Optimize and Automate the Documentation Process in the Manufacturing Granulation Process

Roberto C. Colón Colón
Advisor: Dr. Hector J. Cruzado, PhD, PE
Polytechnic University of Puerto Rico

♦ Abstract

During the past year, the pharmaceutical industry has embraced many situations that encourage the human resource of each company to improve and develop the organization. Integrating the lean manufacturing principles can increase the ability to complete and enhance the operation in the area [1]. This research involves the integration of the Manufacturing Execution System (MES) using Electronic Batch Records (EBR) system in the documentation records process at the granulation stage. Improvement in the manufacturing area can embrace the use of electronic batch records which helps employees perform the task with accuracy and consistency during the process by increasing the productivity (none rework) since minimal risk, high quality and auditable data integrity in all leveling of the documentation was obtained.

♦ Introduction

The pharmaceutical industry recognized the potential to develop and changes the infrastructure which optimized the supply chain system. The importance of those processes is to empower those areas with the finality of reducing cost and begin the innovation of new ideas. The reduction of costs and the innovation of new ideas can be achieved by adding values to the performance of the areas and the efficiency of all employees. Lean manufacturing has revolutionized the pharmaceutical industries and created innovations opportunities in all leveling to the departments. Opportunities can embrace the manufacturing area to generate products with the highest level of quality, purity, strength, and security to be received by the customer and in which they comply with FDA regulation including data integrity. In order to comply with the manufacturing area necessities, some opportunities in the granulation stage were identified where the electronic records could be an improvement. An MES is a software that connects, monitoring and controls complex manufacturing systems and data flows in the manufacturing or packaging areas. The MES functionality consists in business integration, specs, reports, process integration, batch execution, recipe and specification management, materials management, equipment production order management, recipe execution, electronic batch records, and device history [2].

♦ Objectives

The principal objectives and focus in the pharmaceutical industry when implementing the use of MES with EBR in the manufacturing area are the following:

- Improve accuracy and consistency
- Increase productivity
- Reduces manufacturing cycle time
- Reduces or eliminates data entry time
- Reduces work-in-process
- Reduces or eliminates paperwork between shifts
- Reduces lead times
- Improves product quality
- Eliminates lost paperwork
- Empowers plant operations people
- Improves the planning process
- Improve decision making
- Improves customer service
- Reduces setup costs, wait times
- More reliable and precise sequence planning

♦ Methodology

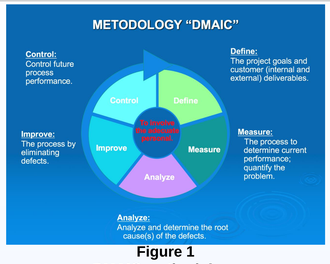

Figure 1
DMAIC methodology

Figure 1 present the methodology used as Define, Measure, Analyze, Improve, and Control (DMAIC) [3]:

- Define – documentation problem found in the granulation area.
- Measure – recollect data from different batch records (manual and electronics process).
- Analyze – the data recollected was compared between each manual process and EBR documentation analyzing the risk and problems that it can cause in the process.
- Improve - implementing full EBR avoid errors and problems in the documentation. The benefits of using EBRs software: improve accuracy and consistency, increase productivity, reduce cycle time, reduce compliance costs, reduce operating costs, increase the ability to scale rapidly, and improve decision making.
- