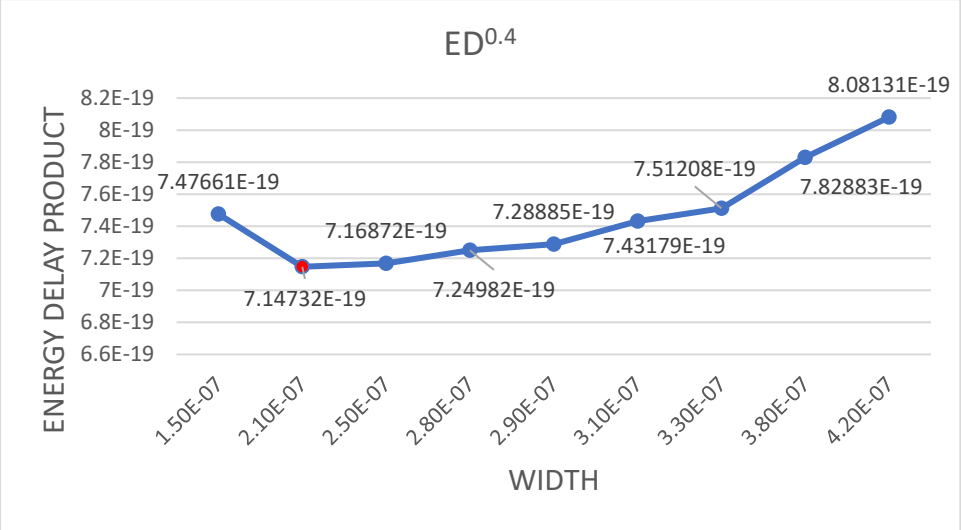
SETUP TIME CHARACTERIZATION:

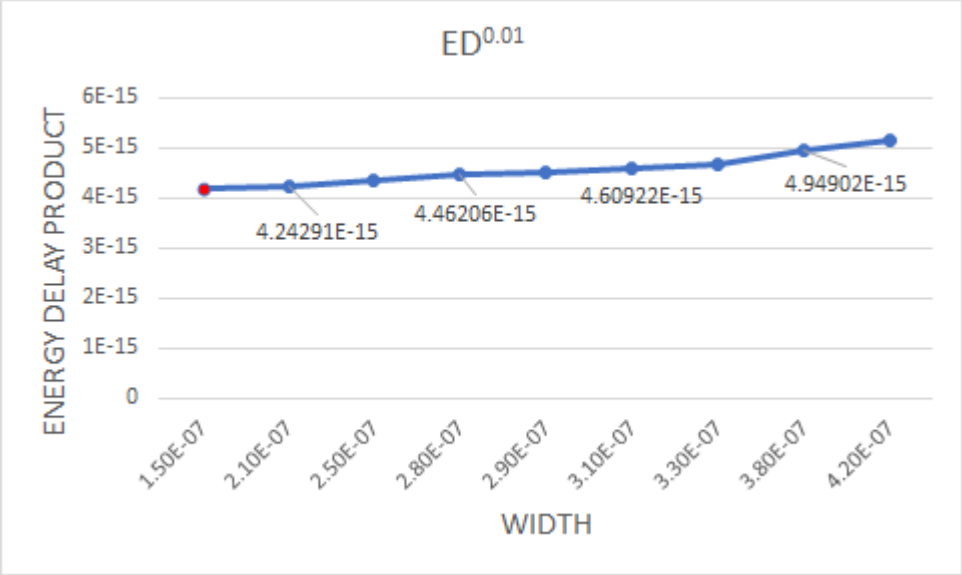
FALL SETUP TIME CHARACTERISTICS			
D_CLK	SETUP	CLK_Q	D_Q
1.98E-09	-3.00E-11	2.67E-10	2.37E-10
1.97E-09	-2.00E-11	2.18E-10	1.98E-10
1.95E-09	-1.00E-12	1.91E-10	1.90E-10
1.94E-09	1.00E-11	1.84E-10	1.94E-10
1.92E-09	3.00E-11	1.81E-10	2.11E-10
1.90E-09	5.00E-11	1.80E-10	2.30E-10
1.80E-09	1.50E-10	1.78E-10	3.28E-10
1.60E-09	3.50E-10	1.74E-10	5.24E-10
1.40E-09	5.50E-10	1.74E-10	7.24E-10
1.20E-09	7.50E-10	1.73E-10	9.23E-10
1.10E-09	8.50E-10	1.73E-10	1.02E-09

