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PROPOSAL ON ELECTRIC ARC FURNACE UTILIZATION TO ACHIEVE COST OPTIMIZATION IN SLAB STEEL PLANT PT KRAKATAU STEEL

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Abstract— *Steel Business environment has changed a lot lately, and competition is getting stronger. The global competitive pressure has changed the nature of economy Causing changes in methods of operation in industries. Faced with these situation, the company must be Able to survive and win the competition by performing measurements include all aspects that are future oriented. Krakatau recently imported a lot of semi-finished slab regarding low price for commercial grade steel. In order to win a competition all the effort was done by continuous improvement to reduce production costs. Steel slab plant is part of an integrated stainless steel production facility of Krakatau play the biggest role of production cost responsibility. It is by the caused of the major metallurgical task to convert iron ore to steel and non-metallic raw material to slag. Secondly steel making consume huge slab of electrical energy to melt the solid material to liquid steel. Excellent strategy and controlling tights will get very high benefit to earn much profit.The final assigment is focused on formulating a production strategy based on market requirements and production cost. Key point to get succesfull implementation of these depends on the top management strategy comitment, the Efforts of socialization, and the participation of all staff and employee. The feedback pattern always makes the learning more effective strategic and structured and continuous improvement smootly runs.*

Keyword: cost reduction, formulating strategic production, involvement, feedback pattern

1. Introduction

Background of Company

Once upon a time in 1960, President Sukarno declared TRIKORA Steel Project to lay a strong national industrial base. Ten Year later, precisely August 31 1970, stood PT Krakatau Steel (Persero) which utilizes re-equipment of the project in the form of steel wire factories, steel mills and steel mills profiles. there in 1977, President Suharto inaugurated the operation of the largest steel producer in Indonesia. Development of Krakatau Steel as a company engaged in the steel industry for quite advanced. In less than ten Year, the Company has been adding various production facilities such as Sponge Iron Plant, Steel Billet Plant, Wire Rod Plant, as well as infrastructure facilities such as power stations, Water Purification Center, Cigading special ports and telecommunication systems. With this development, Krakatau Steel is the only integrated steel company in Indonesia.

Furthermore, Krakatau Steel continues to develop the production of various types of steel for various, such as hot rolled coils, cold rolled coils and wire rods. Currently, Krakatau Steel has a rugged steel production capacity of 2.45 million tons per Year to support the production of steel. And with ten subsidiaries Krakatau Steel could divers efforts on supporting businesses that produce a variety of high value-added steel products (such as spiral pipe, ERW pipes, steel rears, steel profiles), providing the utility industry (water, electricity), industry infrastructure (ports, industrial areas), technical services industry (construction, engineering), information technology, and providing health services (hospitals). Steel products Krakatau Steel is not only intended to meet the national demand for steel, but also marketed internationally.

Krakatau Steel's technical ability is high by international standards has been recognized since ancient times. Even in 1973, the Company had obtained Certificate ASTM A252 and AWWA C200, and in 1977 obtained Certificate to API 5L spiral pipe production. Certificate obtained ISO 9001 Krakatau Steel in 1993 and has been upgraded to ISO 9001:2000 in 2003. Meanwhile, SGS certificate ISO 14001 international giving in 1997 on the Company's commitment to environmental awareness and safety.

On November 10, 2010 in the middle of the market conditions are still volatile, Krakatau Steel managed to become a public company to carry out an initial public offering (IPO) and listed its shares on the Indonesia Stock Exchange. In 2011, PT Krakatau Steel (Persero) Tbk. posted a net income of IDR17, 9 trillion and net profit of IDR1, 02 trillion. In 2011, the Company and its subsidiaries with assets worth IDR21, 5 billion has 8,023 emplothees.

Corporate Culture

Values culture known as Krakatau Steel features which has a length of Reliable Innovative Competence Integrity. The explanation of these values as follows:

• Reflects the ability of self confidence and spirit to improve the knowledge, skills, expertise, and mental attitude.
• Reflecting a commitment to any agreements, rules and regulations and applicable laws.
• Reflecting preparedness, and response speed in responding to the commitment and promise.
• Reflecting the willingness and ability to create new ideas and better implementation.

