

**A Report On One Credit Course “ME1305 Lean Manufacturing”  
offered by WABCO during Even Semester 2015-16**

**Summary:**

Department of Mechanical Engineering took initiative to make the students industry ready engineer through offering a one credit course on ME1305 Lean Manufacturing during even semester 2015-16 for Mechanical and Automobile engineering students. This course was designed in collaboration with Wabco India Limited. This course was started with introductory session by Mr P.Jagannathan, Vice-President, Wabco. Mr Sundararajan, Site Lean Operations Leader, handled all the classes. The course was designed in such a way that consists of four parts 1. Theory and presentations of case studies. 2. Demonstrations of Lean practices in Ambattur plant and Mahindra City plants. 3. Training the students in Ambattur, Mahindra City, Jamshedpur Plants during summer vacation 4. Final year project work in lean manufacturing area. The first three components were completed successfully. During their training period, the students were allowed to study the process and identify the problems. The students solved the problems using the lean tools. The solutions were submitted to Wabco after completion of the training period. Students expressed their satisfaction of the course and recommended to conduct such course in future. Madras Engineering Industries Limited came forward to support this course demonstrating Poko-Yoke principles in their industry. Mr Parthasarathy, General Manager, helped us in this regard.



*Mr Sundararajan Lean Expert conducts class on lean manufacturing*



*Mr P. Jagannathan Vice-President, Wabco, delivers introductory lecture on lean manufacturing*

**Theory classes:**

Theory classes were conducted in SRM University, KTR Campus. Mr Jagannathan , Vice President Ambattur Plant, gave introductory lecture to the students. All the remaining theory classes were handled by Mr.Sundararajan, Site Lean Operations Leader, Ambattur Plant. More case studies were presented during the lectures.

Details of classes conducted and syllabus coverage for ME 1305 Lean Manufacturing- **Batch I**

S No	Topics	Date	Duration(min.)	
1	Introduction to Lean thinking	30 <sup>th</sup> Mar	60	
2	History & Basics of Lean Manufacturing – Introduction to the Toyota Production System	(wed),FN	60	
3	Lean Manufacturing pre-requisites:			
3a	5S Principles	2 <sup>nd</sup> Apr	60	
3b	“Learning to see” – WASTE reduction principles	(SAT), FN	60	
3c	TPM	2 <sup>nd</sup> Apr	60	
3d	Takt – time	(SAT), AN	30	
3e	Visual Management		30	
3f	Standard work	13 <sup>th</sup> Apr	30	
3g	Poka Yoke	(WED),	60	
3h	Built in Quality (JIDOKA)	FN	30	
4	Lean Manufacturing tools (Value stream mapping, Kanban, Pull system, SMED, Heijunka, etc)	13 <sup>th</sup> Apr (WED), AN	120	
5	Interactive case studies & simulation games	16 <sup>th</sup> Apr (WED), FN	120	
6	Demonstration of Lean practices in WABCO Mahindra city	12 <sup>th</sup> May FN	240	
7	Demonstration of Poka- Yoke practices in Madras Engineering Industries Limited	12 <sup>th</sup> May AN	120	
8	Demonstration of Lean practices in WABCO Ambattur	13 <sup>th</sup> May FN	240	

**Lean Practices in Industries:**

All students attended all the classes and visited the industries. The students were taken to Wabco (two plants) and Madras Engineering Industries Ltd. The lean experts demonstrated the lean practices which are implemented in their plants. The details of visit to industries is given below.

**Demonstration of Lean Practices in Industries:**

Sl No	Demonstration of Lean Practices in	Date
1	Wabco Ambattur Plant	13.05.16 FN
2	Wabco Mahindra City Plant	12.05.16 FN
3	Madras Engineering Industries Limited, Mahindra City Plant	12.05.16 AN

