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MORAH WEIGHT CONTROL AND MONITORING SYSTEM FOR JUTE INDUSTRY

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ABSTRACT

Morah is the starting unit of jute fibre prepared by workers prior to the commencement of mechanical processing in a jute mill. Effective control of morah weight is essential for maintaining uniform sliver weight and yarn weight per unit length, which in turn ensures evenness and consistency of the final product.

IJIRA has developed a system for continuous monitoring, control, and documentation of morah weight prepared by morah makers. The system enables real-time feedback and complete coverage of morah preparation, thereby addressing the limitations of conventional sampling-based practices.

KEYWORDS: *Morah, Morah Weight, Morah Weight Control, Morah Weight Variation, Morah Weight Control and Monitoring System*

Article History

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INTRODUCTION

Morah is a term used in the jute industry to denote a bundle of jute reeds prepared in the selection area by morah makers after opening raw jute bales. These morahs are placed individually and systematically on the morah barrow for subsequent processing in the softener or spreader section.

Morah represents the primary unit of jute fibre feeding at the spreader. Variation in morah weight plays a critical role in determining the uniformity of sliver weight and the quality of the final yarn. At present, jute mills generally follow a manual system in which only 10–20 morahs are weighed periodically by the Quality Control Department. This procedure is labor-intensive and time-consuming, and the number of morahs inspected is negligible compared to the total number of morahs processed by a mill on a daily basis.

To overcome this limitation, IJIRA has introduced a Morah Weight Control and Monitoring System aimed at continuous control and effective monitoring of morah weight prepared by morah makers, thereby improving process consistency and yarn quality.

LITERATURE REVIEW

IJIRA conducted a detailed study to evaluate the effect of controlled morah weight and regulated spreader feeding on jute yarn quality in a selected jute mill. The results were encouraging and statistically significant. The detailed study, titled *"Study of Effects of Controlling Morah and Feeding on Jute Yarn Quality,"* was published in the *International Journal of Scientific Development and Research*, Volume 8, Issue 8, August 2023.

For the study, one jute spreader machine was selected along with a defined processing line consisting of an inter-spreader, breaker card, finisher card, four drawing stages, and a spinning machine. Four independent trials were conducted using the same machinery line to eliminate process variability. The study conditions were as follows:

- Normal morah – Normal feeding
- Normal morah – Controlled feeding
- Controlled morah – Normal feeding
- Controlled morah – Controlled feeding

In the published paper by Ms. Soumita Chowdhury et al., the effect of morah weight control was studied in detail. The results indicated that maintaining morah weight within a controlled variation of ±200 g led to an approximately 3% improvement in yarn quality ratio. Quality Ratio of jute yarn is expressed by the formula:

Quality ratio is the ratio in percent of single yarn strength (lbf) and yarn count (lb/spyndle).

$$\text{i.e. Quality Ratio} = \frac{\text{Single yarn strength in lbf}}{\text{Jute yarn count in lb/spyndle}} \times 100$$

Again, conventionally, yarn count or linear density in lb/spyndle is the weight of yarn in lbs per 14400 yards.

In addition, the average sliver weight at intermediate processing stages remained more uniform and within control limits.

Table 1: Morah Weight Summary

PARAMETER	STD	Normal morah & Normal feeding			AVG.	Normal morah & control feeding			AVG	Morah & Normal feeding			AVG	Control morah &Control feeding			AVG
		EXP -1	Exp-2	Exp -3		EXP -1	Exp -2	Exp-3		EXP -1	Exp-2	Exp-3		EXP -1	Exp-2	Exp-3	
AVG. MORAH WT.(g)	**1250**	1227	1186	1276	**1229.67**	1130	1287	1305	**1240.67**	1190	1184.98	1187	**1195.33**	1244	1228.26	**1277.2**	**1249.8**
CV%		20.01	10.62	17.51	**10.62 -20.01**	14.76	16.35	12.23		9.93	10.42	9.91	**9.91-10.42**	9.91	8.22	**11.21**	
RANGE.(g)	**FEEDING RATE=10/min**	700-2000	1000-1400	900-1900		650-1500	800-1800	1000-1500		1000-1400	1000-1400	1000-1400		1000-1400	1000-1400	**1000 - 1400**	
MR%		12.74	12.55	12.69	**12.66**	16.81	11.93	12.69	**13.81**	14.5	13.89	12.99	**13.79**	13.6	13.74	**11.21**	**13.09**
MR % RANGE		9.5-18.5	12.0 - 13.0	11.5 - 13.0		15-19	10-14	10-14		12-17	12-18	11-14		12-16	12-16	**10-14**	