Objectives and Corporate Strategy

Corporate Goals

Krakatau Steel in business is implementing and supporting policies and programs of the government in the economy, especially in the steel industry.

Corporate Strategy

Strategy of The Company in 2010 - 2015 are shown in Table 1.

Table 1. Strategy of The Company in 2010-2015

No	Proyek Strategis	Manfaat Utama
1	Revitalisasi Existing Facilities*) (DR, SSP, dan HSM)	▪ Modernisasi dan meningkatkan kehandalan fasilitas dan efisiensi proses. ▪ Meningkatkan produksi besi spons, baja slab, dan HRC (400,000 ton per tahun). ▪ Menurunkan biaya produksi melalui pengurangan konsumsi energi spesifik (gas alam, listrik).
2	Ironmaking Project – Kalsel (PT MJIS, JV dengan Antam)	▪ Mengurangi bahan baku impor dengan memanfaatkan bijih besi lokal.
3	Blast Furnace (BF) – Modernisasi Steelmaking (SSP dan BSP)	▪ Modernisasi fasilitas produksi. ▪ Menurunkan konsumsi energi listrik di steelmaking (hot metal charging). ▪ Meniadakan impor *semi finished products* (slab dan billet). ▪ Penggunaan teknologi berbasis batu bara yang lebih efisien. ▪ Meningkatkan produksi Wire Rod (150.000 ton per tahun).
4	Joint Venture Integrated Steel Mill 3 MTPY: a. BF-BOF-CCM b. Plate Mill dan/ atau Hot Strip Mill	▪ Ekspansi usaha untuk memenuhi kebutuhan baja nasional. ▪ Penggunaan teknologi berbasis batu bara yang lebih efisien dan adopsi teknologi baru.
5	Peningkatan Kapasitas HSM menjadi 3.5 juta ton per tahun	▪ Ekspansi usaha untuk meningkatkan pangsa pasar dengan memanfaatkan slab dari JV KS_POSCO ▪ Peningkatan revenue

Corporate Philosophy

Philosophy embraced by Krakatau Steel is the Partnership for sustainable growth which means passion, desire, and promises to grow and develop sustainable for PT Krakatau Steel and all stakeholders together.

Vision and Mission

Krakatau Steel's vision is: "an integrated steel company with a competitive advantage to continually grow and evolve into a leading company in the world", while Krakatau Steel's mission is "To provide quality steel products and services related to the prosperity of the nation".

Business Unit : Slab Steel Plant

Business units that will be Discussed at this final project is Slab Steel Plant (SSP), is a plant that produces steel slabs. PT Krakatau Steel has 2 Slab Steel Plant, that SSP-1 built by Ferrostal Germany and Began operations in 1983, and SSP-2 built by VAI (Voest Alpine Industries) Austria and Began operating in 1994.

SSP is a steelmaking process based on electric arc furnace (EAF). The raw materials used are solid iron material in the form of Sponge Iron or DRI (Direct Reduced Iron), Scrap, HBI (Hot Briquetted Iron), Pig Iron, and CBI (Briquetted Cold Iron). Particular proportion of some kind materials are feed into Gradually EAF. Materials melt into a liquid by using electric arc forming graphite electrode with very high temperature. To Accelerate the melting process also added the chemical energy in the form of oxygen injection. After have sufficient amount of liquid steel and the temperature Reaches the targets then poured into stainless Ladle, processed at the next station called the Ladle Furnace.

In Ladle Furnace, alloying materials added to the liquid steel According to the type of steel that is made, but it is also heated using electrical energy again through graphite electrodes. To make the steel into a homogeneous liquid is Carried out using argon gas blown through the bottom of the ladle. For certain types of steel with low gas content (hydrogen, nitrogen) and ultra low carbon steel it must pass through the molten steel in RH Vacuum Degaser. If the targets of the chemical composition and temperature of the liquid steel has been Achieved then ready to be sent to the next process in the Continuous Casting Machine (CCM).

Continuous casting machine is the facility to cast the molten steel into solid steel in slab form with certain dimensions (thickness, width, length). Currently CCM SSP produces slabs with grade of low carbon steel, cabon medium, high carbon, and microalloy. Slab thickness 200 mm, width 960 -2080 mm, length of 6-12 meters. After the slab pass from the quality checks then send to the Hot Strip Mill (HSM) to be thinned by rolling process into coils and plates.

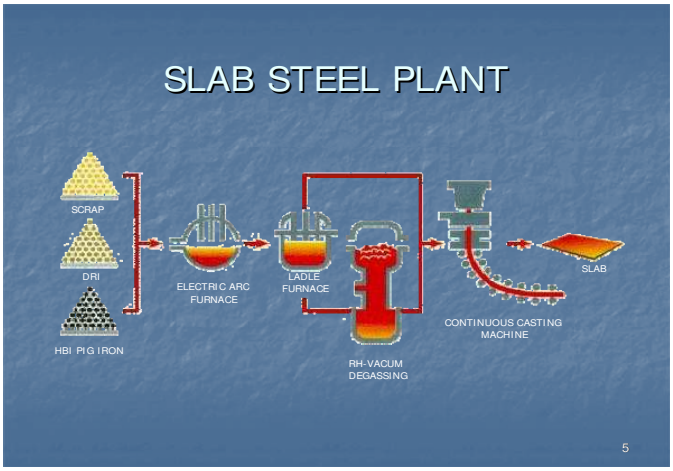

Figure 1. Production Process of Slab Steel Plant

Business Issues

As a part of the supply chain in the integrated steel mills, SSP capacity is currently not match with the downstream plant capacity in HSM. HSM current capacity is 2.4 million tons while the SSP only 1.8 million tons. Lack of capacity is filled with imported slab. SSP capacity of 1.8 million tons were never Achieved. In the last of 5 Year, the slab production continue to decline and only about 1,014,195 tons in 2011.

One factor to reduced production of steel slabs is the decline in the suply of energy, specially the number of electricity input. Starting in the beginning 2000 gas energy input from pertamina decline in quanttity and quality, also synergize with PLN comes in limit number. Coorperation with PLN had additional input 400 MW from 150 kv at Rawaarum Cilegon , but can not utilize maximum regarding

interconection jawa Bali electricity conection. At Peak load time between 18 pm to 22 pm PLN decide to reduce electricity suplly regarding of shortage at electricity Jawa Bali

2. Exploration Business Issue

2.1 Production Performance of Slab Steel Plant 2

Performance of the steel mill slab 2 this time shows that the situation is not optimal. Performance results showed that a low plant utilization factor is the main cause of the well due to internal and external factors. Factory utilization will affect the yield parameters for each printing slab losses will occur in the liquid steel in the tundish steel container. Effect of electrical energy to the electric arc furnace operation cycle will be lower when operate continuously with a short pause between batch operations. Effect of electrode due to its frequent chills causing the operating side and the high oxidation occurs spalling effect. Influence due to the refractory carbon and alumina magnesite brick base material will quickly crack and brittle when temperatures often up and down cycles. Since 2007 from its low production capacity utilization is less maximum power availability factor is lacking, some equipment was getting tired, ascending equipment breakdown, obsolete instrument and the unpreparedness of the spare parts on time. Besides the skill factor is also key employee positions are inadequate due to lack of training and turnover.

Table 2.Production Performance of Slab Steel Plant 2

Year To	*Production ton*	*Plant Utilization %*	*Yield %*	*Electrical kwh/ton*	*Electrode kg/ton*	*refractory kg/ton*
1	*551.108*	*68,8*	*79,30*	*886,49*	*2,82*	*15,80*
2	*557.218*	*69,6*	*80,42*	*838,68*	*2,73*	*15,39*
3	*606.607*	*75,8*	*81,93*	***811,08***	*2,65*	*14,44*
4	*571.414*	*71,4*	*81,98*	*851,68*	*2,83*	*15,52*

2.2 Pareto Problem

Maximum production performance data is not affected by low capacity utilization due to the dominant factor is the shortage of electrical energy and raw material shortages. Procentase in Pareto shows the contribution of each cause to the total number of idle capacity. Problem Procentage Serial Number of Idle Time Utilization.

