

Theme of the Month :*Life Cycle Assessment***What is Environment Life Cycle Assessment**

Life Cycle Assessment (LCA) is a **tool for the systematic evaluation of the environmental impacts** of a product through all stages of its life cycle. LCA provides an adequate instrument for environmental decision support. Reliable LCA performance is crucial to achieve a life-cycle economy. The International Organization for Standardizations (ISO), a world-wide federation of national standards bodies, has standardized this framework within the series ISO 14040/44 on LCA.

There are 5 steps to do this assessment:

1st Step is Collection and calculation of Life Cycle Inventory (LCI) & then second step is preceding the life cycle impact assessment which involves classification, characterising & evaluation of these data in relation with ecological impact. Interpretation comes after the 2nd Phase. And then comes the results which are classified into 5 different categories which are as follows : Global Warming Potential, Eutrophication Potential , Primary Energy, Resource Efficiency & Acidification Potential.

The main purpose of LCA study under sustainability terminology is to know the resource consumption, resource impact globally, benchmark , find the scope for improvements and identify future course of projects to reduce the environmental impacts .

Mahindra Sanyo did its first study in LCA in the year 2013 & then in 2016. Not only the study but we also did our Simulation LCA for future projections. And now moving ahead with our success stories on E LCA we also have progressed in Social Life Cycle Assessment & have taken up Organizational LCA.

Mr. Sandeep Shah
Member LCA Team

Lifecycle Assessment as a basis for Decision Support

Since many years proactive companies like Mahindra Sanyo are starting to formulate ambitions to design and produce more sustainable products. This means companies need tools to be able to plan, do and check; a rational tool that can provide verifiable information. Life cycle assessment (LCA) is now generally regarded to be that tool; **it can help to understand where the hotspots in the supply chain are. Based on this companies can identify improvement opportunities.** When these improvements are implemented, LCA can help checking the progress. This development also has commercial relevance for a company like Mahindra Sanyo . There is a real chance that clients will identify steelmaking as a hotspot and may want to choose the best producer as one of their improvement opportunities.

So far most emphasis has been on environmental LCA's as for many years this was and is seen as the most relevant topic. **However, also a new topic is emerging and this is what we could call Social LCA.** Companies started to realise that while it is very important to focus on reducing environmen-

tal impacts, managing social impacts over the supply chain is emerging as a new topic. **I must congratulate Mahindra Sanyo with its foresight, as it was the first Indian company to join a pioneering project in this field; the Product Social Metrics Roundtable.** This roundtable is aiming to develop a commonly accepted method to assess the most relevant social impacts along the supply chain. Mahindra Sanyo has recently presented a case-study they developed together with their client BMW, see - <http://product-social-impact-assessment.com/wp-content/uploads/2016/09/Mahindra-presentation-Forum-July19th.pdf>

With its proactive attitude, Sanyo Mahindra has become a forerunner in the sustainability area which brings them in a unique position to inform and serve clients like BMW, and it has given the company a tangible tool to develop a pathway to a sustainable future.

Mr. Mark Goedkoop
Founder : PRé Consultants bv



E LCA at MSSSPL



MSSSPL conducted Life Cycle Assessment of

2016 Study completed for:

Steel Division: 30 products (23 Old + 7 New)
Ring Division: 2 products (1 Old + 1 New)

its 32 products (30 Steel & 2 Ring Products) on the basis of F 16 data to understand various environmental impacts like GHG, Energy, recyclability, waste, renewable materials, other environmental toxins etc. over the complete lifecycle of the products. First LCA study was conducted in year 2013. LCA study has been conducted as per ISO 14044 & ISO 14044 standards. Further we compared our 2016 performance with 2013. Overall observations are as follows:

Fuel Efficiency: Specific fuel consumption in SMS has decreased by 21%, Bloom/Billet and Forge shop has improved by 28% and Rolling shop by 6%.

Electricity Efficiency: The electricity consumption has improved by 8.8% in SMS, 19.68% in rolling shop, increased in forge shop by 10.6%

Yield: The average liquid metal yield in SMS is increased from 90.3% to 91.8%

The average yield of rolling shop is increased from 91.92% TO 93.25%

The average yield of billet/bloom shop is increased from 87.01% to 92.59%

The average yield of forge shop is increased from 73.14% to 75.03%.

Weight of the New ring is higher thus the impacts are also higher than the old ring.

