TUGAS AKHIR BIDANG

STUDI KONVERSI ENERGI

ANALISIS PERFORMA HRSG 1.3 PT. INDONESIA POWER UBP PERAK-GRATI SEBELUM DAN SESUDAH CLEANING DENGAN VARIASI BEBAN

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PENDAHULUAN

LATAR BELAKANG

listrik pintar

Solusi Isi Ulang dari PLN

PENDAHULUAN

RUMUSAN MASALAH

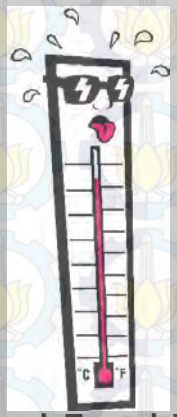
1. Perbandingan Efisiensi ?

Before

After

2. Perbandingan Temperatur Keluar ?

Before



After

3. Perbandingan Steam Produksi ?

Before

After

4. Perbandingan Total Feed Water ?

Before

After

5. Macam-Macam Pekerjaan Cleaning ?

HRSG CLEANING

PENDAHULUAN

TUJUAN

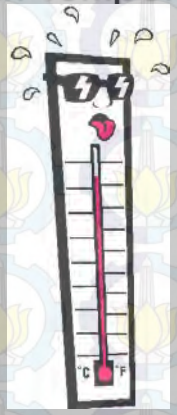
1. Mengetahui Perbandingan Efisiensi

Before

After

2. Mengetahui Perbandingan Temperatur Keluar

Before



After

3. Mengetahui Perbandingan Steam Produksi

Before

After

4. Mengetahui Perbandingan Total Feed Water

Before

After

5. Mengetahui Macam-Macam Pekerjaan Cleaning

HRSG CLEANING

PENDAHULUAN

BATASAN MASALAH

1. Data yang digunakan adalah pada HRSG 1.3 PT. INDONESIA POWER UBP Perak-Grati
2. Perhitungan performa berdasarkan kalor yang masuk dan yang keluar
3. Nilai AFR dan laju aliran bahan bakar didapatkan dari perhitungan gas turbine
4. Proses cleaning hanya pengenalan saja dan tidak membahas tentang material yang ditanamkan pada HRSG
5. Tidak membahas tentang perpindahan panas yang ada di setiap tahapan HRSG
6. Data dari referensi lain yang relevan

