Towards a resource efficient auto component manufacturing in India: A case study

1. Introduction

India's auto component industry forms the backbone of the burgeoning automobile sector, with three fourths of the total sales generated in the country. It may be a minnow compared to the global automotive component industry, but the sector has achieved huge growth in recent years and has emerged as a leading hub for outsourced manufacturing of components for leading global automobile manufacturers. The component industry has achieved a turnover of almost USD 40 billion in 2015-16 and is expected to reach USD 100 billion by the end of this decade. India's demand for personalised transport and export potential will stimulate growth in the sector.

Component manufacturing is material intensive. Hence, meeting future demand will require substantial materials. Estimates from the GIZ-TERI (2016) analysis reveal that materials[1] requirement by 2030 will increase to more than 100 million tonnes. India is import dependent on many of these resources. Further, price volatility, difficulty in material processing, increased costs of logistics, etc. would have a spiralling impact on overall cost of component manufacturing and consequently automobiles. The situation, therefore, calls for greater adoption of resource-efficient practices across the value chain, which would improve direct and indirect consumption of materials and enhance material productivity, thereby increasing competitiveness of the automotive industry.

Auto component manufacturing in India takes place in the formal and informal sectors. While the formal sector mostly caters to equipment manufacturers, the informal sector caters to low-value products that find place entirely in the aftermarket category. The formal sector controls 80 per cent of the production of components (in value terms), leaving the rest to the informal sector. Even among the organised players, a vast majority of the companies operate at the bottom of the pyramid and may not have the adequate scale of production, technical know-how

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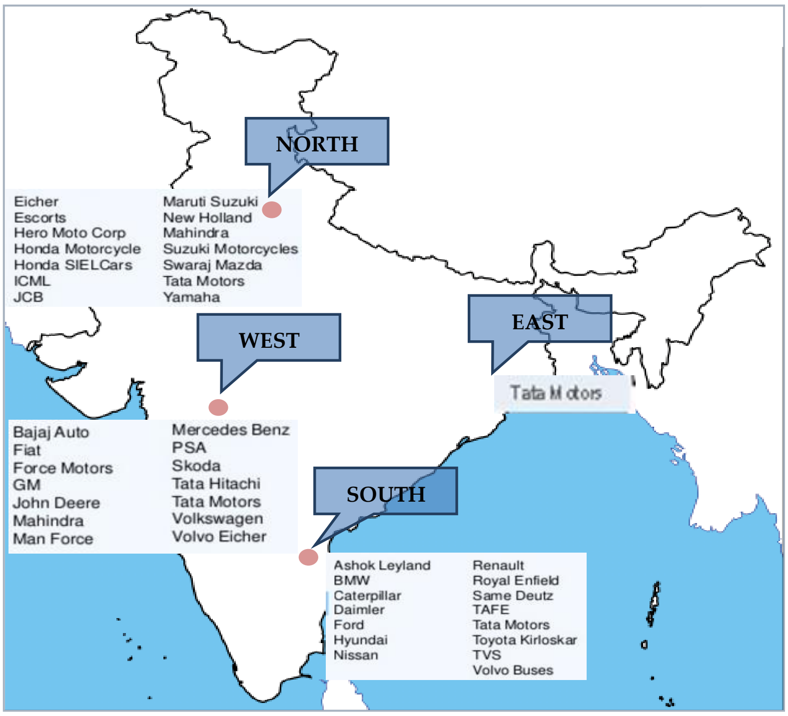
[1] Key materials include iron, steel, copper, aluminum, zinc, nickel, plastics and composites

and human resources to strengthen competiveness through better material utilisation. The problem is often compounded by their inability to participate in effective cluster-based development programmes. Hence, these companies are hotspots for potential efficiency improvement-related pilot activities. The growing demand/requirement of industrial materials, primarily from these smaller companies, can be met sustainably through improvement of resource-use recovery and recycling, thereby reducing costs and increased material productivity.

2. Cluster identification and selection of companies



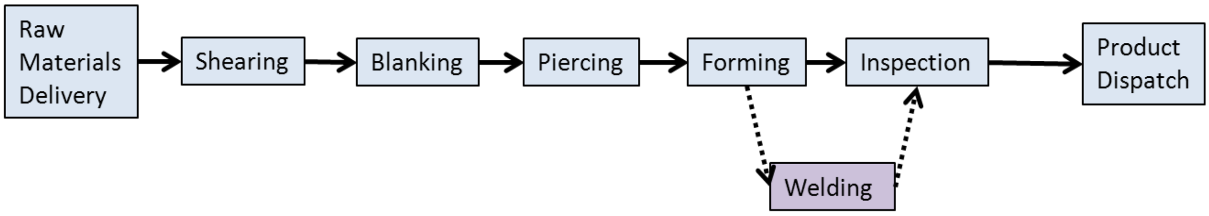
The automotive cluster in Maharashtra is among the most promising in India.