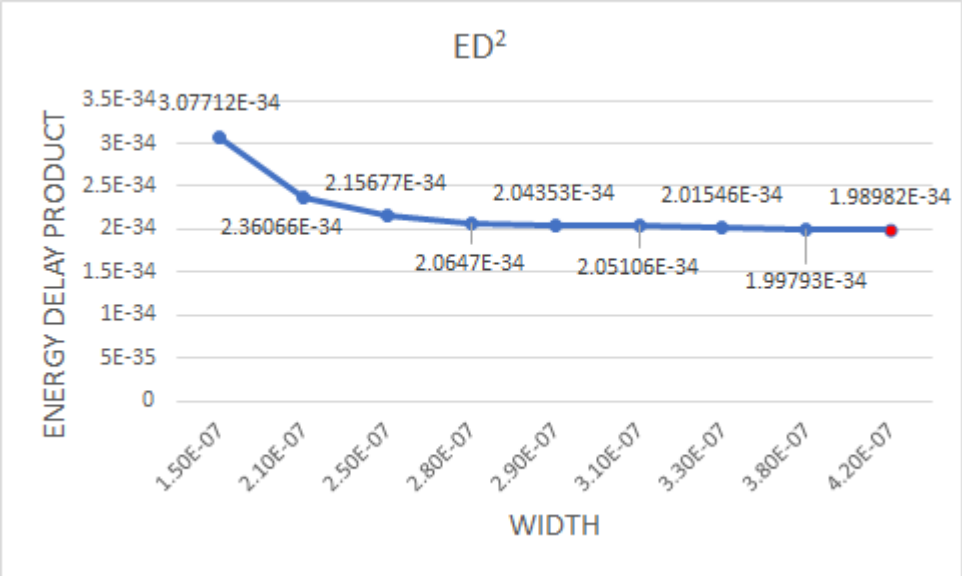


Other cost function graph:

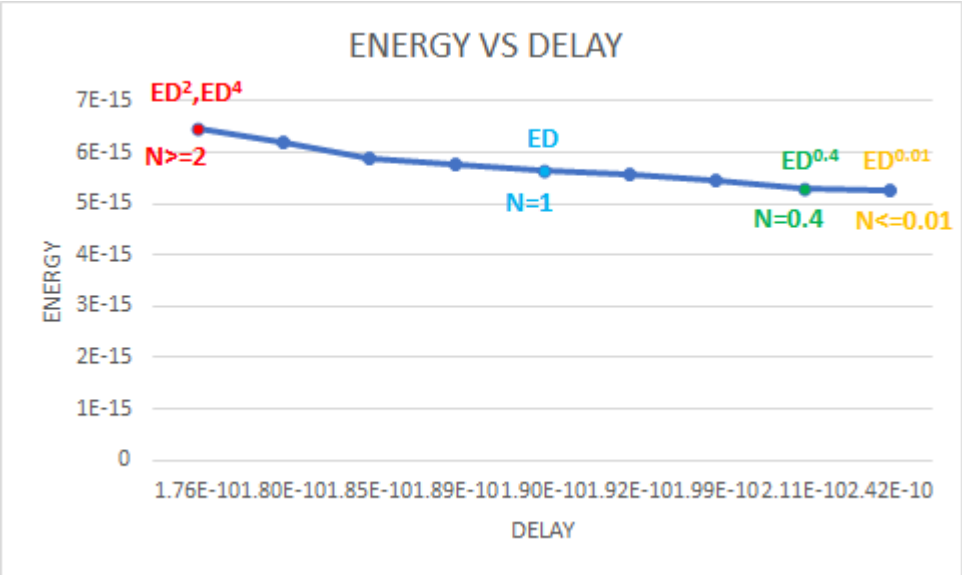
ENERGY	D0.4	ED0.4	D0.01	ED0.01	D0.8	ED0.8	ED2	ED4
5.24922E-15	0.000142433	7.47661E-19	0.801383	**4.20663E-15**	2.02871E-08	1.06491E-22	3.07712E-34	1.80383E-53
5.30177E-15	0.00013481	**7.14732E-19**	0.800282	4.24291E-15	1.81738E-08	9.63532E-23	2.36066E-34	1.05111E-53
5.44316E-15	0.000131701	7.16872E-19	0.799815	4.35352E-15	1.73453E-08	9.44132E-23	2.15677E-34	8.54591E-54
5.58078E-15	0.000129907	7.24982E-19	0.799541	4.46206E-15	1.68758E-08	**9.41802E-23**	2.0647E-34	7.63868E-54
5.63285E-15	0.000129399	7.28885E-19	0.799463	4.50325E-15	1.67441E-08	9.43169E-23	2.04353E-34	7.41371E-54
5.76597E-15	0.000128891	7.43179E-19	0.799384	4.60922E-15	1.66128E-08	9.57887E-23	2.05106E-34	7.29597E-54
5.86958E-15	0.000127983	7.51208E-19	0.799243	4.69122E-15	1.63797E-08	9.61421E-23	2.01546E-34	6.92056E-54
6.19407E-15	0.000126392	7.82883E-19	0.798993	4.94902E-15	1.5975E-08	9.89504E-23	1.99793E-34	6.44442E-54
6.45132E-15	0.000125266	8.08131E-19	0.798814	5.15341E-15	1.56916E-08	1.01231E-22	**1.98982E-34**	**6.13731E-54**