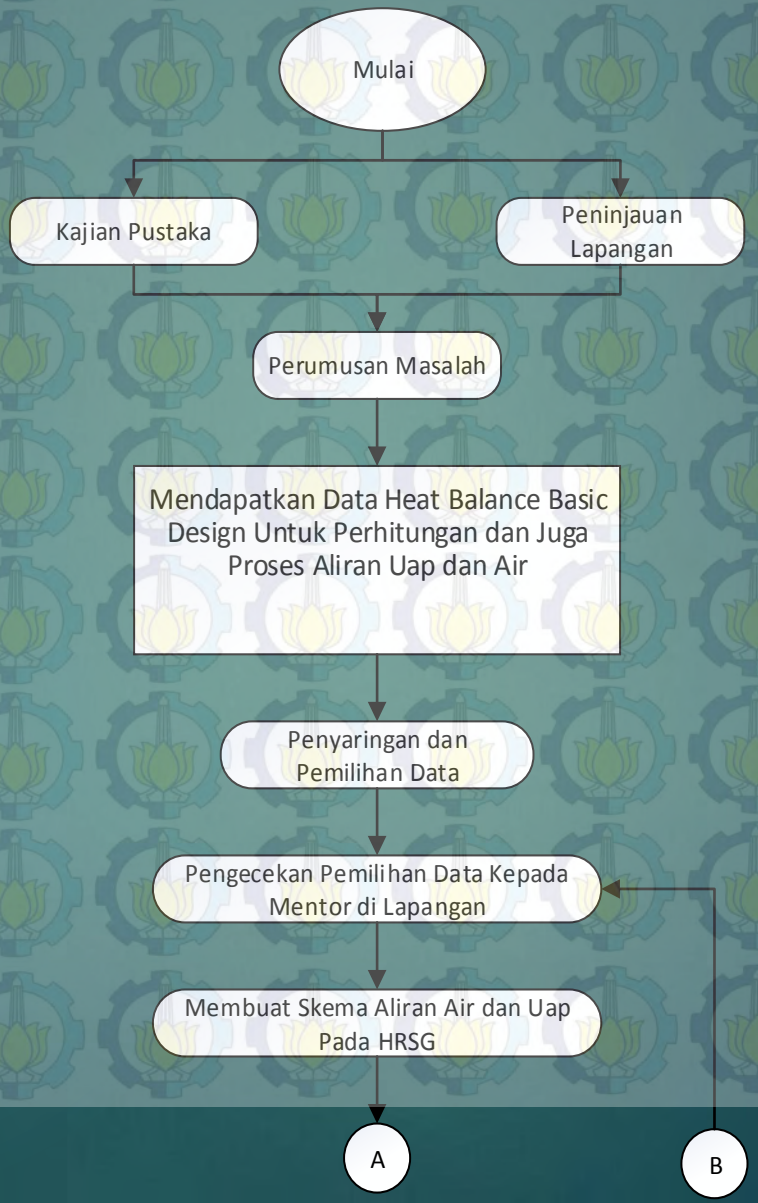
PENDAHULUAN

MANFAAT

1. Memberikan manfaat dan ilmu tambahan terutama yang berkaitan dengan HRSG.
2. Memberikan informasi kepada pihak PT. INDONESIA POWER tentang performa HRSG sebelum dan sesudah *cleaning*.
3. Memberikan informasi tentang macam-macam pekerjaan *cleaning* yang ada di dalam HRSG.