Indian component manufacturers largely operate near the Original Equipment Manufacturers (OEMs) due to the symbiotic relationship between them. In Maharashtra, the proliferation of activities of world's leading OEMs as well as the component manufacturers and automobile part suppliers in Pune and neighbouring areas such as Chakan, Pimpri-Chinchwad, Talegaon, etc. have made it India's Detroit. The state accounts for more than one third of the total automobile output in India while the sector contributes to almost 10 per cent of the total employment of the state.

While there are major component manufacturers in the area, most of the component manufacturers/part suppliers are small-scale operations. Due to this and their limited revenue and profitability, they are unable to join formal cluster development programmes by various national agencies. TERI leveraged its previous experience in the region and the sector to explore these players' willingness to participate in the resource efficiency pilot activities. In the process, five companies were shortlisted for pilot-level interventions. The companies were also shortlisted keeping in mind the possibility of forming a small ecosystem that gainfully utilises their scraps and off-cuts.

3. Key interventions and outcomes

Those shortlisted were mostly press parts manufacturers. Key materials used in these companies include steel sheets of various specifications (in terms of grade and thickness), coolants and lubricating oils. A typical process flow of a press part manufacturing looks like this -



Parameters based on onsite assessment, for which detailed information was collected, included raw material consumption, waste/rejects (generation), consumption of water and electricity and non-electricity based energy. Interventions were proposed to each of the participating companies based on Resource Efficiency and Cleaner Production (RECP) assessments. A multi-pronged engagement and communication process was developed for employees and senior management.

	Frontline Workers	**Middle management/floor managers**	**Senior management of industrial units**
Major responsibilities	➢ Implementation	➢ Technical processes + supervision	➢ Take decision to implement RE measures
	➢ Providing feedback to middle managers	➢ Provide feedback to senior management ➢ Engage with vendors etc.	➢ Communicate results to associations, vendors and clients
Required capacities	➢ Additional knowledge and skills on RE intervention	➢ Technical knowledge	➢ Leadership (*acceptability towards new ideas and business models*)

		➢ Managerial & communication skills	➢ Technical know-how
Key interventions planned	➢ Training/ resolving queries	➢ Questionnaire survey to assess awareness	➢ Invitation to national workshops for sharing economic benefits & technical know-how
		➢ Technical training sessions	➢ Technical training sessions

The summary of savings in materials, energy, water and greenhouse gas (GHG) emissions of the participating companies are presented in the section below. Savings have been quantified for each company on the basis of electricity, material, water and monetary savings respectively.

3.1 Interventions proposed and estimated savings of materials

Two major opportunities for material-use saving were explored through (i) internal recycling/reuse of the generated off cuts within the company's processes and (ii) external recycling leading to the sale of generated off cuts (and scraps) to other press part companies, thereby creating material use circularity within the cluster. Recycling of the secondary raw materials, both internal recycling of raw materials and the potential external recycling strategies were evaluated. Internal recycling is the reuse of the generated off cuts within the company's processes whereas external recycling is the sale of generated off cuts (and scraps) to other press part companies for their consumption. An average reduction in material wastage of 15 per cent was thus achieved. External recycling was possible through organising B2B meetings and helping create a market for scrap from one company that was found to have potential use in another company's manufacturing process.

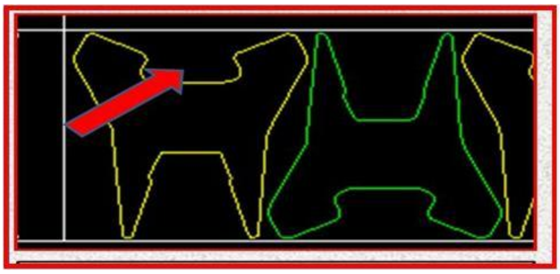
Following is a summary of the **e**stimated material savings (in physical and financial terms) and carbon dioxide (CO_2) emissions avoided:

