TEXTILE PROCESS AUDIT: AN APPROACH TOWARDS CONTINUAL IMPROVEMENT

Vijay Shirole*

Technical Services Dept., The Bombay Textile Research Association, L.B.S. Marg, Ghatkopar(west), Mumbai 400086

WHAT IS A PROCESS?

In short, we can say "it is a series of steps that lead to a desired result." In other way we can say a process audit is an evaluation of the sequential steps and interactions of a process within a system. For doing any process, we have to give some inputs and when we give any input we look for the desired output after the process. The following things are taken into consideration during this flow.

INPUT	PROCESS	OUTPUT
• Raw material	• Planning	• Product & service
• Accessories	• Establishing	• Customer satisfaction
• Human resources	• Implementing	• Stack holders satisfaction
• Machinery	• Maintaining	• Revenue to company
• Infrastruture	• Monitoring	
• Methods	• Measuring	
• Work environment	• Controlling	
• Customer orders	• Action	
• Customer feedback	• Improvement	
• Legal requirements		
• Regulatory requirements		
• Time		
• Training		

PROCESS AUDIT:

A process audit may check conformance to defined requirements such as time, speed, accuracy, temperature, pressure, composition, component mixture, responsiveness. It may involve special processes such as heat setting, pretreatment, dyeing, finishing etc.

A process audit examines the resources (equipment, materials and people) used to transform the inputs into outputs, the environment, the methods (procedures and instructions) followed and the measures collected to determine process performance.

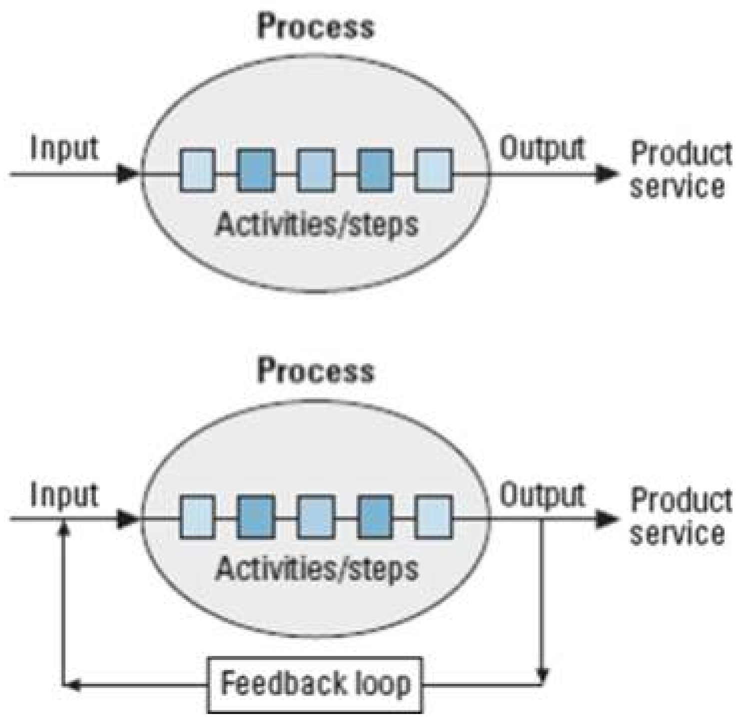
*Corresponding author,
E-mail : tsd@btraindia.com

A process audit checks the adequacy and effectiveness of the process controls established by procedures, work instructions, flowcharts, training and process specifications.

By its very nature, process auditing implies an action, such as transforming inputs into outputs. Process auditing is evaluating the steps and activities that create the action or transform the inputs into outputs. This is a very useful approach because it focuses on the work cycle and deliverables instead of isolated requirements/controls.

The process model in Figure 1 shows inputs, outputs and sequential steps. Some process models also show a feedback loop that is essential for control of a process.

FIGURE 1 Process Diagrams With and Without a Feedback Loop



There are 2 types of audit methodology

1. Auditing by element
2. Auditing by Process

As we are mainly concerned in the methodology of auditing by process here we describe the methodology in brief,

AUDITING BY PROCESS

Auditing a process or system using process techniques verifies conformance to the required sequential steps from input to output. Process auditors use models and tools such as simple flowcharts, process maps or process flow diagrams.

