Replacing old Technology Tyre Retreading Line with Energy Efficient Tyre Retreading Line

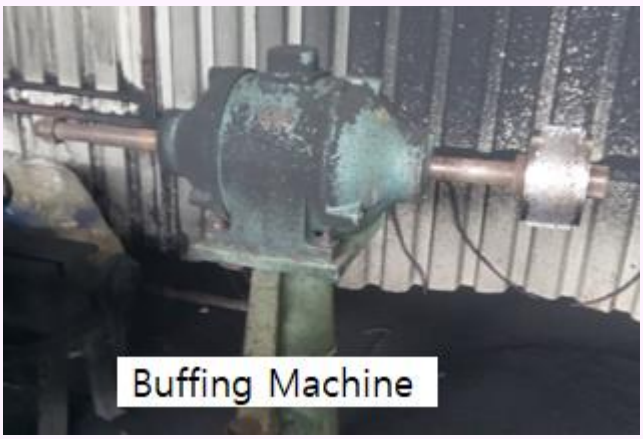
Aurangabad Mixed MSME Cluster

Cluster Brief:

Aurangabad (Maharashtra) is a prominent MSME Cluster and houses about 1000 Auto parts Manufacturing MSME Units located in major industrial Areas Waluj – MIDC and some in outskirts of the city in industrial area like Chikalthana etc. The Auto Component Units in Aurangabad Cluster are principally known for rubber, metal and plastic components for auto and non- auto Sectors. Aurangabad has mainly metal, plastic, rubber component and tyre retread industries which caters to the auto OEM's like Bajaj Auto, Skoda Auto, Audi etc. and Non-auto like Siemens etc.

Deogiri Rubber Cluster Foundation is the local industry association having about 50 members industries from rubber sector. The association has formed one Common Facility Centre (CFC) for rubber mixing, which provides ready pre-mixed rubber as raw material to its member industries. The production capacity of the CFC is around 70 to 100 tons /day.

Pratishtan Forging Cluster Foundation is another local industry association managed by forging industries in Aurangabad with around 150 members. This association has also setup a CFC for Shot blasting, drawing, cutting and forging operations.


Buffing Machine

Present Technology:

Tyre retreading units in Aurangabad uses set of three processes i.e. buffing, building and curing, consecutively to retread the old tyres. The equipment used include buffing machine, building machine and curing furnace.

Presently, on the buffing machine, the buffing of the old tyres is done manually using 5HP motor. Since, the buffing is done by holding the tyre manually, the energy consumption is high and production is low. The buffing done on the tyres is not even on the surface of the tyres leading to the extra repair/ rework on the tyre surface. Also, performing buffing manually is noted to be very dangerous. This machine processes 24 tyres in 10 hours.


Building Machine

Talking about the building process, this is also done manually and high specific energy consumption with limited productivity. Another issue is that, building tyre requires special skill sets of the operator which is very hard to find and therefore, sometimes the quality of pasting rubber belts on the tyre is not very good. This machine also processes 24 tyres in 10 hours.


Curing Machine

The third technology used is curing machine, wherein the ready retreaded tyres are heated at a temperature of about 125 deg. C in order to cure the rubber belts pasted. In the cluster most of the machines are more than 15- 20 years old. Few of the units uses electrical heating for curing process and remaining units uses thermopack for creating the heating atmosphere inside the curing machine chamber. Since, the old technology curing machines have larger cycle time for the curing process, its production is very low i.e. 4 Hours/ cycle and the specific energy consumption is very high compared to the new technology curing machines.

The specific energy consumption of the entire tyre building process is 8.9 kVAh/tyre. Rubber units in Aurangabad have shown interest for replacing the entire retarding line and insisted to consider this as single project for demonstration.

Proposed Energy Saving Technology:

The new technology tyre retreading line is uses clamp on mechanism in buffing and building machines because of which it completely removes the human involvement during the buffing and building operations. The said machines would have higher productivity and lesser energy consumption. Also, as new technology curing machine would have reduced curing cycle time, the production of the curing process would also be faster and will take around 2.5 Hours per batch to process.

The new tyre retreading setup would produce around 40 – 50 tires a day with proposed specific energy consumption of about 5.76 kVAh/ tyre.