Beside this we also compared our grade wise performance. It is observed that there was a **reduction in Global warming potential** across many grades. Maximum reduction was observed in 20 MC5 ,SAE AISI 4140 followed by AISI 01 Bar Further **acidification potential have been reduced** due to lower improved fuel efficiency in SMS, Forge Shop & Bloom/Billet shops. Major contributor to Human Toxicity Potential are the heavy metals release to atmosphere during the production thus where ever there is electricity consumption surge the HTP value is higher. Maximum decrease is observed in 20MC5 and SAE 1541. Photochemical Ozone Creation Potential reduction is observed in most of the grades.

Team Member

Mr. C. N. Sonavane : Mentor
Mr. Utsav Tayade : Leader
Mr. Prasad Giri : Co-Leader
Mr. Tukaram Mokal : Member
Mr. Sunil Hibare : Member
Mr. P. G. Shete : Member
Mr. Shankar Navalkar : Member

Ms. Ambalika Gupta : Member
Mr. Sachin Meshram : Member
Mr. Sudarshan Walkar : Member
Mr. Sandeep Ragade: Member
Mr. Jeetendra Patil : Member
Mr. Rahul Bhoir : Member
Mr. Sandeep Shah : Member
Mr. B. H. Patil : Member

Mr. Utsav Tayade
Leader LCA Team

F16 LCA Data collection



Life cycle inventory data collection is the most important and time consuming part for an LCA project. So depending upon importance, and route we filter our product grade and gather all necessary data shop wise. We collect gate to gate data for product grade, electricity, oil, raw material consumption, scrap mix, Yield, waste and route process. Also the various aspects of water, electricity ,oil , renewables, GHG are linked to prepare the report.

The products selected were based on longest route or on highest volume in order to cover the products which have the highest environmental impact within the plant. This can be used for identifying the hot spots for improvement as well as categorise the products for future study.

For F 13 LCA project, we had data of 23 product grades from Steel Division and 1 grade from Ring Division. For F 16 LCA project we included additional 7 grades from Steel Division and 1 grade from Ring Division according to maximum production and long route process. So total 30 grades from Steel and 2 grades from Ring, we had considered in our Data collection process.

Mr. Jitendra Patil
Member LCA Team

Product Social Impact Assessment



The changing scenarios and business models have made it mandatory for businesses to act more responsibly. The dynamic markets and aware consumer has made accountability, responsible behaviour a core to any business

tively assess the impact of the product across the different stakeholder categories on different social parameters like health, well-being working hours, wages etc. in the entire value chain.

The methodology helps in hotspot identification in the entire value chain from cradle to grave and is flexible enough to suit the industry and business demands for the study also at the same time its benchmarks the business in specific against the international and national standard of operations. It has been developed in synchronisation with prevailing different international guidelines and standards for the social well-being and sustainability (GRI, SAI, UNEP – SETAC, UNDP, ILO, OECD, MDG, ISO etc.)

success story. The stakeholders of business be it direct or indirect are the story tellers of the business legacy

While a willingness to make a difference and to showcase more responsible conduct has moved the business to work with PSIA. The aim of PSIA is to empower business with more transparency, stronger and ethical decision making, sensible procurement and respectable marketing strategy.

To survive in rough times of poor demand slumped market the companies have started to tread the road of **Sustainability** as the road to success. People, Planet and Profit are the three major components to the idea of sustainability. *While the industries and companies have worked a lot in the domain of environmental sustainability the people aspect of it is slowly gaining momentum with its jurisdiction increasing more than that of Corporate Social Responsibility*

Mahindra Sanyo has been a part of this project from 2013 where ten companies across industry are leading this forum and *Mahindra Sanyo has been the only company headquartered in Asia to do this.*

Product Social Impact assessment (PSIA) is one of the step in this direction. To ascertain and compute the social impact of the any manufactured product to be able to assess the social well-being of the stakeholders (Employees, Consumers and the Community) has been well recognised by the different industry and businesses.

<http://product-social-impact-assessment.com/news/>

PSIA is the methodology developed to quantitatively and qualita-

Ms. Ambalika Gupta
Leader SLCA Team

Simulation E - LCA



Life-cycle assessment (LCA, also known as life-cycle analysis, Eco Balance, and cradle-to-grave analysis) is a technique to assess environmental impacts associated with all the stages of a product's life from cradle to grave (i.e., from raw material extraction through materials processing, manufacture, distribution, use, resource consumption, and disposal or recycling). Designers use this process to help critique their products. LCAs can help avoid a narrow outlook on environmental concerns.

MSSSPL is one of the first companies to extend this study into future forecast of the environmental impacts of its products & operations based on the aimed improvements in aspects like reduction in energy, oil and increasing the re-



newable mix into our consumption.

It is expected that a reduction of 6.22% in GHG emissions can be achieved by FY21 from baseline FY16 the SMS electricity is reduced as per the simulation values

A reduction of 1.97% in GHG emissions can be achieved by FY21 from baseline FY16 when the specific fuel consumption is reduced as per the simulation values.

A total reduction of 9.84% in GHG emissions can be achieved by FY21 from baseline FY16 with increase in the share of renewable energy in the total electricity consumption.

Mr. Rahul Bhoir & Tukaram Mokal
Member LCA Team

Quiz Time :

Fine organic or inorganic particles Suspended in the air is called ?

- 1. Particulate Pollutant 2. Gaseous Pollutant 3. Aerosol 4. None of these**

(Be the first one to SMS the answer with your name @ 7720091891 & get a prize for the same.)

Natural Capital Valuation

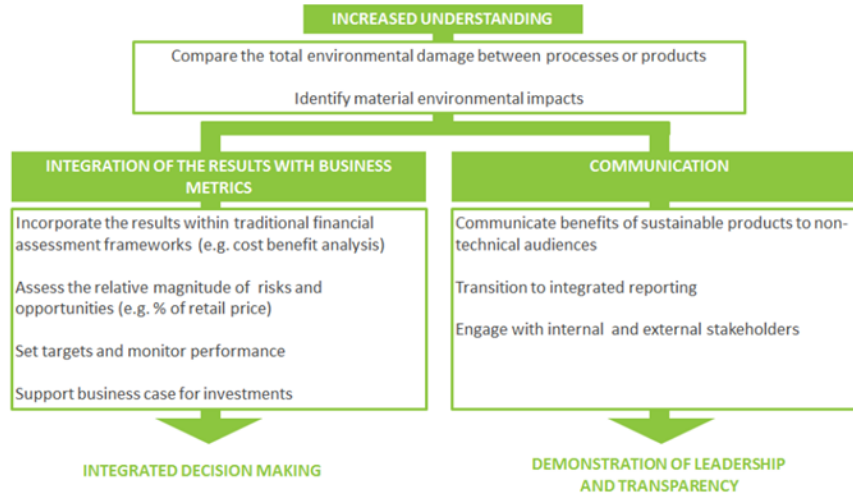
Natural capital is the world's stock of natural resources, which includes geology, soils, air, water and all living organisms.

Businesses rely on this Natural Capital to produce goods and deliver services. They depend on natural non-renewable resources (e.g. fossil fuels and minerals) as well as natural renewable ecosystem goods and services (e.g. freshwater and pollination).

Businesses also rely on Natural Capital for its ability to absorb by-products of production such as pollution and waste. This ability is finite and has already shown its limits, as with climate deregulation caused by greenhouse gas emissions.

Business's extraction and production activities can damage natural capital with long term economic and social consequences which are more often paid by those affected rather than those responsible. Natural capital costs are financial val-

How can MSSSPL use the results of this analysis?



ues applied to absolute environmental impacts that reflect the full costs to society that a company is responsible for.

MSSSPL engaged M/s Trucost to enhance and extend the value of existing LCA study by applying financial metrics to the physical environmental metrics. By understanding the natural capital cost of its products, operations and processes, as well as the relative

materiality of each impact category, MSSSPL can then overlay this data with other metrics, such as costs and prices to inform its overall sustainability strategy and communicate its natural capital impacts to internal and external stakeholders in a transparent and easy-to-understand language.

Mr. Prasad Giri
Co - Leader LCA Team

Life Cycle Assessment Project at Ring Division.



Ring Division conducted its LCA study and proud to say that MSSSPL Ring Division is the first & only forging company who has initiated this study. This study is from cradle to end of life of the product.

The product for the LCA study was a tapered roller bearing ring which is used for the application in BMW 1 series car, manufactured in Germany.

The value chain for the study was the MSSSPL Steel – Rings--- FAG Hungary bearings ---- BMW Cars

The LCA team of Ring Division is led by Mr. Shankar Navalkar and supported Mr. Basaprabhu from Quality, Mr. J Venkat from production as members from different functions.

Data collection's major focus was to have all relevant information on consumption of raw material, energy, natural resources like fuel, water at each manufacturing stage of the product. The study was so detailed that the data for the transportation of the material during the manufacturing stage was also considered to assess the environmental impact completely.

After this study, we got a holistic view on the consumption of natural resources and its impact on environment as a bench mark for all manufacturing process and this triggered a drive to strive to the bench mark

targets. *As a resultant to the study the raw material consumption for the studied product improved by 12% weight reduction.* This 56± weight reduction led to energy saving in subsequent processes, like heat treatment, transportation, less energy for machining and gaining in substantial reduction of impacts on environment.

The second project selected by Ring division was for its product named LM 48548/510, which is further linked to customer M/s SKF India Pune.

This project has triggered in 2 improvements:

- Improvement is in raw material reduction, which resulted in 9% weight reduction.
- Improvement is in energy reduction with the help of proportionate induction coil diameter is under project stage,

Ring Division is further proceeding with the LCA studies for other product lines to bench mark and to carve a greener path for future by less polluting and energy efficient products.

Mr. Sunil Hibare
Member LCA Team

Understanding of LCA Terms



Till now, you read about LCA & NCV. Now its time to understand the various terms used in Life Cycle Assessment study. This terms are compiled by the Centre of Environmental Science at Leiden University and include the following LCIA categories:

Parameter	Meaning	MSSSPL Performance
Global Warming Potential 100 years	Impact assessment level with global effect; GWP is mainly caused from CO2 and CH4 emissions which account for major GHG emissions from the steel industry. In exploratory impact assessments, other GHGs account for less than 2% of the steel industry GHG emissions, on a CO2 equivalent basis.	Fuel Efficiency: Specific fuel consumption in SMS has reduced by 21% , Bloom/Billet and Forge shop has improved by 28%, and Rolling shop by 6% Electricity Efficiency: The electricity consumption has improved by 6% in SMS, 21% in Rolling shop, increased in forge shop by 17% Yield: The average yield in SMS has increased from 90.3 to 91.8%, Rolling shop is increased from 91.92% to 93.25% & billet/ bloom shop is increased from 87.01% to 92.59%
Acidification Potential	Impact assessment level with local effect; AP is mainly caused by SO2 and NOx. Acidification potential is mainly due to the SOx and NOx emissions from the gate to gate processes as well as the value chain.	Acidification potential is mainly due to the SOx and NOx emissions from the gate to gate processes as well as the value chain. The major contributions are due to fuel combustion in SMS, Forge shop and Bloom/Billet shops. As their fuel efficiency has improved by 21% in SMS, Bloom/Billet and Forge shop it has improved by 28%, & Rolling shop by 6% respectively, the process emissions of SOx and NOx have reduced leading to reductions in acidification potential. Another reason is the average yield of processes has improved.
Eutrophication Potential	Impact assessment level with local effect; with in the steel industry, EP is mainly caused from NOx emissions.	The major impact is caused by electricity consumption thus where ever there is electricity consumption surge the EP value is higher
Photochemical Oxidant Creation Potential	Impact assessment level with local effect; with in the steel industry, POCP, also known as summer smog, is mainly caused from carbon monoxide emissions.	The major impact is caused by energy consumption thus where ever there energy consumption has surged the POCP value is higher.
Human Toxicity Potential	Impact assessment level with local effect; is mainly caused from the emission of some substances (such as heavy metals).	Major contributor to HTP are the heavy metals release to atmosphere during the energy production thus where ever there is electricity consumption surge the HTP value is higher.

Mr. Utsav Tayade
Leader LCA Team

Comparative Analysis of Rings



Comparison of LCIA results for 1 ton of old vs 1 ton of new ring product shows % difference in LCIA results of the new ring SKF grade 3 vs old ring 100Cr6. New ring SKF grade 3 is showing better results than old ring product in all LCIA impact categories. The Eutrophication Potential is 26.91% lower in new ring product, Acidification Potential is 21.46%

lower in new ring, Global Warming Potential (GWP 100 years) is 18.54% less than old ring. Similarly, Human Toxicity Potential (HTP inf.), Photochem. Ozone Creation Potential (POCP) and Primary energy demand (net cal. value) show 14.71%, 21.42% and 18.83% less impact in the new ring product, respectively.

Mr. Shankar Navalkar
Member LCA Team

Theme Based Month : W2W



Skit

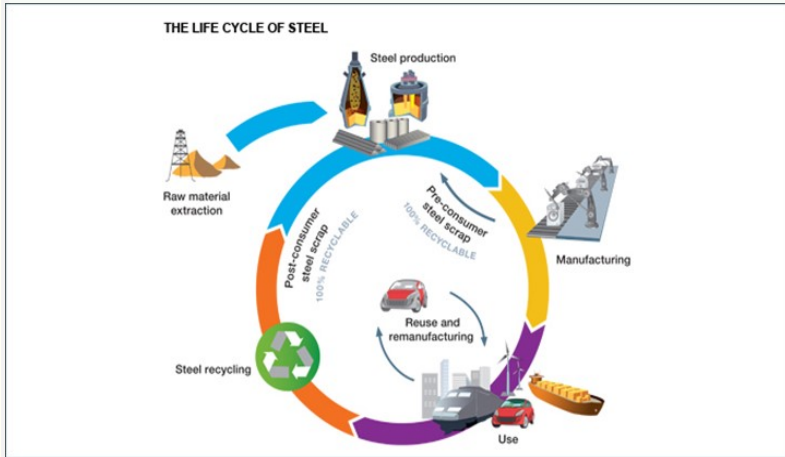


Awareness Sessions

What is LCA

Life cycle assessment (LCA) is a standardized scientific method for systematic analysis of flows (e.g. mass and energy) associated with the life cycle of a specified product, a technology, a service or manufacturing process systems (ISO, 2006a). The approach in principle aims

1. Goal and scope definition (framework and objective of the study);
2. Life cycle inventory (input/output analysis of mass and energy flows during office workstation manufacturing)
3. Life cycle impact assessment (evaluation of environmental relevance, e.g. global warming potential); and
4. Interpretation (ISO, 2006a; ISO, 2006b).



Business value of LCA

LCA study helps in identifying the “hot-spots” with respect to various environment parameters at various stages of production process value chain (e.g. material sourcing, logistics, manufacturing, distribution and end-of-life stages). LCA is an effective tool in the industry to support decisions during the development process concerning the ecological performance of the products. LCA also helps in selecting KPIs relevant environmental performance. LCA is also used

for Environment product declaration (EPD) or environmental communication to external stakeholders, Green marketing and branding.

(Source: <http://www.worldsteel.org/publications/position-papers/lca.html>)

at a holistic and comprehensive analysis of the product including raw material acquisition, manufacturing as well as use and End-of-life (EoL) management.

ISO 14040/44 and components of LCA

The International Standard: ISO 14040:2006 describes the principal and framework for life cycle assessment and ISO 14044:2006 provides requirement and guidelines for conducting LCA studies. According to the ISO 14040/44 standard, LCA study consists of four phases:

LCA at Mahindra Sanyo

A comprehensive LCA study has been conducted for 30 identified grades of special steel products of MSSSPL. The study provided fair understanding of environmental impacts during the various life cycle stages of the product. It also identified the hot-spots in the value chain where improvement activities can be prioritised and accordingly investment have been planned.

Dr. Rajesh Kumar Singh
Managing Director : thinkstep

Theme Based Month : W2W



Every year we celebrate theme based month to sensitize our employees on various sustainability aspects. One of the most important material aspects for our

organisation is “Waste Management” and useful utilisation of waste in industry and in day to day life. Major waste in our plant is furnace & ladle furnace slag, refractory, mill scale, plastic, wood & paper.

We started this month on 18th November, it is inaugurated by CFO, Mr. Sudhir Yagnik, which infused a sense of responsibility to all the employee. The month witnessed lots of activities involving awareness programs at shop floors where the employees are given key details of various types of waste generated in the specific shop, Waste disposal methods, Three “R” principle. *More than 250 employee’s participated in this awareness session.*

During this month we also conducted Interdepartmental audits and **CHALTA BOLTA** competitions, wherein employees participated wholeheartedly. *More than 60 employees were rewarded on this occasion. Tracking of food waste* from canteen has been started from this month to sensitise about food wastage in canteen.

Our internal team also prepared a *smart skit* on this subject. Our employee performed on shop floor, main building & recreation centre. Shopwise competition for waste (scrap) collection was conducted during this month. Wherein *approximately 260 MT scrap was collected.* Approximate *value of this waste material is Rs.64 Lacs.*

School children & family members also participated in this month by making various types of articles from waste. This article *exhibition* was done in recreation centre & canteen. As a gratitude towards society, drive for *donation of old clothes* to the needy was initiated during this month. Approximately *69 kg of clothes* were collected during this drive.

Mr. Vijay Prabhune
Leader W2W Team