METODOLOGI PENELITIAN

DIAGRAM ALIR

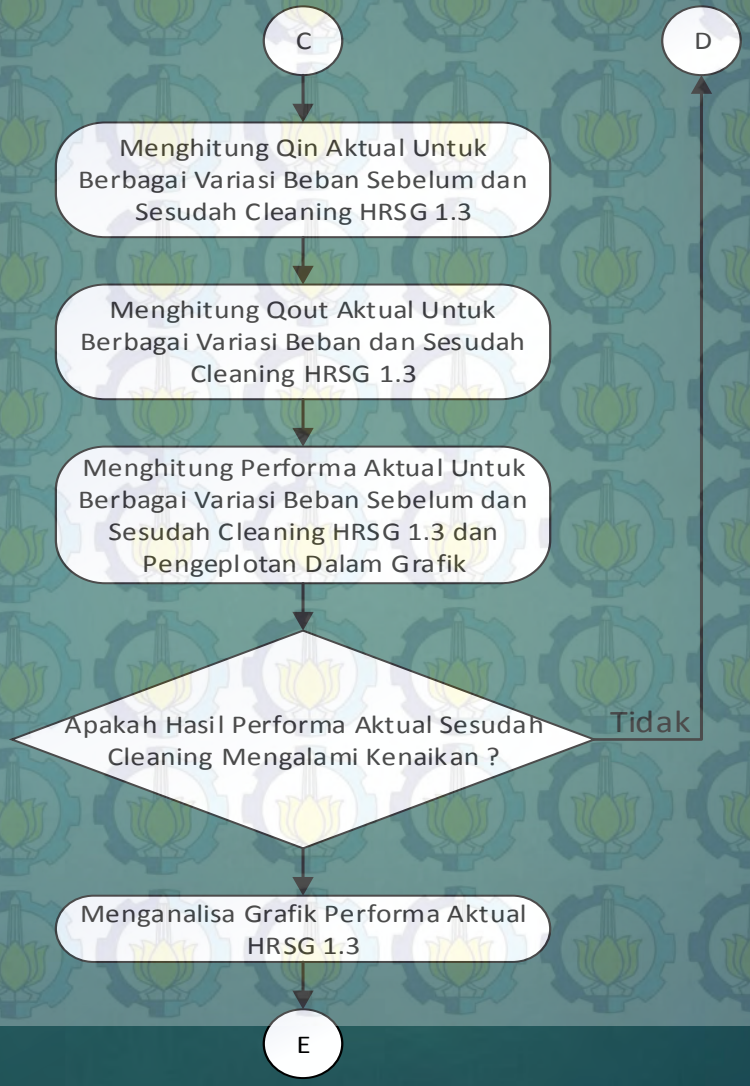


METODOLOGI PENELITIAN

DIAGRAM ALIR

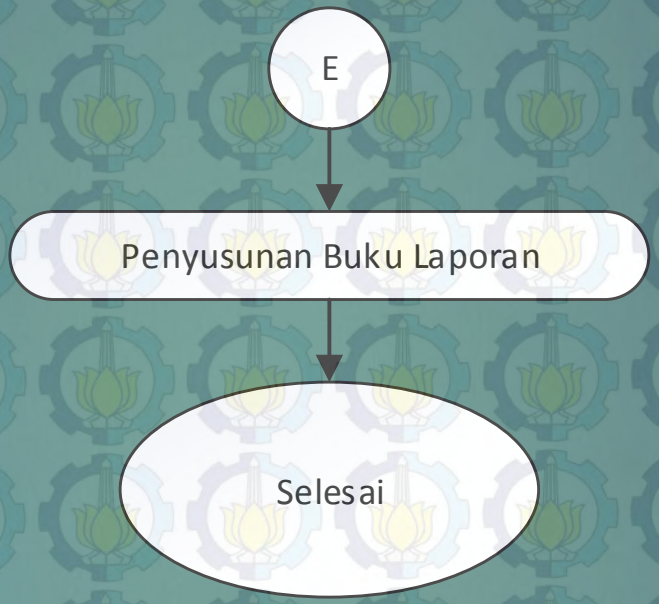
METODOLOGI PENELITIAN

DIAGRAM ALIR



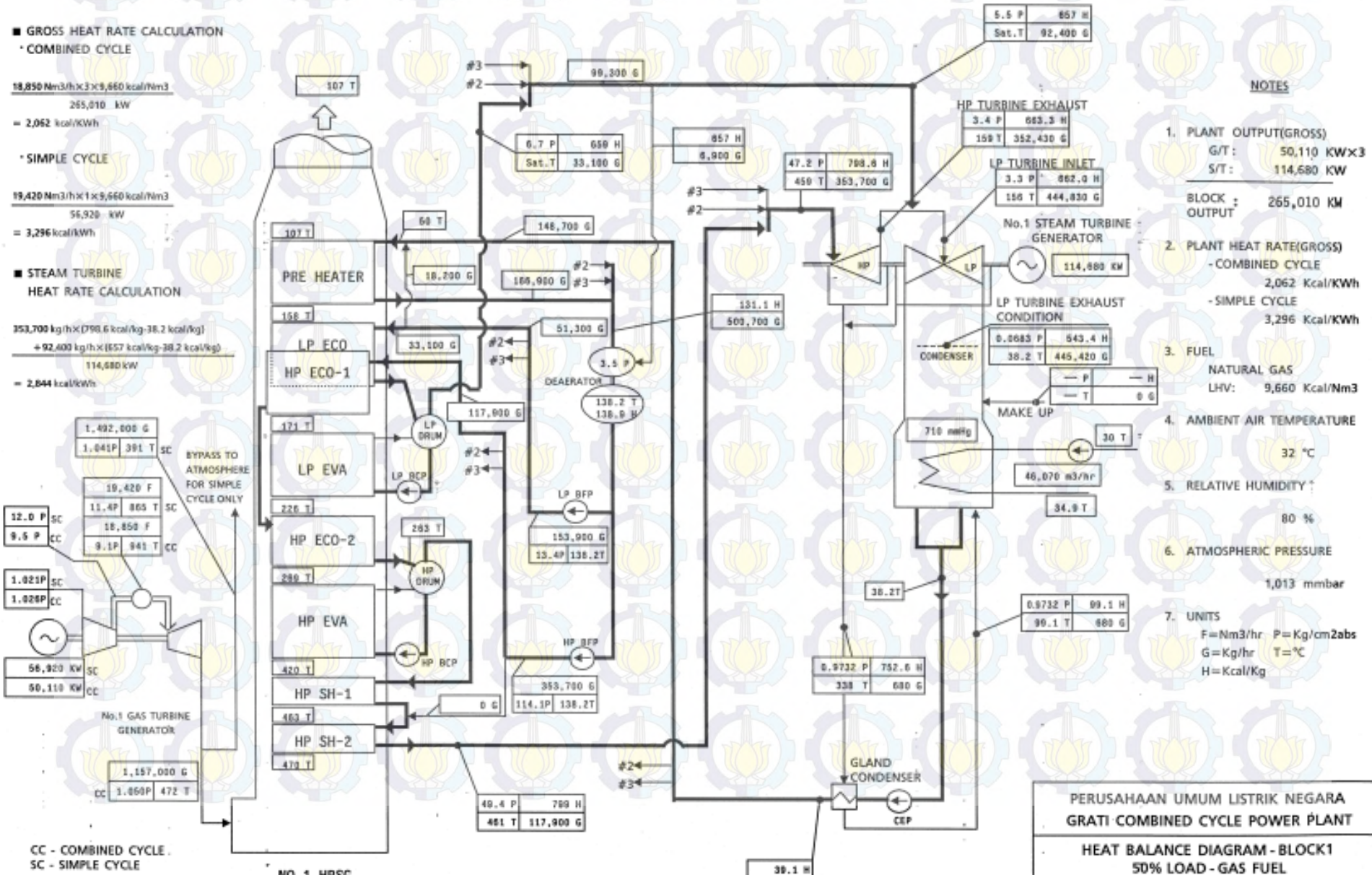
METODOLOGI PENELITIAN

DIAGRAM ALIR



PERHITUNGAN

Blok Diagram Basic Design



PERHITUNGAN

Data Perhitungan Basic Design :