Justification of technology selection:

The proposed tyre retreading line would offer complete safety to operators and would produce more tyres per unit of energy consumption. Since the demand of retreaded tyres has increased during the last couple of years especially in the commercial segment, the tyre retreading units are getting good business opportunities in the sector. Therefore, industries in Aurangabad are very much willing to upgrade the technology and are looking forward to participate in the project energy efficient technology adoption.

Energy & Monetary Saving:

The detailed energy savings calculations for replacing old Technology Tyre Retreading Line with Energy Efficient Tyre Retreading Line are given in the table below.

As per the observations, the Specific Energy Consumption in present situation is noted to be 8.9 kVAh/ Tyre. The estimated specific energy consumption on the new technology machine is 5.76 kVAh/Tyre.

Parameters	Units	Values
Electrical Consumption	kVAh	14.86
Production Output	Tyres/ Day	30
Operating Hours	Hrs/ Day	18
Specific Energy Consumption – Existing	kVAh/Tyre	8.9

Parameters	Units	Values
Electrical Load of New Tyre Retreading Line	kVAh	16
Production output	Tyres/ Day	50
Operating Hours	Hrs/ Day	18
Specific Energy Consumption – New Retreading Line	kVAh/Tyre	5.76
Specific Energy Savings	kVAh/Tyre	3.2
Percentage Savings	%	35.4%
Annual Energy Savings	kVAh	52074
Annual Energy Cost Savings (Tariff Rate @ Rs. 9.6/ kVAh)	In Rs.	499910.4
Manpower Savings	Nos.	2
Worker Wage Rate	Rs./Day/Man	500
Annual Manpower Cost Savings	Rs.	300000
Total Cost Savings	Rs.	799910.4
Investment for New Retreading Line	In Rs.	1800000
Payback in Years	Years	2.3

Based on the energy savings calculations, the annual electrical savings would approximately be 52074 kVAh annually (@ Rs. 9.6/ kVAh). The total cost savings calculated is Rs. 799910/ year. The estimated technology installation cost is Rs. 18.0 Lakhs per installation; the simple payback period for the same would be nearly 2.3 years.

The benefits can be summarized as:

- 35 % reduction in energy consumption and reduced CO2 emissions
- Reduced cycle time
- Payback within 3 years
- Operator/ Human friendly technology

Replication Potential:

Based on the discussion with associations, unit owners and energy audits, it is estimated that the technology has a replication potential of about 15 Nos. Based on replication potential, the overall project benefits will be as follows:

Parameters	Units	Values
Annual electrical energy saving (1 unit)	kVAh/year	52074
Annual electrical energy saving (15 units)	kVAh/year	781110
Annual CO2 emission saving (1 unit)[1]	tCO_2/yr	42.7
Annual CO_2 emission saving (15 Units)	tCO_2/yr	640.5
Estimated investment in technology (1 unit)	Rs in Lakh	18.0
Estimated investment in technology (15 units)	Rs in Lakh	270.0
Total Investment	in million USD	0.36

[1] CO_2 Emission: Electricity – 0.82 kg/kVAh

Parameters	Units	Values
Life time energy saving	GJ	28119
Life time CO_2 saving	tCO_2	6405

Availability of the Technology:

There are good many technology providers available in India and many of them have their supply channels to Aurangabad. The following are the technology providers available in the cluster.

Name of the Supplier	Complete Address	Email Address and Contact Number
Rajmahaal Tyre Equipments Pvt. Ltd.	No.-1C, Mahalakshmi Kovil Street, M.K. Palayam, Coimbatore - 641015	Email: Rajmahal9@dataone.in, 91-422-2570565/2580229
Bright Tyre Moulds & Eng. Works	Saw Mill Road, Koorkenchery, Thrissur-680007, Kerala, India	T. Antony George (Manager): 91 -9446466426
K.M.T. Retreading Industries	Plot No. 31, Hsiidc Industrial Estate, Jind, Narwana - 126116, Jind, Haryana	Mr. Kuldeep Kumar, 91-9812044530

Effect on the process

This technology will reduce the energy demand, cycle time, delivery time and would increase the overall productivity of the MSME unit.

Reasons for unpopularity:

This technology has yet not penetrated the cluster because of the following reason:

- Higher capital cost of the technology and limited finance availability.
- No one has yet demonstrated the results of the technology to all unit owners in the cluster.
- Lack of awareness about energy efficient technologies in Tyre Retreading Sector.