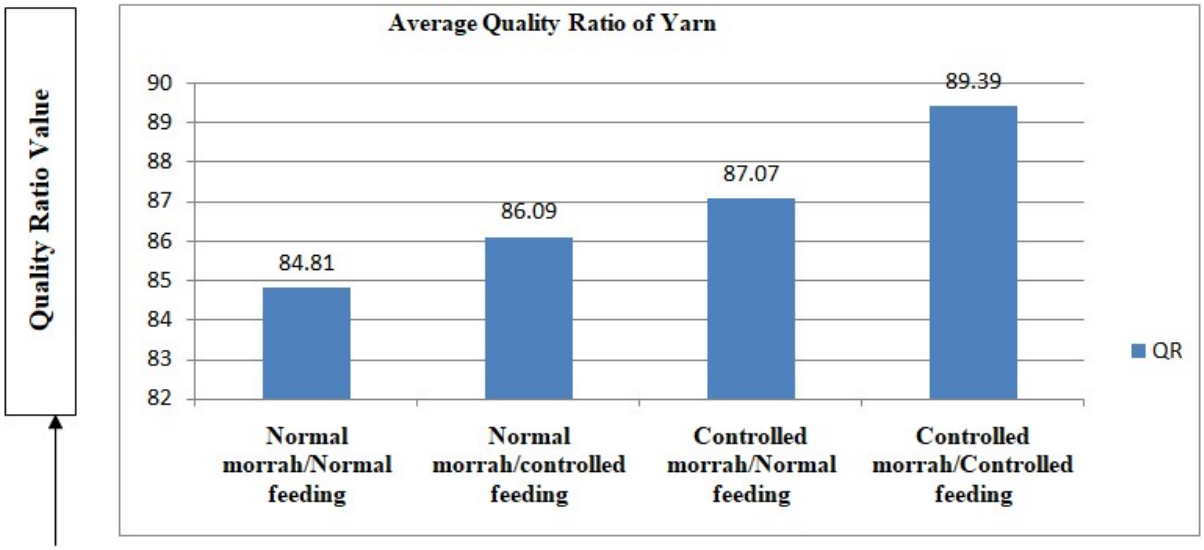

Figure 1: Average Yarn Quality Ratio Variation for Different Processes (Average of Three Experiments of Each Process)

MATERIALS AND METHODOLOGY

The Morah Weight Control and Monitoring System developed by IJIRA is designed to control and monitor load **1**00% of the morahs placed on each morah barrow. Control of morah weight variation and regulation of spreader feeding are two fundamental parameters for minimizing yarn count variation and improving overall yarn quality.

The system consists of a weighing unit and a controller unit. A platform-type digital weighing scale of 1.5–2.0 MT capacity, fitted with four cells, is installed on the selection floor. The platform size is customized according to the dimensions of the morah barrow. The controller unit is programmed to sense, record, and store the weight of each morah sequentially.

The controller display shows the individual morah weight immediately after placement on the barrow. A tri-colour indicator light system provides real-time visual feedback:

- **Red light**: morah weight higher than permissible limit
- **Green light**: morah weight within permissible limit
- **Yellow light**: morah weight lower than permissible limit

This visual guidance system continuously assists morah makers in preparing morahs within the prescribed control limits, ensuring uniform feeding at the spreader and improved consistency in downstream processing.

RESULTS AND DISCUSSIONS

The system enables continuous monitoring of morah weight without disturbing the normal working speed of morah makers. Two morah makers can work simultaneously on a single barrow, as per existing mill practice.