Factors dominant lack of energy contributed 60 percent of its stop factory aavailibility followed by lack of raw materials by 27%, followed by unefficient electrical energy is 5 percent of plant operations, equipment breakdown by 4 percent and 2 percent of obsolete equipment. Issues causal factors above can be explained as follows:

a. Electricity Shortages

Increasing PGN gas prices cause electricity prices increased electrical power krakatau products uncompetitive. Slab production is very dependent on the supply PLN.

b. Raw Material Shortage

Currently experiencing shortage slab plant matrial dri due pullback zero upstream mill revitalization reformer (lack of raw materials)

c. Electrical energy waste melting

Indicated the occurrence of waste electrical energy consumption in EAF melting furnace 10 while the EAF furnace 9 in normal usage.

d. Breakdown Maintenance

Operate the strategy pattern due to breakdown caused less damage to producing the equipment. Fore Emphasis on original spare parts and increased inspection and maintenance prediktive based on life time

e. Obsolete of Equipment

The number of obsolete equipment especially equipment instrument level 1 and level 2 are obsolete potentially major issues in the upcoming production SSP2

2.2.1 Situational Appraisal

Based decisioon making ***kroeper toege*** that isue low plant utilization factor of the 5 analyzed based on the level of interest of time (timing), trend (trend) and its impact. Each categorized in the score of low, medium and high. Formulation process can be continued with a follow-decision analysis, potential problem analysis or problem analysis. It can be concluded that the issue of energy and raw materials are categorized in decision analysis, while a group of internal plant anaysis tools into the problem, and potentially problematic to the group of potential problem analysis.

Table 3. Procentage Pareto Problem

No.	Problem	Procentage Idle of Time Utilization
1	Shortage of Electrical Energy Supply	60
2	Shortage of Raw Material	27
3	Unefficient Electrical Energy	5
4	Breakdown Maintenance	4
5	Quality	1
6	Obsolete Equipment	2
7	Low Speed/Adjustment	2

2.2.2 Root cause analysis Fishbone problem of high electrical energy

Fishbone diagram (fishbone diagram) or ishikawa diagrams (according to the inventor, Dr.. Kaoru Ishikawa) is an analysis tool that provides a systematic way of looking at the causes and consequences arising from or contribute to a result. Because this function is also called a fishbone diagram as a cause-effect diagram. The name is chosen to remember that this diagram is useful to assist in the categorization of the potential causes of a problem or issue and identify the main causes. The cause of the influence of the high consumption of electricity:

a. Tap to Tap Time

Tap to Tap time is the time required in a circle between the fused fusion with subsequent melt. Tap to tap time consists of the sum of power on time with power off time. Power on time is the time from start to arcing and melting temperature of molten steel composition is reached. Power off time consists of activity tapping time, set up time is the inspection and repair, charging time. The longer the tap to tap time the greater the electric energy consumed. Ideal tap to tap time when power on time / tap to tap time above 85 percent.

b. Raw Materials

The biggest influence is affected by the cleanliness and density scrap, namely the quality dri metallization and carbon, the influence of fuel quality limestone, the magnitude ratio dri and scrap. The larger the percentage and cleanliness of scrap electrical energy obtained is low. Metallization dri higher the lower the electrical energy. The higher quality the lower the electricity consumption of lime.

c. Dedusting

Is the vacuum exhaust and dust in the smelting furnace. Under ideal conditions, little heat loss and if there is going to be a waste over pressure. Quality carbon raiser containing high volatile matter adds to the higher heat loss.

d. Process.

Foaming slag ineffective working optimally so as to produce Fe content into wasted steel slag. Steel recovery process is less than perfect so wasted cause.

e. Tons of liquid Steel Tapping

Scales and the rest is affected by a low liquid steel and low basicity.

The bigger tonnes of liquid steel in the energy consumption of a small circle.

Table 4. Analysis of situasional appraisal

ISSUE	*TIMING*	*TREND*	*IMPACT*	*PROCESS*
Shortage of Electrical Supply	*H*	*H*	*H*	*DA*
Shortage of Raw Material Supply	*H*	*H*	*H*	*DA*
Unefficient Efficient Usage Energy	*M*	*M*	*M*	*PA*
Breakdown Maintenance	*M*	*M*	*M*	*PA*
Obsolete Equiptment	*L*	*M*	*L*	*PPA*

Note H: high M: midle L: low DA: Decision analysis PA: Problem analysis PPA: Potential problem analysis

2.3 Target Electric Energy Consumption

Results of Tata Steel Consulting benchmarks that compare energy consumption and material PT. Krakatau Steel and other steel mills in North America & South America, India and North Africa can be seen in the graph below.