Load	AFR	m dot Fuel	Cp eg	Ti	To	m dot eg	Steam Production
(MW)		(kg/s)	(kJ/kg.K)	(K)	(K)	(kg/s)	(kg/s)
50,11	76,27815	4,158858	1,0858	745	380	321,3888524	41,94444444
78,16	59,27749	5,350256	1,10716	834	374	322,5000025	53,22222222
112,45	59,20207	6,921135	1,10044	806	380	416,6666537	64,22222222
118,59	56,75667	7,218984	1,10428	822	380	416,9444766	66,91666667

m dot feed water	h condensate	h LP Superheater	h HP Superheater	Q out	Q in	Efisiensi
(kg/s)	(kJ/kg)	(kJ/kg)	(kJ/kg)	(MW)	(MW)	(%)
41,30555556	210,2246054	2770,59533	3340,396256	112,7666407	127,3718658	88,53339789
52,16666667	210,2246054	2770,59533	3426,520052	142,685368	164,2471873	86,87233577
63,27777778	210,2176307	2766,142604	3414,076839	173,2728144	195,3280939	88,70859839
65,80555556	210,2176307	2777,215853	3408,812403	180,6052703	203,5071634	88,74639462

PERHITUNGAN

Data Perhitungan Sebelum Cleaning :

Load	AFR	m dot Fuel	Cp eg	Ti	To	m dot eg	Steam Production
(MW)		(kg/s)	(kJ/kg.K)	(K)	(K)	(kg/s)	(kg/s)
52,65373	82,57304213	4,597797269	1,083059963	733,583181	393,972	384,2519049	41,06852889
60,414673	78,44185478	4,845239099	1,086425679	747,606997	387,5136	384,9147809	44,02755389
66,14797	73,73769116	5,153830455	1,089502774	760,428224	384,9357	385,1853889	45,86197833
71,792266	74,37096208	5,31801878	1,09302129	775,088709	393,5284	400,8241918	48,59471361
75,415818	67,80488557	5,614270752	1,090612592	765,052466	359,213	386,2892566	49,62056056
81,118436	70,80013982	5,904229851	1,091940544	770,585598	385,825	423,9245288	51,40457944
86,41873	71,30168499	6,152856685	1,095193897	784,141236	397,2973	444,8619058	54,43316944
90,63874	71,80804346	6,304184017	1,095971315	787,38048	403,8877	458,9953039	55,55832583
95,65025	70,64966341	6,574159251	1,095597873	785,824472	401,8554	471,0362975	56,37300028
101,84881	67,88670531	6,959165398	1,097512065	793,800271	388,2522	479,393976	59,79765556

m dot feed water	h Condesate	h LP Superheater	h HP Superheater	Q out	Q in	Efisiensi
(kg/s)	(kJ/kg)	(kJ/kg)	(kJ/kg)	(MW)	(MW)	(%)
28,35979	129,2700109	2750,089671	3289,879123	125,965813	141,3352564	89,12554181
30,38073583	130,99763	2750,52633	3311,76734	135,9014038	150,5843257	90,24936903
31,46912889	140,3682795	2750,812717	3331,635122	142,2189396	157,579399	90,25224144
33,34802528	139,9915481	2750,910494	3359,041385	151,8568004	167,1651486	90,84238049
34,31442889	142,5942579	2751,64004	3336,366653	153,868188	170,9768908	89,99355832
35,57287472	134,4293048	2751,924904	3342,647729	159,9435422	178,1058272	89,80253184
37,52557	139,9703298	2751,883065	3363,928056	170,3233689	188,4742511	90,36956925
38,68022778	142,321547	2752,733549	3360,050439	173,3063743	192,9143889	89,83589834
39,1389725	152,9228028	2753,232817	3358,530831	175,2983641	198,1535236	88,46593334
41,57147056	136,5372951	2753,225287	3370,191896	187,3621109	213,3753348	87,80870156