Salient features of the system include:

- A tri-colour (Red–Green–Yellow) indicator with digital display for real-time morah weight indication.
- An IJIRA-developed mobile application to connect with the controller via Bluetooth after completion of daily work for downloading barrow-wise morah weight reports along with analysis.
- Capability to prepare morahs at normal operational speed without workflow interruption.
- Full traceability and documentation of morah weight for each barrow.

A sample morah weight report (standard morah weight: 1800 g; permissible range: ±200 g) includes frequency distribution and statistical parameters for effective monitoring and analysis.

Morah Weight Report

Table 2

Device Serial Number	**MORAH WEIGHT CONTROLLER 0000**
Operator Name	**Jitendra Sha and Ram Singh**
Khata Number	**01**
Location	**Hastings R3**
Start Time	**13-Dec-2023 11:06:00**
End Time	**13-Dec-2023 12:05:00**
Total Number of Morah	**188**
Avarage Weight	**1.87 Kg.**
Maximun Weight	**2.8 Kg.**
Minimum Weight	**1.4 Kg.**
Standard Deviation	**0.283**
Cofficient Of Variation Percent	**15.169**
Normal Weight Morah Count	**121**
High Weight Morah Count	**44**
Low Weight Morah Count	**23**

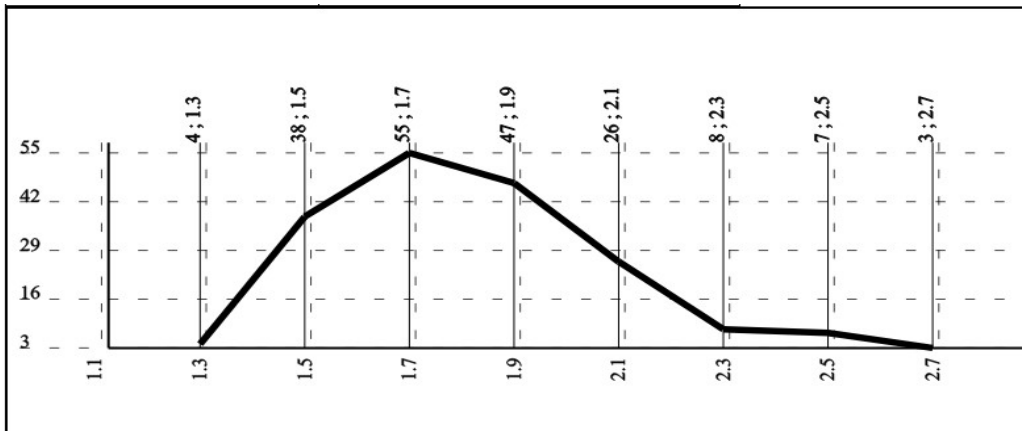

Figure 2: Morah Weight Report for Each Barrow.

Frequency Distribution

Table 3

Weight Range and Counts

Weight Range Kg.	Count
1.2 -> 1.4	4
1.4 -> 1.6	38
1.6 -> 1.8	55
1.8 -> 2.0	47
2.0 -> 2.2	26
2.2 -> 2.4	8
2.4 -> 2.6	7
2.6 -> 2.8	3

Figure 3: Working of Morah Weight Control and Monitoring System in a Jute Mill.

Advantages of IJIRA Developed Morah Weight Control and Monitoring System

- Enables workers to maintain consistent uniformity in morah weight preparation.
- Helps workers quickly standardize handling techniques as per mill norms.
- Provides mill management with detailed, barrow-wise morah weight reports throughout the day.
- Eliminates the need for manual SQC-based morah weight testing, saving time and manpower.
- Ensures accurate, transparent, and dispute-free morah weight records through automated data capture.

CONCLUSION

The Morah Weight Control and Monitoring System developed by IJIRA is currently operational infive jute mills and is functioning satisfactorily. The system has demonstrated its effectiveness in controlling morah weight variation, improving process discipline, and enhancing yarn quality consistency, making it a practical and scalable solution for the jute industry.

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