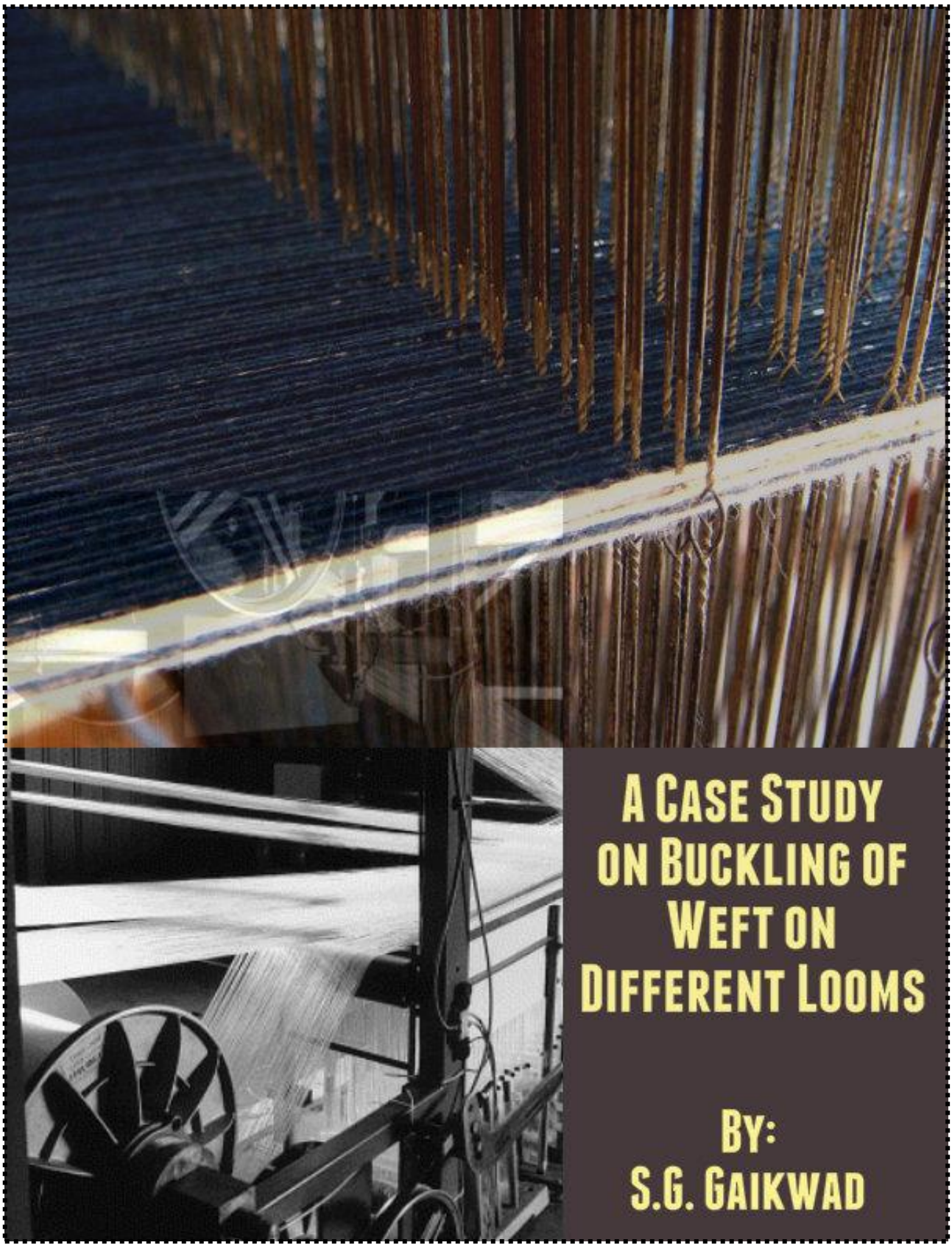
A CASE STUDY
ON BUCKLING OF
WEFT ON
DIFFERENT LOOMS
BY:
S.G. GAIKWAD

A Case Study on Buckling of Weft on Different Looms

By: S.G. Gaikwad

The textile industry should produce the superior quality fabric with zero defects as per the quality standard & market requirement. The aim of this work is to study causes and remedies of buckling which is a most common fault occurred on all types of weaving machines. The buckling creates various defects in fabric which will give seconds quality of cloth. The percentages of buckling, for different parameters, were also examined on various looms.

In globalize market; the goal of any textile mill is to make profit. The decrease in quality of product may hammer the organization performance.