PERHITUNGAN

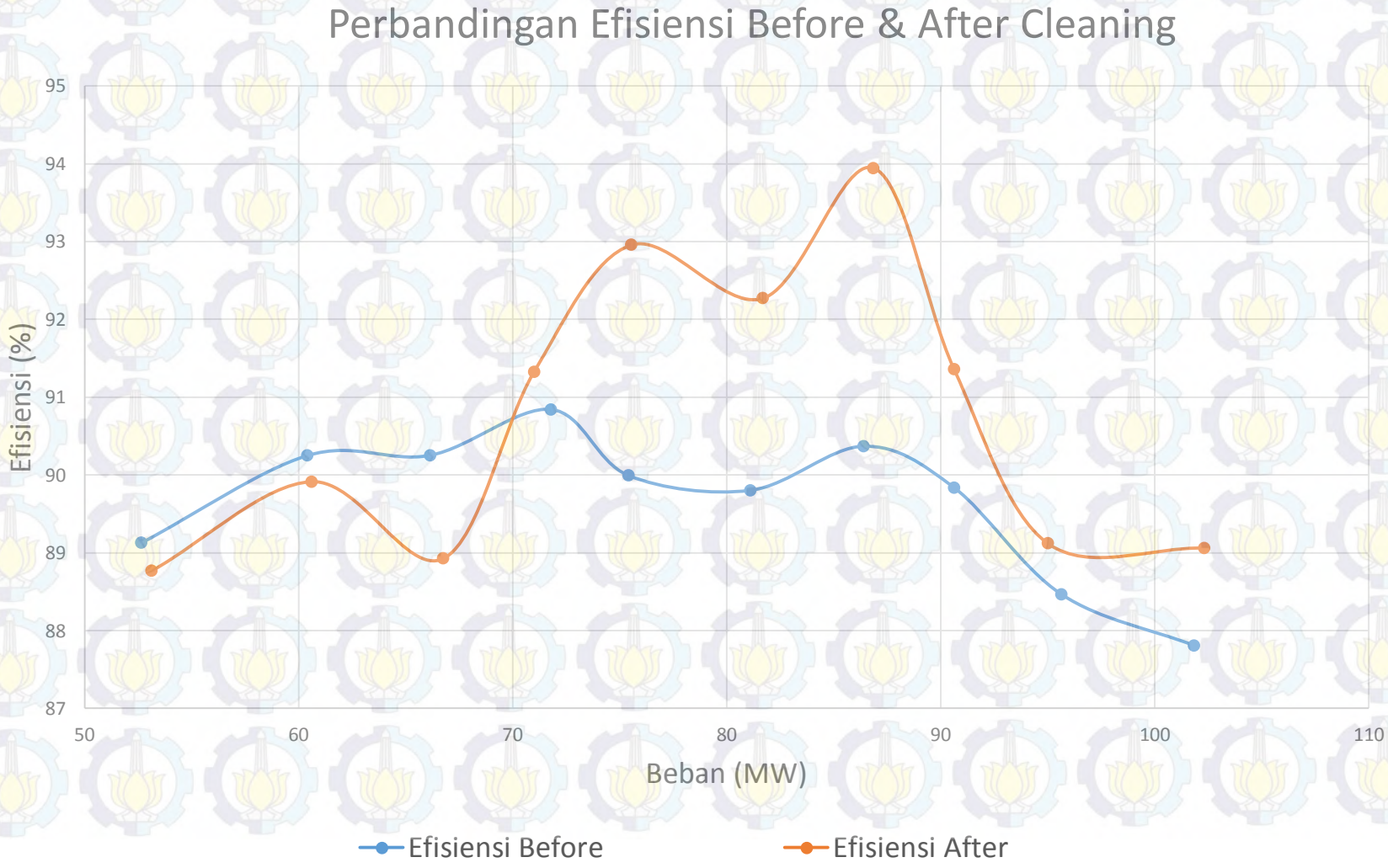
Data Perhitungan Sesudah Cleaning :

Load	AFR	m dot Fuel	Cp eg	Ti	To	m dot eg	Steam Production
(MW)		(kg/s)	(kJ/kg.K)	(K)	(K)	(kg/s)	(kg/s)
53,143495	77,61442194	4,624748179	1,085802194	745,009141	381,8907	363,5719047	40,83490222
60,619479	75,45166689	4,797206717	1,09194748	770,6145	387,9623	366,7544499	43,65163806
66,768039	66,38845974	5,168938974	1,090421825	764,257605	339,8664	348,3268359	45,79434083
71,007172	71,24827305	5,275378124	1,098072151	796,133961	395,1416	381,1369592	48,19606222
75,55031	72,19087628	5,473537689	1,09396048	779,002001	403,3377	400,6130198	48,66176556
81,703839	71,44700707	5,788694034	1,093698916	777,91215	404,41134	419,3735576	50,27212611
86,86963	74,06116814	5,968851108	1,088781811	757,424214	410,0894	448,0289367	51,6900125
90,63625	73,22923125	6,230169052	1,089829158	761,788158	408,6863	462,4606593	52,58779083
95,0119	75,58026146	6,404373295	1,091011491	766,714545	413,8636	490,4485814	54,40874167
102,3288	68,04392285	6,832038256	1,09541615	785,067291	384,9413	471,7107222	58,44421972

m dot feed water	h Condesate	h LP Superheater	h HP Superheater	Q out	Q in	Efisiensi
(kg/s)	(kJ/kg)	(kJ/kg)	(kJ/kg)	(MW)	(MW)	(%)
27,84164028	126,3950599	2750,170594	3340,342744	127,2458419	143,34724	88,7675563
29,65234611	143,2357821	2750,085537	3399,1124	137,7867665	153,243251	89,91375841
31,44237611	133,2870189	2751,094751	3365,052644	143,3422792	161,1936188	88,92552962
32,66074111	144,7095605	2750,658783	3422,985165	153,2644761	167,821671	91,32579552
33,32853917	149,413356	2751,245456	3395,705292	153,0379593	164,6366874	92,95495537
34,52040778	143,4898256	2751,657398	3392,175438	158,0708977	171,3130209	92,27021789
36,23586694	155,7705405	2753,256672	3341,117076	159,1723298	169,431922	93,94471123
36,68366389	153,190643	2753,25118	3349,661509	162,5817774	177,9644349	91,35633055
38,50828111	153,8000119	2753,73101	3353,796488	168,2637049	188,8052613	89,12024153
40,25389528	137,9886791	2752,308995	3394,079426	184,1355268	206,7529193	89,06066594