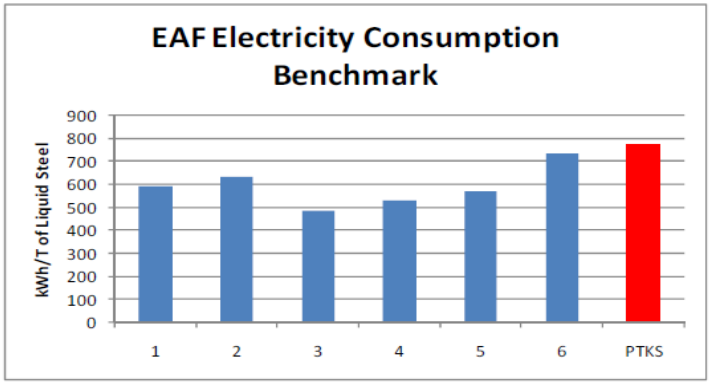

Figure 2. Power Consumption Benchmark

Based on Figure 9, the consumption of electricity and electrodes for EAF PT. Krakatau Steel is the highest compared to other factories in the benchmark. Gap between actual electric arc furnace with best practice can achieve 200 kwh / ton liquid steel

3. Business Solution

Of exposure to chapter 2 , influence factor waste electricity consumption is the first priority of concern of internal management to improve properly. The second factor is the electrical power supply to ensure continuity of operations in steel making. In chapter 3 will discuss efforts to increase the efficiency of power consumption by adjusting the pattern of steel making operations with limited resources and efforts to the two, is a management effort to get cheap energy. The method used is the Problem Analysis and Decision Analysis.

3.1 Optimization of slab production with limited power supply

Performance is a major steel slab plant plant Overall effectiveness (OPE) as a key performance indicator key. OPE is the generally accepted formula wherein the formulation includes

OPE = PR X PA X QR

PR : Performance rate
PA : Plant avaibility
QR : Quality rate

Performance rate is measured operational readiness of equipment in calendar time - time breakdown - avaibility repair.Plant time is a measure of the effective time of factory operations divided by the time productively. QR is the ratio rate quality product output divided by input raw materials. Picture performance electric arc furnace steel making slab can be seen on the table. Visible with limited electrical power supply causing the entire furnace operation effectiveness operation not get maximum results. This is evident from the value of overall plant effectiveness.

Known as steel making plant consists of a steel mill plant Billet, Steel Slab Plant 1 and Plant 2 steel slab. Power requirements when operated full is 400 Mega watts. Electric power supply internally in the production of electric power by Krakatau steel with a capacity of 5 x 80 Mega watts to serve the needs

Table 5. Overall Electric Arc Furnace Effectiveness

EAF NO.	5	6	7	8	9	10	TARGET
PR	50	70	55	65	75	70	85
PA	40	42	44	47	65	55	95
QR	96	97	96	95	98	97	98
OPE	19,2	28,5	23,3	29,1	47,8	37,4	80

of the whole PT Krakatau Steel with 540 Mega watt power requirement of PT Krakatau Steel main factor why not operated full power is due to the limited amount of energy used cheap gas. Overview residue of used electricity production costs can reach IDR 1400/kwh, whereas when the production of the gas supply at the price IDR 800/kwh PGN. Pertamina is the alternative of the cheapest gas prices to electricity prices IDR 600/kwh. Pertamina gas problem is a limited amount of supplies and tend to fall. PT Krakatau Steel.

Table 6. Optimisation of Electric Arc Furnace Operation

EAF NO.	6	8	9	10	TARGET
PR	90	75	90	90	85
PA	85	70	85	85	95
QR	98	98	98	98	98
OPE	75	52	75	75	80

has done a synergy with PT PLN with additional 200 mega watts of power with I4 tariff for IDR 606/kwh.With limited power supply of 200 megawatts of electricity for steel making, required surgery only a maximum of 4 furnace. Two proposed for standby furnace. The selection of furnace and Simulation of the pant overall effectiveness can be seen in table 3.2.