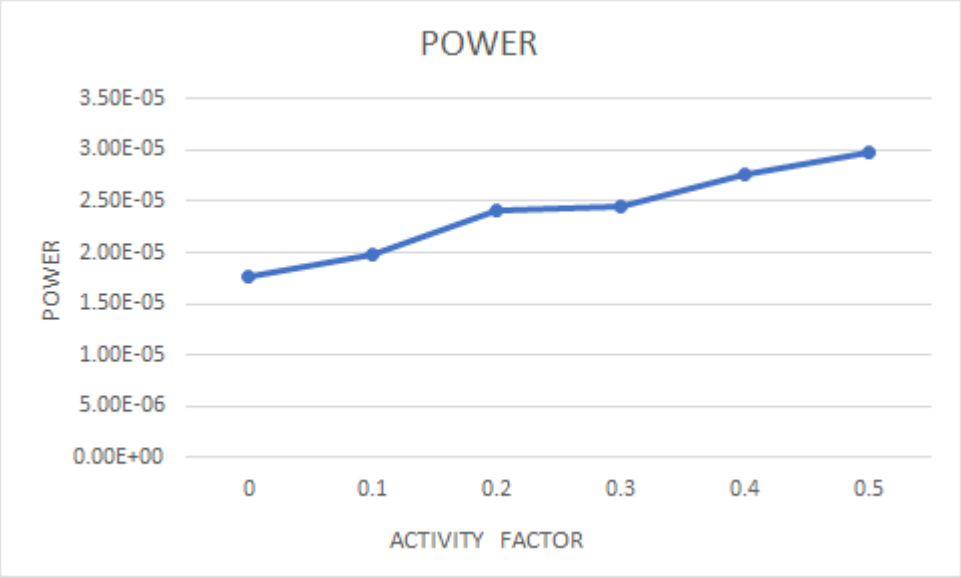


ENERGY WRT DELAY



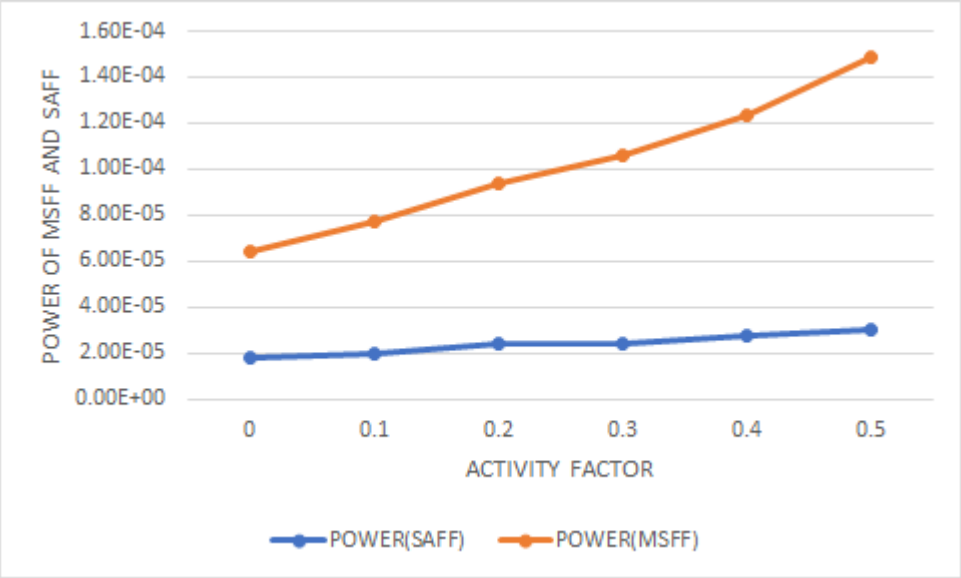
POWER CONSUMPTION FOR DIFFERENT ACTIVITY FACTOR

ACTIVITY F	POWER
0	1.76E-05
0.1	1.99E-05
0.2	2.41E-05
0.3	2.45E-05
0.4	2.76E-05
0.5	2.98E-05



MSFF AND SAFF POWER COMPARISION FOR DIFFERENT ACTIVITY FACTOR

ACTIVITY FACTOR	POWER(SAFF)	POWER(MSFF)
0	1.76E-05	6.38E-05
0.1	1.99E-05	7.74E-05
0.2	2.41E-05	9.37E-05
0.3	2.45E-05	1.06E-04
0.4	2.76E-05	1.24E-04
0.5	2.98E-05	1.49E-04



DIFFERENT POWER CALCULATION

POWER		
STATIC POWER CALCULATION		
	CLK:DATA	STATIC POWER
	00:00	5.91E-09
	00:01	8.47E-09
	01:00	1.05E-08
	01:01	1.30E-08
	AVG	**9.47E-09**
DATA SWITCHING POWER		
	CLK	POWER
	0	1.30E-06
	1	2.16E-06
	AVG	**1.73E-06**
CLOCK SWITCHING POWER		
