

**DESIGN & DEVELOPMENT OF ADVANCED TECHNOLOGIES FOR HI-TECH
SHUTTLELESS LOOM (LR 450)**

Minutes of 2nd PROJECT REVIEW & MONITORING COMMITTEE (PRMC) meeting,

Held on 10-JAN-2018 at CMTI.

Members present

Project Review & Monitoring Committee (PRMC)		Central Manufacturing Technology Institute (CMTI)	
Prof. S. M. Ishtiaque	Chairman	Shri. S Satish Kumar	Director Incharge
Shri. Vivek Plawat	Member	Shri. B. R. Mohanraj	Joint Director (P.I)
Dr. Prakash Vasudevan	Member	Shri. S. V. Mansur	Sc-E (Proj. Coordinator)
Shri. D. Yuvaraj	Member	Shri. R. S. Suresh	HOD - DDC
Shri. T Parabrahman	Member	Shri. K K Rajagopal	HOD - CPC
Shri. Sanjay Chavre	Member Secretary (thru' VC)	Shri. V G Yoganath	HOD - PMD
		Shri. R S Honnatti	HOD - Purchase
		Smt. Asha Upadhyaya	Sc-E
		Shri. J. G. Arun Kumar	Sc-E
		Shri. S. Narashimmalu	Sc-E
		Shri. P. Agarwalla	FA & CAO
		Shri. S. K. Ananth	Technical Consultant
		Shri. R. Baglodi	Technical Expert
			All Project Execution Team Members
Textile Machinery Manufacturers' Consortium (TMMC)			
Shri. Vallabh S Thumar	M/s Alidhra Weavetech		
Shri. Ketan Sanghvi	M/s Laxmi Looms		
Shri. P Srinivasan	M/s Vaari Textiles		
Textile Machinery Manufacturers' Association (TMMA)			
Shri. Sachin Arora	Secretary, TMMA		

PRMC Members - Leave of Absence

Shri. S. Balaraju	Member - Convener
Shri. Neeraj Kela	Member
Dr. M.K.Talukdar	Member
Shri. K.Selvaraju	Member

TMMC Members - Leave of Absence

Shri. Dilip J Dhamanwala	M/s Life Bond
Shri. Ashish Amin	M/s Premier Looms

Regional Textile Commissioner's Office (RTCO) - Leave of Absence

Shri. Satish Kumar	Assistant Director
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Demonstration of weaving trials on indigenously developed Prototype loom

Prior to the meeting, CMTI demonstrated the on-going weaving trials with shirting fabric @ 450 ppm on the indigenously developed Prototype loom to the PRMC Chairman and PRMC & TMMC/TMMA members.

Meeting Session - Project Overview & Review with PRMC, TMMC & TMMA

Welcome & Opening Remarks

Shri. S Satish Kumar, Director I/c, CMTI, welcomed PRMC chairman & members, TMMC & TMMA members to the meeting with a special mention on Shri. T Parabrahman and Dr. Prakash Vasudevan, who were attending the PRMC meeting for the first time. He noted that the indigenously developed prototype loom was undergoing testing at 450 ppm and indicated that currently the project is at a point of

inflexion with regard to the need to take the project forward by continuing with Phase-II without any break and reap the benefits of indigenization efforts made by CMTI. He also briefed the PRMC that CMTI has already initiated work on Phase-II activities, including the indigenous development of micro-controller based control system to reduce the cost of the loom. He then requested Chairman to conduct the proceedings.

Prof. S. M. Ishtiaque, Chairman, PRMC & Professor, IIT, Delhi, appreciated the efforts put in by CMTI and remarked that the machine has taken shape successfully. He stressed on the need for maintaining desired humidity of working environment for limiting yarn breakage during weaving.

Shri. Parabrahman, appreciated CMTI for having dared to accept the challenge to indigenously develop High speed shuttleless loom and for having successfully realized a fully functional prototype. He also stressed on the need to control the inputs (warp beam preparation, yarn quality etc.) for ensuring optimum loom performance. He also suggested that CMTI team should now undergo detailed training on weaving process for continued engagement on weaving machinery development.

Shri. Vivek Plawat expressed that NTC is always ready to offer CMTI team the necessary training on weaving process at NTC, Hassan

Dr. Prakash Vasudevan congratulated CMTI for the efforts put in to develop a High speed rapier loom. He remarked that the prototype loom developed by CMTI is rigid and robust in construction. He further suggested that CMTI may also attempt developing an Airjet loom in future.

Dr. Yuvaraj remarked that the loom is running smooth and with lower noise level. He appreciated CMTI for successfully controlling the loom operations through PLC in the first phase and for initiating development efforts on microcontroller based control System for Phase II.

Shri. Sanjay Chavre, Member Secretary, PRMC & SDO, DHI, suggested CMTI to benchmark the machine performance against international standards. He also stressed on the need to develop energy efficient looms.