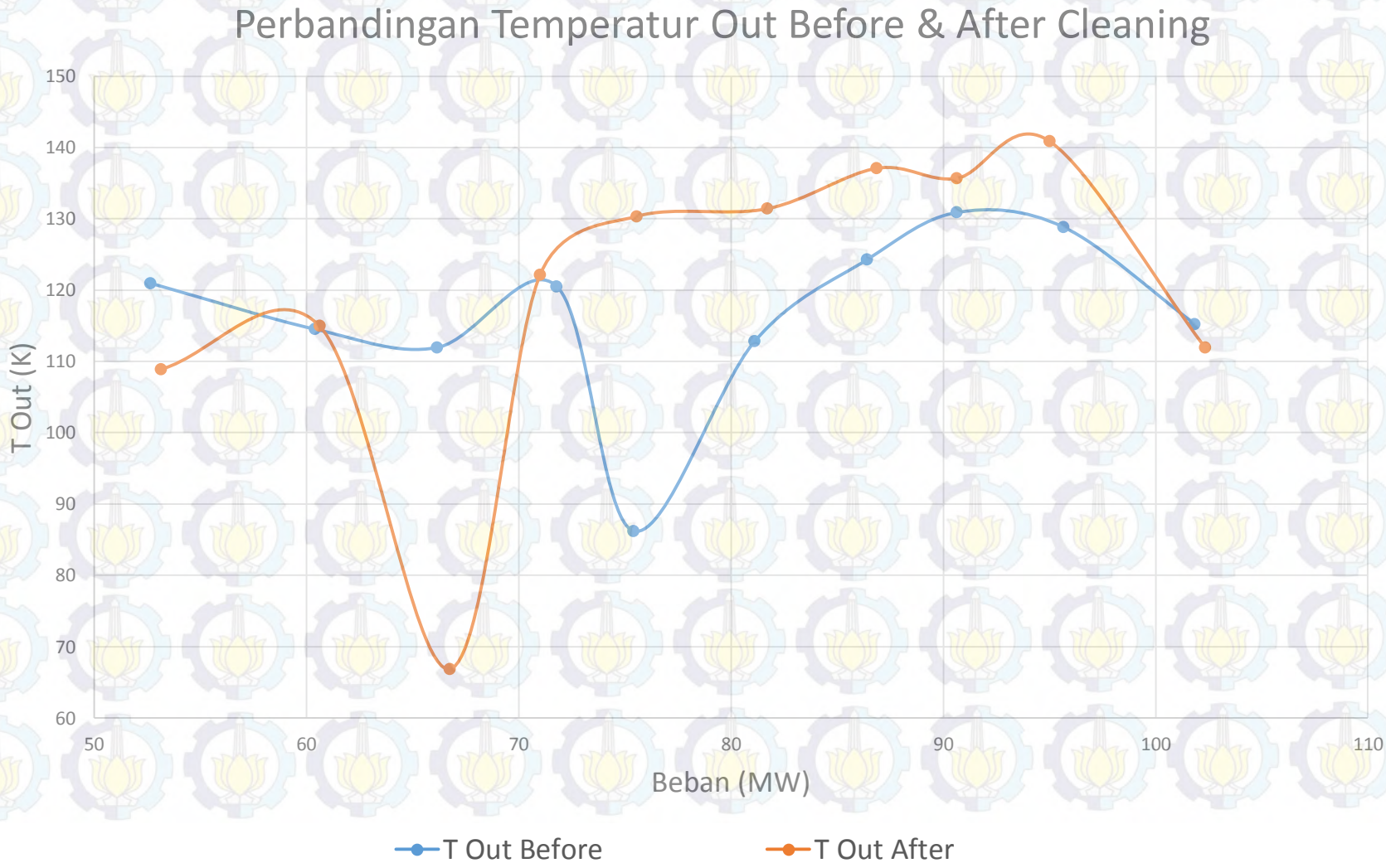
PEMBAHASAN

Perbandingan Efisiensi :