**Attendance sheet**

Sl No	Register No	30.3.16		2.4.16		13.4.16		16.4.16		12.5.16		13.5.16	
		FN	AN	FN	AN	FN	AN	FN	AN	FN	AN	FN	AN
1	1021310405	P	NA	P	P	P	P	P	NA	P	P	P	NA
2	1021310400	P	NA	P	P	P	P	P	NA	P	P	P	NA
3	1021310394	P	NA	P	P	P	P	P	NA	P	P	P	NA
4	1021310403	P	NA	P	P	P	P	P	NA	P	P	P	NA
5	1021310354	P	NA	P	P	P	P	P	NA	P	P	P	NA
6	1111310043	P	NA	P	P	P	P	P	NA	P	P	P	NA
7	1111310297	P	NA	P	P	P	P	P	NA	P	P	P	NA
8	1111310283	P	NA	P	P	P	P	P	NA	P	P	P	NA
9	1111310274	P	NA	P	P	P	P	P	NA	P	P	P	NA
10	1111310250	P	NA	P	P	P	P	P	NA	P	P	P	NA
11	1111310276	P	NA	P	P	P	P	P	NA	P	P	P	NA
12	1111310082	P	NA	P	P	P	P	P	NA	P	P	P	NA

**Internship during Vacation:**

Eleven students were interested to take the internship during summer vacation. The students were divided into three batches and sent to Ambattur, Mahindra city and Jamshedpur for training in lean practices. Mr Senthil, Team Leader Wabco gave instructions. The details of students who have undergone internship during summer vacation (2<sup>nd</sup> June to 25<sup>th</sup> June 2016) are given in the following table.

Sl.No.	Reg .No.	Name	Dept	Plant
1	1021310405	Ronak Parmar	Mechanical	Ambattur
2	1021310400	S.Harish	Mechanical	Ambattur
3	1021310394	Vinod Kumar.R	Mechanical	Ambattur
4	1111310043	B.Lakshmi Sai charan Reddy	Automobile	Ambattur
5	1111310082	K.Rohith	Automobile	Ambattur
6	1111310250	Sangram Sadangi	Automobile	Mahindracity

7	1111310297	Abishek Gupta	Automobile	Mahindracity
8	1021310403	P.Viswa Mihir	Mechanical	Mahindracity
9	1021310354	Anshuman Panigrahi	Mechanical	Mahindracity
10	1111310283	Asish RanjanSingh	Automobile	Jamshedpur
11	1111310276	Sumit Kumar	Automobile	Jamshedpur

Students were freely allowed to go around the shop floor and observe the process of various products. The students collected the data on specific process and proposed the solution to reduce waste to Wabco. The students submitted their reports to SRM and Wabco.

**Details of Project which was carried by students is given in the following table.**

Sl No	Title of Project	Plant at which it was done	Student's name	Remarks
1	Compressor 230cc layout change considering lean principles	Jamshedpur	1 Ashish Ranjan Singh 2 Sumit Kumar	
2	Line balancing in double diaphragm spring brake assembly	Mahindra city	1 P Vishwa Mihir 2 Abhishek Gupta 3 Sangram Sadanghi	
3	Head count optimization in clutch servo assembly line	Ambattur	1 K. Rohith 2 Lakshmi Sai Charan	
4	Plant layout modification in compressor assembly station	Ambattur	1 Anshuman Panigrahi 2 Vinod kumar	
5	Head count optimization in modular valve assembly	Ambattur	1 Ronak Parmar 2 S.Harish	

#### **Feedback from Students:**

1. Case studies presented during the theory classes are excellent.
2. One month training in Industry gave confidence to solve problems.
3. All people in Wabco helped them to solve the problems.
4. They wanted to do final year project work in Wabco and specialize in Lean manufacturing.
5. This course can be offered in future.

#### **Evaluation of the Course:**

Final examination was conducted on 30<sup>th</sup> May 2016. Mr Sundararajan prepared the question paper. It contains MCQs and Essay type. The answer papers were evaluated and marks were submitted to CoE for publication.

Sl No	Objectives of one credit course on Surface Engineering Course	Status
1	Creating Awareness on Surface Engineering	Met
2	Avenue to take industry related problems	Met
3	Students learn industrial practices	Met
4	Improve industry –institute relations	Met
5	To Make students Employable	Two students were employed by Wabco

**Conclusions:**

1. Wabco extended a very good support to this course.
2. Students gained a lot of knowledge in lean manufacturing.
3. Students recommended similar course should be conducted.
4. Eight students wanted to do final year project in lean and specialize in Lean manufacturing.
5. Two students from this batch 1. P.Viswa Mihir (1021310403) and 2. Ronak Parmar were selected for employment in Wabco.

This course was coordinated by Prof. M. Gopal and Mr Selwyn Jebadurai from mechanical engineering department.