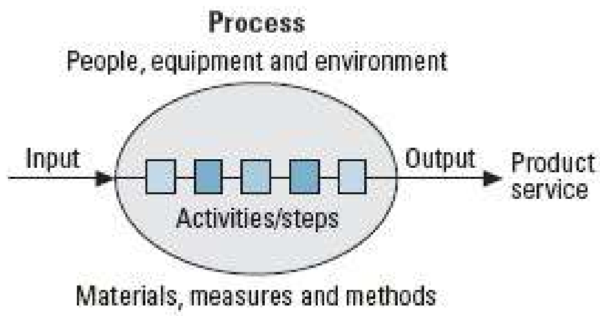
In the process diagram (see Figure 1), the boxes in the center could represent a flowchart of the sequential steps.

Flowcharts typically identify inputs, people, activities or steps, measures and outputs. The auditor normally gets this information from a procedure or flow charts provided by the audited organization.

Processes can be described using the process elements so called PEEMMM (see Figure 2):

- People involved.
- Equipment needed.
- Environmental requirements.
- Measures to test or monitor.
- Methods to follow.
- Materials used or consumed.

FIGURE 2 Process Elements



Process: underwriting

People: Underwriter, account manager and customer.

Equipment: Computer and software.

Environment: Office.

Materials: Financial, security, logistical information provided by customer and account manager.

Measures: Financial and security risk.

Methods: Organizational procedures and industry standards.

CONTROL POINTS AND CHECK POINTS UNDER THE SCOPE OF AUDIT:

The control points and check points are under the scope of the audit,

CONTROL POINTS	CHECK POINTS
Process parameters	▪ Level of adherence to process parameters. Calibration of equipment's monitoring the process. ▪ Suitability of process parameter decided to get the results.
Selection of raw materials	▪ Quality of Raw materials received. ▪ Handling and storage systems.
Selection and training of employees	▪ Competency levels of men available and men employed. ▪ Process performance. ▪ Work practices. ▪ Housekeeping practices.
Maintenance of machines	▪ Adherence to maintenance schedules. ▪ Suitability of maintenance schedules and plans for the production and quality expectation. ▪ Condition of machine parts. ▪ Maintenance practices. ▪ Results of maintenance.
Rejection Rates	▪ Whether acceptance criteria are clear to all on the shop floor? ▪ Whether process parameters are as per standards specified? ▪ Rejection Machine wise, Shift wise, operator wise and material wise.
Delivery schedule	▪ Whether production started in time? ▪ Utilisation of machines. ▪ Productivity of each machine. ▪ Whether quality approved?

CHECKPOINTS DURING PROCESS AUDIT

The following things are checked during process audit

1. Machine details and its condition
2. Product design and its process flow
3. Production process documentation – standard operating procedure (SOP) and work instruction
4. The process flow or sequence of individual machine.
5. Process control parameters&Specification limits of process control parameters
6. Calibration of measuring equipment's and calibration criteria and its frequency.
7. Daily Process control round data by QC or management representative
8. Deviation if found necessary corrective action to take
9. Action plan for implementation for corrective / preventive action

AREAS UNDER THE SCOPE OF PROCESS AUDIT

The following areasare under the scope of Process audit

1. General Information(No of staff, Production facility, Location)
2. Production capacity.
3. Production management systems (production Planning & executions)
4. Quality – In house testing facility
5. Purchase - Procurement
6. Store - Incoming material
7. Manufacturing quality
8. Process control
9. Occupational Health and Safety (OSH)
10. Production - Non confirming material
11. Monitoring and measurement
12. Maintenance
13. Environment
14. Training

STEPS IN PROCESS AUDIT:

1. Notification by letter, by email to the factory.
2. Plan the audit
3. Initial General meeting with factory senior management persons to give information about the purpose of meeting.
4. To fill up questionnaire needed to do the process audit.
5. Document check - under the scope of audit.
6. The factory round to know the factory with respect to Housekeeping and cleaning, Safety, Material handling, Maintenance, Machinery conditions, Process control, Environment, Calibration, etc.
7. Suggestion for the improvement during factory round.
8. Discussion on the problems faced by the factory during fabric processing and their remedies to overcome the problem.
9. Closing meeting with factory management persons.
10. Preparation of draft audit report with audit findings and conclusion.
11. Feedback from the factory.