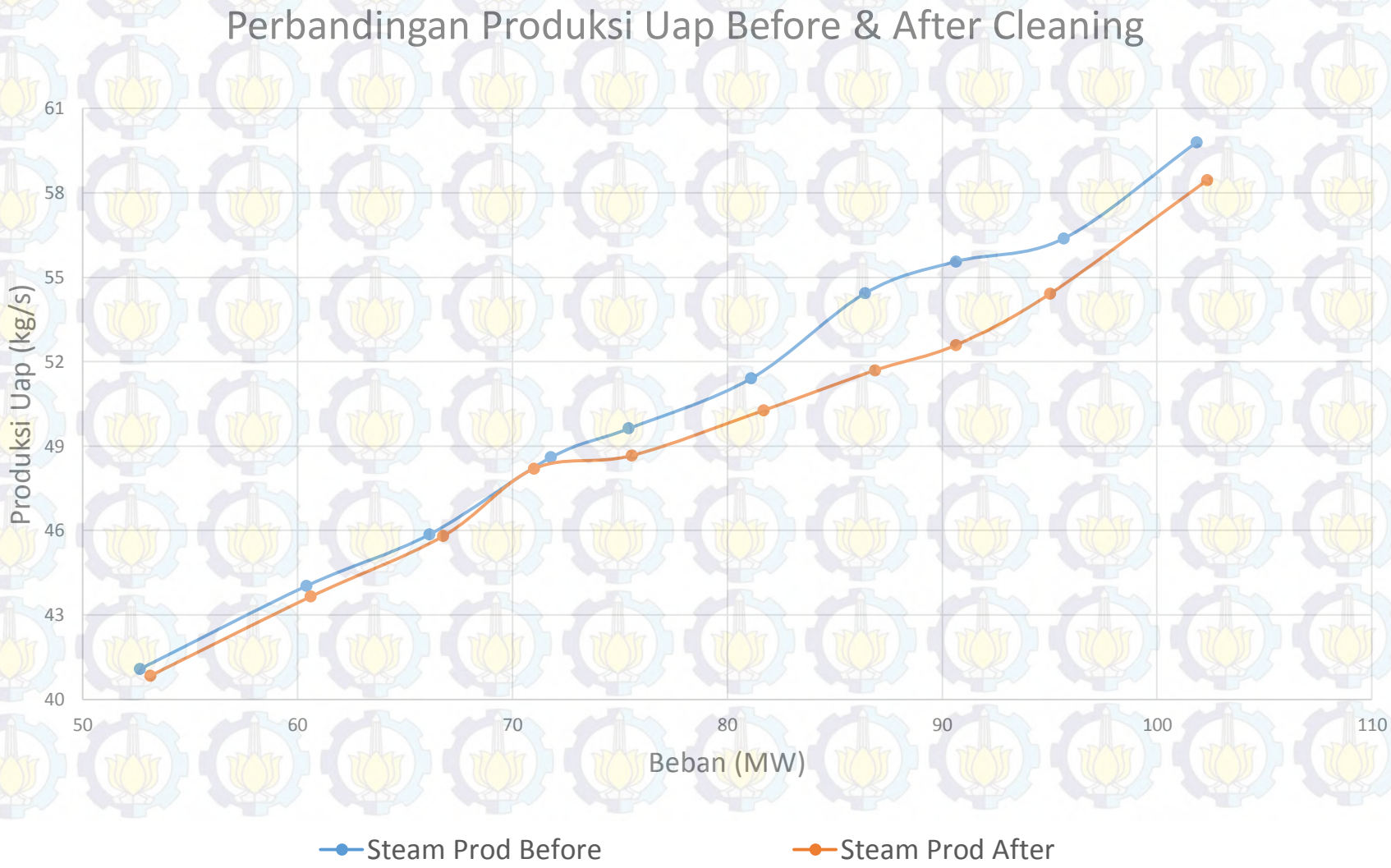
PEMBAHASAN

Perbandingan Temperatur Keluar :