Manufacturing processes of fabric at different looms differ in the application of pick insertion method. The pick insertion requires a proper control on weft during insertion ensures its concentration, but the losses of weft control significantly cause the weft defect called buckling.

The buckling is a dynamic deformation of weft during filling insertion, which modeled as nonlinear dynamic deformation, because the weft not applied in straight manner so that fabric completely specified as a defective fabric.

The buckling may cause by

1. Improper tension within weft.
2. Application of dynamic force during filling insertion.
3. Method of weft insertion.

Buckling of weft is easy to identify. Deformation of weft in warp shed during insertion shows slightly different appearance than normal fabric structure. It shows dynamic deformation of weft yarn found protruding or tucked on the fabric may cause slackness of pick. These give extra buckle or crackle effect at the fabric right hand selvedge end because these are mostly found on the middle to right hand side of fabric, depends on type of pick insertion. The buckling shows very worst effect on fabric. The present article, enumerating likely causes and remedies for buckling of weft .Study is based on various case studies conducted on different looms.

CAUSES OF BUCKLING

Buckling is caused either during pick insertion or after pick insertion depends on type of picking system on loom which deforms the weft yarn in shed and causes weft defects such as loose pick, pick catch, tail re-entry and snarling.

Sr.	Type of Picking System	Causes of Buckling
1	Air Jet Loom	Buckling occurs when air pressures is not continuously maintain, the constant force on weft; as a result the weft will tend to buckle
2	Rapier Loom	A positive grip will insert the weft in rapier loom, But after pick insertion, improper gripping of false selvedge caused to buckle the weft.
3	Water Jet Loom	An improper pressure maintained by water throughout the weft insertion, converts weft to buckle at the end of insertion.
4	Projectile Loom	The incoming tension variation will affect to travel the weft, improper way by projectile, which tends to buckle the weft.
5	Automatic Loom	In shuttle loom the picker propels the shuttle in a warp shed, it does not go in a straight manner caused the weft to buckle.

Effect of Buckling on Fabric

1. The buckling creates various defects in the fabric, which damage the fabric structure.
2. The cloth with such defects has to cut in small pieces or sold in seconds.
3. The buckling of weft is one of the causes responsible for value loss in fabric.

METHODOLOGY

Case 1: This study of buckling of weft was performed on the NISSAN Nax - 100A (Japan) Air jet loom with following particulars.

Yarn Count Range	6^s Ne - 2/50^s Ne
Material	100% cotton & 100% polyester
Weave	3/1 Twill & 2/1 Twill
Reed Space Range	165-174.6 cm
PPCM Range	13.77 - 23.62
% of Buckling	1.65

Causes of Buckling:
At the end of weft insertion weft suddenly comes at lower velocity due to main nozzle does not maintain a constant pressure, causing the weft to buckle at the end.

Remedial measure:
A constant main nozzle pressure and applied sub nozzle pressure can reduce the weft deformation.

Study shows that:
1. At constant reed width, percentage of buckling is more for 165 cm about 3.44%.
2. At same count, percentage of buckling is more for 7^s Ne about3.91 %.
3. At constant speed, percentage of buckling is more for 766 rpm about 3.34 %.

4. At constant nozzle pressure, percentage of buckling is more for main nozzle pressure (2.10 Kg/cm^2) about 0.0885%.
5. At constant nozzle pressure, percentage of buckling is more for sub nozzle pressure (2.15 Kg/cm^2) about 3.845%.

Case 2: This study of buckling of weft was performed on the 'SULZER' Ruti I 5000 (Switzerland) Air jet loom with following particulars.

Yarn Count Range	50^s Ne - 3/100^s Ne
Material	100% cotton
Weave	Twill &Plain
Reed Space Range	165.7-167.3 cm
PPCM Range	30-58
% of Buckling	0.01089

Causes of Buckling:
Low main nozzle or sub nozzle pressure decreases the propulsive force on weft during weft insertion cause weft to buckle at the end.

Remedial measure:
Weft buckling avoid through optimum bursting of air pressure by main nozzle and sub nozzle.

Study shows that:
1. At constant speed, percentage of buckling is more for 450 rpm about 0.01276%.
2. At same count, percentage of buckling is more for 2/100^s Ne about 0.016%.
3. At constant sub nozzle pressure, percentage of buckling is more for 4.75 bar about 0.036%.
4. At constant main nozzle pressure, percentage of buckling is more for 2 bars about 0.036%.
5. At constant nozzle pressure, percentage of buckling is more for sub nozzle pressure 2.15 Kg/cm^2 about 3.845%.