The Bombay Textile Research Association (BTRA) is conducting such process audits in the textile factories for their continual improvement all over India. The factories which want to avail this service can furthermore contact with Technical service Department of BTRA, Mumbai. The email id for communication are tsd@btraindia.com and info@btraindia.com.

Reference:

1. Processing audit techniques – by JP Russell & Associates – 2002-2009.

ABSTARCT

Effect of heat treatment on the microstructural properties of silica embedded cobalt ferrite nanocomposites :

Meenakshi Bansal , Dharamvir Singh Ahlawat , Amrik Singh , Vijay Kumar & Shish Pal Rathee

Nanocomposite , published 14 Dec 2020

https://doi.org/10.1080/20550324.2020.1865711

Silica coated cobalt ferrite (CoFe2O4:SiO2) nanocomposites were synthesized by coprecipitation technique using metal nitrates as precursors. The as-prepared samples were heat treated at different temperatures of 250, 500 and 750 C for 24 h. Structural, thermal, and morphological behavior of nanocomposites are investigated by XRD, FTIR, TGA-DTG, and SEM characterization results, useful in biomedical applications. With increasing calcinations temperature from 250 to 500 C and 750 C an increase in crystallite size of CoFe2O4:SiO2 nanocomposites has been determined from 20.26 to 28.95 nm and 38.76 nm by Williamson–Hall method, respectively. Furthermore, by increasing the temperature from 250 to 750 C the lattice parameter and strain values have been found to increase from 8.0321 to 8.0691 Å and 1.01 102 to 3.75 103 , respectively. Analysis of TGA results found no weight loss when the sample was heated beyond 700 C and thus complete decomposition of precursors has led to the formation of stable nanocomposite structures at high temperatures. SEM analysis of synthesized samples at 750 C revealed well developed nanoparticles of CoFe2O4: SiO2 with inter-granular porosity.

Nano engineered electro spun fibers and their biomedical applications: a review

Xi Zhang , Xuetao Shi , Julien E. Gautrot & Ton Peijs

Nanocomposites: published on 29 Dec 2020

https://doi.org/10.1080/20550324.2020.1857121

Electrospun fibers have received significant interests for various application areas such as filtration, composites and biomedical products due to their large surface area, good continuity, high porosity and many other unique properties. In bio-related applications, electrospun fibers have been used for in-situ drug delivery, tissue engineering scaffolds and wound dressing. In more recent years, there has been a drive toward novel electrospun fibers with added functionalities. Nanoengineering of electrospun fibers has introduced many of such novel properties. Through this review, researchers are provided with a state of the art overview of nanoenhanced electrospun fibers with added functionalities. Examples of some nanoengineered fibers include; surface functionalization, multi-component fibers, porous nanofibers, the creation of surface nano-topographies, and the incorporation of nanoparticles to create hierarchical fibrous structures for tailoring of physicochemical properties with a special focus on biomedical applications.

Structure and properties of thermomechanically processed silk peptide and nanoclay filled chitosan

Pei Chen , Fengwei Xie , Fengzai Tang & Tony McNally

nanocomposites 2020, vol. 6, no. 3, 125–136

https://doi.org/10.1080/20550324.2020.1820796

While chitosan has great potential for biomedical and wider application due to its appealing characteristics such as biocompatibility and inherent antimicrobial activity, its properties usually need to be further tailored for specific uses. In this study, the effect of inclusion of silk peptide (SP) and nanoclays (montmorillonite, MMT and sepiolite, SPT) on the properties of thermomechanically processed chitosan were examined. Blending SP with chitosan led to a material with greater elasticity and surface wettability. For the chitosan matrix, addition of either MMT or SPT resulted in increased mechanical properties with MMT being more effective, likely due to its 2D layered structure. For the chitosan/SP matrix, while inclusion of MMT caused increased mechanical properties and thermal stability, SPT was more effective than MMT at reducing surface hydrophilicity and SPT fully counteracted the increased surface hydrophilicity caused by SP. Thus, this work shows the different effects of MMT and SPT on chitosan-based materials and provides insights into achieving balanced properties.