3.2. Problem analysis Wasteful Energy in Electric Arc Furnaces SSP2

Waste of electrical energy in SSP2 will be reviewed by probrem analysisi Kroeger that the biggest factor, as described in chapter 2 is a long tap to tap already discussed in chapter 4.1 by increasing overall plant effectiveness will directly lower the tap to tap time. The second factor is the dedusting serves to regulate the pressure in the furnace so that the heat generated from the arc electrodes can be effective to melt. Problems in ssp 2 technology is already teIDRasangnya oxy fuel burners can reduce electricity consumption 70 kwh / ton but constrained by the dedusting functions may not work optimally. This is due to the inability of the dedusting built in 1993. Dedusting study analyzes the problems can be seen below.

The Most Possible Causes :

The occurrence of reaction-sparking uncontrolled gas CO / unfinished in uncooled ducting

-The occurrence of negative pressure control automation sisitim EAF 10 is not a perfect work of function dec openings and dilution damper flap

3.3. Production strategy to reduce set up time

Continuous operation of the electric furnace with reducing repair time of each heat is electric arc furnace slab factory improve performance efficiency. Changes in current patterns that tend to preserve old brick revetment up to 300 heat with a time of patching in 200 heat need to be reviewed. Thr benefit of this method furnace will get better efficiensi low electric energy consumption and electrode. Other benefit is getting low tefractory cost.

3.4 Alternative to Obtain the Lowest Price of Electrical energy.

To win the competition flat steel products products on the market domisitik, Krakatau Steel had made a breakthrough or continuous improvement efforts to become a market leader. Plathers than Krakatau steel flat products today is PT Gunung Garuda and PT Gunawan Dananjaya. However, for the production of steel slabs in Indonesia only owned PT Krakatau Steel. Of survey Boozalen hamilton show the price factor and quality is the primary role being a loyal customer. Invasion of imported products made the downstream industry with its low price tag threatens the sustainability of the steel industry in Indonesia, the Role of Government as regulator should be able to balance the reasonableness of the price of the practice of unfair practices with the application and implementation of SNI dumping policy. With the gap between supply demand is still high in the market domistik, the government is obliged to encourage the growth of the steel industry, especially in the upstream area. Krakatau steel business solution for low cost premises certainly high quality and on time delivery to the target. Slab factory into an important role as the only producer in Indonesia is expected to import semi-finished authority granted only to producer slab. Thus pt Krakatau can be pillar of nation building.

3.5. Production optimization of slab steel plant with limited electrical energy.

Overall evaluation of Plant effektiveness with 6 furnace operates below 50%, respectively, with the main dominant avaibility lack of electrical energy. For it to be efficient at the level of overall plant effektiveness above 85% then the maximum operating enough 4 furnace. The furnace is the fastest time a selected circle to the concept of joint operations SSP-1 and SSP-2 in order to obtain high productivity and yield the highest printing machines. Each casting machine specified speciality cxasting machine no 1 used for width above 6 feet to 8 feet with a grade that is not sensitive to the internal crack because it is still the single roll. Casting machine no 2 for medium, high carbon and casting no 3 to meet automotive grade and rerolled. The option Optimize Production of steel slab plant with limited electrical energy is the right solution at the moment is at the level of production of 50 thousand tons of providing maximal margin is $ 5.6 million per month. But far more important is getting an extra energy at a low cost. Margins will increase significantly with the increase in production volumes at low electricity prices. Decision analysis of the Krakatau efforts can be explained in the description below. Sensitivity of electrical energy will change its strategy in making steel production.