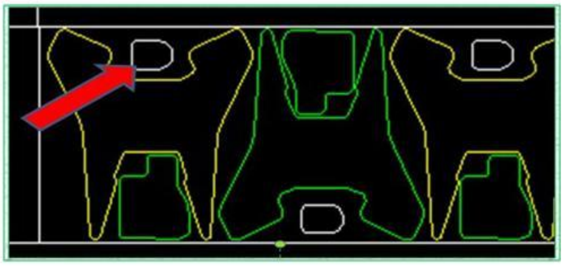
	Number of interventions	Secondary raw material utilised (annualised) - Tons	Financial savings (annualised) ₹	Potential CO_2 emissions avoided (tons)
Company 1	2	15.05	6,87,449	23.184
Company 2	2	17	7,76,900	26.18
Company 3	2	20.31	7,55,131	31.28
Company 4	2	15.1	5,69,398	23.27
Company 5	1	20	7,44,000	30.8
Total	**9**	**87.48**	**35,32,878**	134.71
Average		**17.5**	**7,06,575**	**26.8**

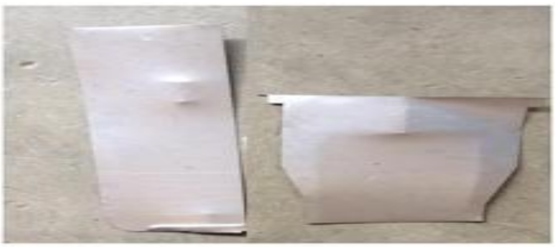
Before intervention

After intervention

a) Control of leakage of lubricants from press shop







b) Better use of rejects

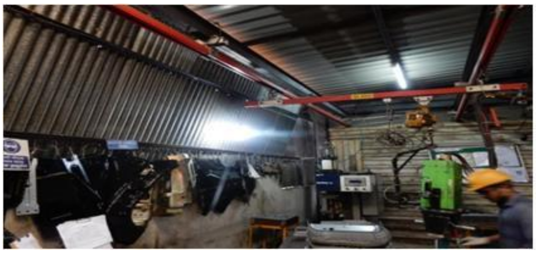
3.2 Interventions proposed and estimated energy savings

The proposed interventions also led to improvement in energy consumption by five per cent, thereby reducing wastage and CO_2 emissions. Key interventions included installation of natural lighting fixtures, energy-efficient lighting, efficient use of compressors and compressed air, periodically cleaning filters of air compressors and air conditioners, optimisation of cooling tower usage, optimum load in press machines to avoid overcapacity, etc.

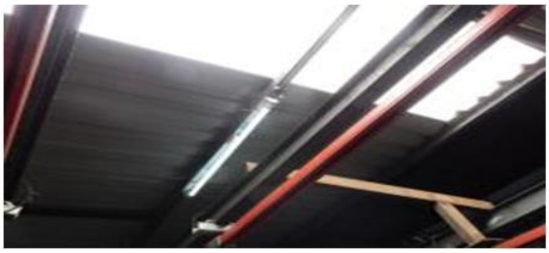
Estimated energy savings and CO_2 emissions avoided

	Number of interventions	**Electricity savings (kWh per annum)**	**Reduction in emissions (tons CO_2 per annum)**	**Estimated monetary savings (₹)**
Company 1	4	11,222	9.2	1,12,220
Company 2	3	5,008	4.1	50,080
Company 3	7	1,45,409	119.24	14,54,090
Company 4	4	70,787	58.04	7,07,870
Company 5	2	16,814	13.78	1,68,140
Total	20	2,49,240	204.38	24,92,400
Average		**49,845**	**40.87**	**4,98,480**

Before intervention



After intervention



a) Better utilisation of natural lighting

b) Improved insulation of drum drier to reduce thermal heat losses

3.3 Interventions proposed and estimated saving of water

Improved housekeeping and better utilisation of recycled water for cleaning led to reduction in water use by three to five per cent.

	Number of Interventions	**Water savings (litres per annum) during 2016-17**	**Estimated monetary savings**
Company 1	2	10,000	2,00,000
Company 2	0		
Company 3	2	32,000	6,40,000
Company 4	1	20,000	4,00,000
Company 5	3	15,000	3,00,000
Total	**8**	**77,000**	**1,54,00,00**
Average		**19,250**	**3,85,000**

Before intervention | After intervention

a) Better house keeping

4. Conclusion

The auto component manufacturing sector consists of industries ranging from small and micro enterprises (SMEs) to larger tier I and II industries. The larger industries have the technological and human resource capacity to achieve better utilisation of material resources, but the smaller ones often lack the scale and know-how to improve material-use efficiency. The pilot interventions in the selected SME cluster have demonstrated how simple and low-cost interventions can not only improve material yield and reduce wastage, but also help reduce energy consumption and water use.