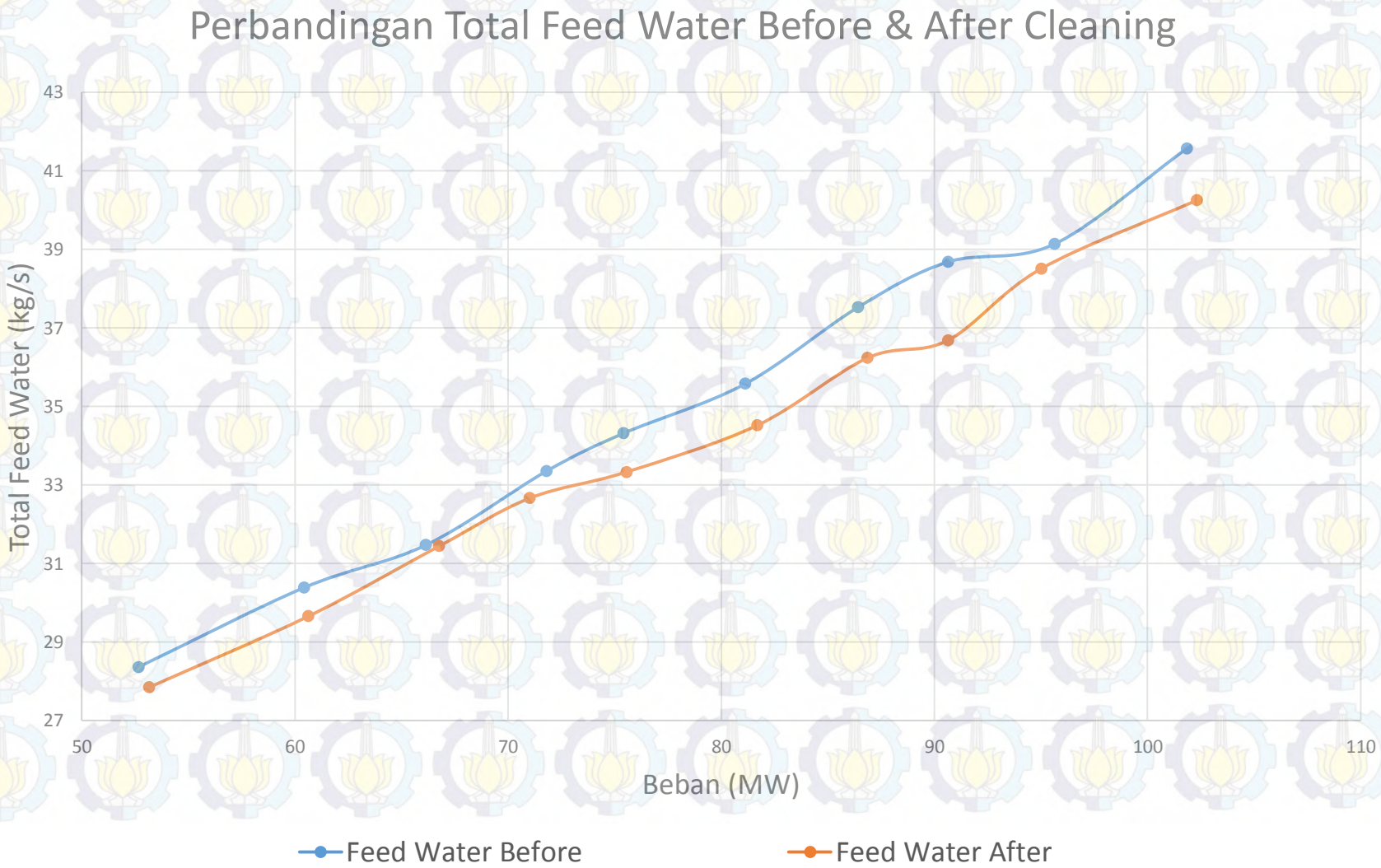
PEMBAHASAN

Perbandingan Produksi Uap :



PEMBAHASAN

Perbandingan Total Feed Water :

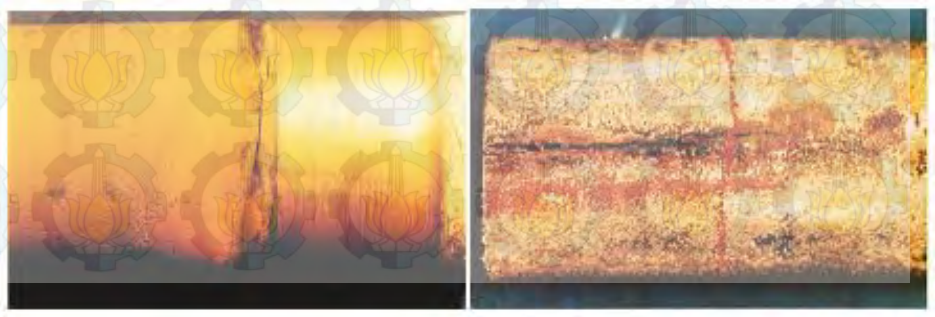


PROSES CLEANING HRSG 1.3 PLTGU GRATI

1. Dew Point Corrosion

2. Pitting Corrosion

3. Corrosion Fatigue



Proses Cleaning HRSG

Proses Cleaning HRSG

Proses Cleaning HRSG

PENUTUP

KESIMPULAN :

1. Efisiensi HRSG sesudah cleaning mengalami kenaikan sekitar 1,214841246 % daripada efisiensi sebelum cleaning.
2. Temperatur keluar HRSG sesudah cleaning mengalami kenaikan sekitar 2,907563473 % daripada temperatur keluar sebelum cleaning.
3. Steam produksi HRSG sesudah cleaning mengalami penurunan sekitar 2,46662083 % daripada steam produksi sebelum cleaning.
4. Total feed water HRSG sesudah cleaning mengalami penurunan sekitar 2,706747386 % daripada total feed water sebelum cleaning.

PENUTUP

SARAN :

1. Perlu dihitung kembali performa HRSG akan tetapi dengan mempertimbangkan atau menganalisa dari perpindahan panas yang terdapat di dalam peralatan yang ada di HRSG. Tentunya dengan didukung oleh data operasi yang cukup lengkap..

TERIMA KASIH

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