	DATA	POWER
	0	1.66E-05
	1	1.85E-05
	AVG	**1.76E-05**
	TOTAL PO	**2.96E-05**
	DYNAMIC	**2.96E-05**
	REGISTER	**2.78E-05**

comparision of SAFF AND MSFF ENERGY

		SAFF			
SETUP		CLK_Q	D_Q	POWER	ENERGY(SAFF)
	5.00E-12	1.55E-10	1.60E-10	5.52E-05	8.84134E-15
	2.00E-12	1.68E-10	1.70E-10	4.12E-05	7.00116E-15
	1.00E-12	1.79E-10	1.80E-10	3.45E-05	6.21E-15
	-1.00E-12	1.91E-10	1.90E-10	2.96E-05	5.63285E-15
	-1.00E-12	2.00E-10	1.99E-10	2.73E-05	5.44316E-15

MSFF				
SETUP	CLK_Q	D_Q	POWER	ENERGY(MSFF
8.00E-11	8.30E-11	[illegible]	1.73E-04	2.81615E-14
7.93E-11	8.96E-11	[illegible]	1.49E-04	2.52183E-14
8.50E-11	9.36E-11	1.79E-10	1.32E-04	2.35821E-14
8.60E-11	1.03E-10	1.89E-10	1.14E-04	2.15886E-14
9.30E-11	1.09E-10	2.02E-10	1.04E-04	2.10654E-14

Chart Area