The choice of cheap energy sources KT decision analysis performed with several option disadvantages Electric Energy Supply can be met by alternative:

1. Utilize full capacity of existing oil energy
2. Maximize capacities PT KDL with natural gas ex PGN
3. Build a combined cycle power plant steam
4. Build coal power plant
5. Splicing long cilegon PLN substation capacity of 100 MW
6. GITET adding 500 KV substation to 400 MW
7. Recovering exhaust gas energy production process

Alternative choice to a necessity to meet the shortage of electricity supply electricity at a low cost and environmentally friendly. Must be obtained from the analysis of 7 alternative, alternative 5 would be done further study of desire (want). Criteria of desire electricity cost is cheap and environmentally friendly is a mandatory factor is the speed of its realization in a Year to materialize, low investment, high availability, low operating cost, high reliability, easy Enggineering, construction

and maintenance. Decision matrix analysis can be seen in the table. From all done scoring option based on the value and weight.

KT Decision Analysis Based on the selected Alternative 6 are:

GITET adding 500 KV substation to 400 MW is the optimal option to get the cheapest electricity prices.

3.6 Potential Problem Analysis

Selection of additional alternative GITET 500 KV substation of 200 MW to 400 MW for the needs of PT Krakatau steel is the most optimal in terms of energy availability ex PLN, reliable and virtually maintenance minor. However, this option is not without consequences, associated grid system where Java Bali trip or blackout and internal protection of PT Krakatau Steel is not working.

Consequences of potential problem causes are posibility Java Bali grid system occurred blackout PT Krakatau steel electrical system collapse, Baja frozen, breakout process, Rolling Kobel, Direct reduction plant incompressible. Trip of the PLN power plants or plant breakdown as Suralaya and new Cilegon, or electricity shortage occurred in Jakarta PT KDL generation Operate at 40% operating capacity of 100 MW or enough as a base load Empowering protection system in each plant with the proper functioning of the emergency diesel automotive work when power outages

Potential problems will arise when a blackout occurs bali java network system can cause the electrical system in Pt Krakatau may stop suddenly can cause breakouts casting machine, rolling Kobel. The main cause of the power plant or cilegon new Suralaya trouble or tripp. Efforts to prevent it is turn kdl least 2 plants 140 megawatts or enough as a base load. As a security precaution emergrnsi mounted diesel-enter each plant that works automati

4. Implementing Plan

As The initial stage of cost reduction in The steel making repairs done internally. Exposure is mentioned on chapter 2 There are 2 main things concerning problem solving that is The first thing dedusting controller repair and strengthening of related technologies has been The installation of oxy fuel burners in electric arc furnace and The second is related to The investment know-how with learning quickly reduce The time set up time or shorten The furnace tap to tap time. Another thing to win daily production, is to eliminate The freezing and clogging in casting ladles to obtain uninterrupted multiples of 4 heat / tundish.

Decision making is an attempt to seek power with low price and high reliability that is doing The addition of 400 MW at 500 kV network. this has The advantage of providing a more stable voltage and supply a sufficient amount of certainty. However, this needs to be discussed with PLN because it involves The distribution network of Java Bali.

4.1 Revamping of Dedusting

Revamping of Dedusting technology oxy fuel burners not be an obstacle to obtain maximum efficiency. Dedusting currently designed in 1990 for the composition of raw materials and scrap 20% sponge 80%.