Case 3: The study of buckling of weft was performed on the Sulzer TW11 (Switzerland) projectile loom with following particulars.

Yarn Count Range	2/24' Nm - 2/60' Nm
Material	PV & PW blend
Weave	Twill &Plain
Reed Space Range	165-170 cm
PPCM Range	13.38 - 25.98
% of Buckling	3.28%

Causes of Buckling:
A low weft tension during insertion and improper gripping of weft after insertion will cause the high rate of buckling.

Remedial measure:
The optimum weft tension will be maintained with uniform setting.

Study shows that:

1. At 165 cm reed space, percentage of buckling is more about3.49%.
2. At 3/34s Ne count, percentage of buckling is more about 7.435 %.
3. At 275-rpm speed, percentage of buckling is more about 4.73 %.
4. At plain weave, percentage .of buckling is more about 7.43 %. .

Case 4: The study of buckling of weft was performed on the Nuovopignone Smit R 400 (ITLY) Flexible rapier loom with following particulars.

Yarn Count Range	2/51^{s} Nm-2/80^{s} Nm
Material	PV & PW blend
Weave	Satin & Hopsack
Reed Space Range	165 -170cm
PPCM Range	21.28 - 32.28
% of Buckling	1.61

Causes of Buckling:
The improper gripping of weft by false selvedge withdraws from RHS rapier cause to buckle the weft.

Remedial measure:
A proper setting between weft releasing and false selvedge should be maintained.

Study shows that:

1. At 165 cm reed space, percentage of buckling is more about 3.62 %.
2. At 2/51 ^{s} Nm count; percentage of buckling is more about 4.45 %.
3. At 565-rpm speed, percentage of buckling is more about 3.62%.

Case 5: The study of buckling of weft was performed on the Picanol gamma (Belgium) Flexible rapier loom with following particulars.

Yarn Count Range	2/34 ^{s} Nm - 2/60 ^{s} Nm
Material	PV & PW blend
Weave	Plain, Twill, Satin, Hopsack
Reed Space Range	165-170 cm
PPCM Range	13.38 - 32.28
% of Buckling	2.38

Causes of Buckling:
Variation in weft tension will deform the weft in warp shed which being tend to buckle the weft.

Remedial measure:
The weft tension will be properly maintained throughout the insertion.

Study shows that:

1. At 165 cm reed space, percentage of buckling is more about 3.082 %.

2. At 2/24 ^{s} Nm count; percentage of buckling is more about3.645 %.
3. At 475-rpm speed, percentage of buckling is more about 3.34%.
4. At Plain weave, percentage of buckling is more about 3.645%.

Case 6: The study of buckling of weft was performed on Tsudokoma ZW 305 (Japan) Water jet loom with following particulars.

Yarn Count Range	75 D-150 D
Material	% Polyester filament
Weave	Plain
Reed Space Range	170-174.37 cm
PPCM Range	56.69
% of Buckling	0.017

Causes of Buckling:
A low water pressure does not having required capability of filling insertion courses weft to buckle.

Remedial measure:
Optimum water pressure should be maintained

Study shows that:
1. At 170 cm reed space, percentage of buckling is more about 0.0205%.
2. At 150 D count, percentage of buckling is more about 0.017%.
3. At 566-rpm speed, percentage of buckling is more about 0.024%.

CONCLUSION

The causes, remedies for occurrence of buckling on different types of loom are reported in this article, through the study of various machine process parameters such as speed, reed space, count, weave, etc.

1. **Types of loom:**
   Different types of picking at different looms vary percentage of buckling, mostly projectile and rapier loom shows more percentage of buckling than water jet and air jet.

2. **Types of Fabrics:**
   Result shows percentage of buckling at suiting fabrics are more than shirting and dress material fabrics.

3. **Types of Weave:**
   The appearance of fabric may affect by the percentage of buckling but some weaves like warp faced satin, 3/1 twill mostly avoids the buckling and its effect not seen more prominently.

4. **Different Count:**
   Buckling of weft occurred mostly at coarser count, as the thick structure arise, problem of Weft insertion increases. Highly twisted yarns are also having more tendencies to buckle the weft.

5. **Feeding Tension of Weft:**
   A different loom requires different tension at weft filling insertion, but decreases in tension, increases the percentage of buckling.

This article was originally published in the Textile Review magazine, February, 2013, published by Saket Projects Limited, Ahmedabad.

About the Author:

S.G. Gaikwad is the Selection Grade Lecturer at the Department of Textile Manufacture at the Govt. Polytechnic Nagpur & Sandhya Meshram DTM Govt. Polytechnic, Nagpur