Project Presentation

1. CMTI presented the actions taken based on the suggestions made by PRMC during the 1st PRMC meeting held on 22nd March 2017 held at CMTI. The following are the details:

S.No	PRMC points	Action Taken
1	Chairman, PRMC emphasized that if CMTI masters the art of developing three primary motions - Weft insertion, Shedding and Beating, the project is a great success	Indigenous weft insertion and Beating system successfully developed by CMTI. Development of Shedding mechanism not in scope of Project. Dobby unit procured from M/s. Staubli.
2	CMTI may explore the possibility of providing different shedding mechanisms like Cam box, Dobby and Jacquard in different versions of looms to suit the requirements of different market segments	Scope of current project considers only Dobby as the shedding mechanism
3	The technical specifications of the prototype machine should include minimum (190 cm) along with maximum reed width (220 cm).	Incorporated

4	Loom may also be made compatible with Tuck-in selvedge	Compatible
5	Shed height to be kept minimum to achieve higher speeds.	Shed height set at minimum value = 70 mm for 1st Heald Frame Shed angle = 20° to 24°
6	Metallurgical aspects need to be looked into to minimize the wear & tear of the cams.	Studied and addressed by CMTI
7	CMTI to look into the possibility of deploying the Electro magnet based mechanism for weft insertion system.	CMTI team visited RWTH Aachen for Technology study and observed Electro magnet based mechanism for weft insertion system is at TRL-3 and is not mature for immediate commercial deployment.
8	CMTI to aim at developing the machine with minimum breakages per hour, minimum weaving defects and reduced power consumption to make the machine competitive in the global market	Bench mark data compiled on few commercial machines.
9	Machine to be designed for an operating life of at least 8 to 10 years	Compliance
10	Cost of the machine should be competitive	Compliance
11	CMTI can sign an MOU with TUL and other Czech organizations for Technology Development and Acquisition in textile machinery	CMTI team visited TUL for preliminary exploration and discussions.
12	Centre of Excellence for Textile Machine Development" may be setup at CMTI to address the needs of indigenous machinery development for textile industry	Report under preparation

2. CMTI project team then made detailed project presentation.

- a) CMTI informed PRMC that the project was in the 34th month of execution and the integration of the prototype loom was completed in Sep 2017. Subsequently, no load trials at speeds upto 450 rpm were carried out to qualify the various sub-systems of the loom as per CMTI test protocol document (CMTI-QP-001-1411050001-REV00). Upon satisfactory performance of the loom during the no load trials, the load trials were initiated with Shirting fabric and are currently in progress. Very preliminary loom performance data was presented and suggestions elicited from the members.
- b) CMTI informed PRMC that the technology transfer process has been already initiated. The following documents relating to the mechanical system design were shared to the TMCC members on 12th October 2017 and 10th November 2017:
 - i. General Assembly drawings,
 - ii. Manufacturing drawings, Manufacturing process plans for critical parts, QP, etc.
 - iii. Bill of materials
 - iv. List of manufacturing machinery used during production
- c) CMTI presented the plan and schedule of activities related to testing and limited production run at CMTI. The load trials are expected to be completed by mid of February 2018. This will mark the completion of Phase I.
- d) CMTI presented the estimated production cost of realizing a one-off loom with PLC / microcontroller and indicated that the bulk production costs would be two thirds the cost of one-off production. This would be a favorable business case.

- e) CMTI also indicated to PRMC that the design activity for phase II is under progress & presented the various other activities planned.
- f) CMTI presented the financial progress and Shri. Sanjay Chavre, requested TMMC members to mobilize industry contribution soon for seamless continuation of development activity.
- g) CMTI and TMMC to hold a technical discussion session on 11th Jan 2018 at CMTI for clarifications related to technology transfer and other information required for commercialization.

Observations / comments by TMMC & TMMA members:

- The prototype loom was still not completely ready for continuous production run. Weave defects like starting mark were present which need to be corrected.
- Technology transfer documents related to BOI ordering specifications, electrical & control system were still pending from CMTI.
- Complete successful commercial production of 450 rpm loom before starting phase II.
- Shri. Kethan Sanghvi suggested CMTI to incorporate a low cost humidifier of AMOTO make to address the issue of humidity to improve the loom performance.
- Shri. Vallabh Thumar suggested CMTI to change the pick density for the shirting fabric to 80-90 ppi during testing.
- Shri. Vallabh Thumar suggested operating cost of the loom and manufacturing cost to be estimated beforehand to enable commercial production by TMMC. He further suggested that CMTI should capture the power consumption data of entire loom to pin point energy efficiency issues.

Observations / comments by PRMC members:

Shri. Vivek Plawat suggested the following points:

- a) CMTI may use multi filament yarn during initial weaving trials to avoid the issue of yarn breakage
- b) Study the weft transfer dynamics and loom stoppages through high speed camera imaging techniques
- c) Thermally map the entire machine for identifying the hot spots on the loom.

Shri. Parabrahman suggested the following points:

- a) TMMC may take up initial commercial production of 2 sets of 5 looms each with testing and qualification of looms by CMTI.

Shri. Sanjay Chavre suggested the following points:

- a) TMMC may initiate steps for commercial production based on the technology content already transferred by CMTI, rather than waiting for completion of technology transfer.
- b) TMMA/TMMC to approach TDB for financing of the Phase II industrial contribution to the project, if required.

Chairman's concluding remarks:

- a) CMTI may incorporate a localized humidifier to maintain a RH level of around 70% during weaving to reduce yarn breakage.
- b) CMTI to ensure proper synchronization of Let-off and Take-up mechanisms to avoid starting marks.
- c) CMTI may employ services of an experienced weaver and textile machinery maintenance personnel from the textile industry during testing of the loom.
- d) CMTI to handhold TMMC during the initial phases of commercialization.

- e) CMTI to refer the international standards regarding acceptable number of yarn breakage during loom operation which will also be shared by him.
- f) Details regarding weft breakage and power consumption data for various looms may be obtained from SITRA.
- g) CMTI may benchmark the various parameters (noise level, vibration level, power consumption etc) against international standards.
- h) CMTI to complete testing and limited production run at CMTI by end February 2018.