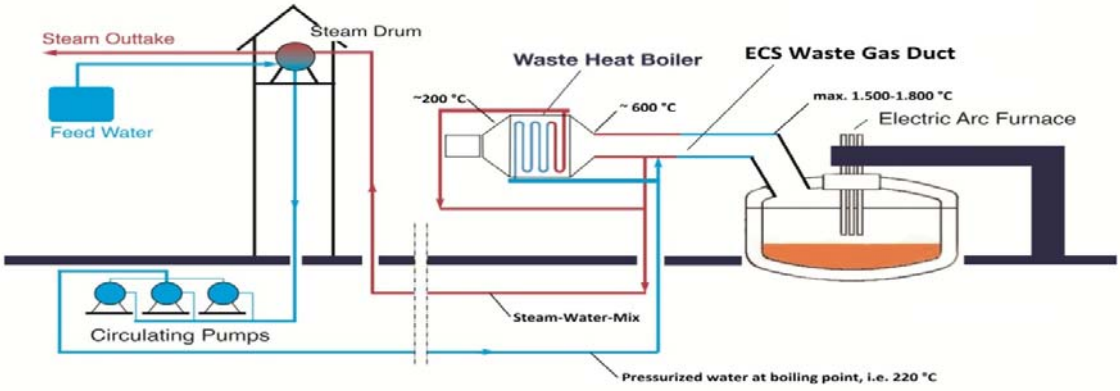

Figure 3.Concept Revamping of dedusting

 waste heat is released by EAF dedusting in Steel Making Plant can be used to make steam required by Reformer or CRM Evaporative cooling technology.
 Utilization of waste heat released from operations 2 Years SSP2 EAF dedusting system can produce steam for 35-38 ton / hour quality as needed Zero reformer or CRM.
Savings from heat recovery are:
1. IDR. 27 Billion / Year, IRR: 24%, PBP: 0.4 year.
(Natural Gas Price Assumptions: 6.7 USD / MMBTU)
2. IDR. 20 Billion / Year, IRR: 24%. PBP: 0.5 year.
(Natural Gas Price Assumptions: 5.0 USD / MMBTU)
NG consumption in 2132 Nm3 / h of manual book Zero Reformer
NG price of 6.7 USD / MMBTU Saving = 27,034,256,120 USD /Year
NG price of 5 USD / MMBTU Saving = 20,174,818,000 USD /Year
Operating days = 250 days / Year

4.2 The combined operations of the steel slab 1 and 2

Slab steel plant management in Krakatau steel plant needs to be redefined in a balanced perspective score card that The financial perspective is measured by profit margin, customer perspective on service satisfaction for on-time product delivery, quality, price and service. To measure The internal organizational capability and reliability of equipment operation execelent while learning and growth aspects in continuous improvement activities, inovation and training.

Achieve strategic objectives by operating excelent based on four activities as basic pillars are:
1. Maximize production capacity
2. Focus raw material cost efficiency, electricity, electrodes, refractories
3. Quality improvement with decreased activity in The non conforming product.
4. Continuous improvement and innovation.
Projected cost Krakatau steel production can be described as follows:
On the strategic direction of revitalization measures already showing on the anticipation of increasingly scarce and expensive energy. The main changes are formulated:
a. Marketing strategy of make to order a mass production. The same experienced by Zisco steel making in China in 2006. This is needs to be a radical formulation of marketing systems Krakatau steel.
b. Full availability of electrical energy, with assigned tasks to PT Krakatau electric power to provide energy cheaper than competitors.
c. Performance of The contracts based on cost performance of The consumable
d. Flexbility ratio of raw materials to meet The consumer with a diverse variety of raw materials
e. Application of reduce reuse, recycling of waste production
Quality Execution, coordination and determined talent manager given full authority and support from management PT Krakatau Steel. In an effort to implement operating strategies slab plant with limited energy is absolutely necessary to change The organization structure. It is currently unknown slab factory organization is divided into two divisions, namely Division 1 and The steel slab mill steel slab plant 2. By only additional 200 megawatts power from PLN could only be operated with 4 electric arc furnace operations so that The proposed division was changed to melting division and casting division. Scope division includes melting smelting area, material handling, energy management, casting division covers an area of secondary processes ladle furnace, Vacuum degassing, casting, slab handling and finishing. Likewise for care organizations are divided into divisions treatment with structural steel slab underneath melting and casting. Especially for refractory section and statistical section directly below The structure under division. It's key to success is The efficiency of The shift coordinator who has The authority to decide in which field Electric arc furnace operations and conduct joint casting. Monitoring The availability of energy under division melting with on line in a single department.

References

Anthony E. Henry, 2011, *Understanding Strategic Management (2nd edition), Oxford University Press.*

Charles T. Horngren, Srikant M. Datar, George Foster, Madhav Rajan, Christopher Ittner, 2009, *Cost Accounting A Managerial Emphasis (13th edition), Pearson International Edition.*

Dermawan Wibisono, Ph.d, 2006, *Manajemen Kinerja, Konsep, Desain, danTeknik Meningkatkan Daya Saing Perusahaan, Erlangga, Jakarta*

Ireland, Hoskinson, Hitt, 2011, *the Management of Strategy, Concept and Cases (9th edition), South-Western, Cencage Learning, Canada*

F. Robert Jacobs and Richard B. Chase, 2011, *Operation And Supply Chain Management (13th edition), Mc Graw Hill-Irwin*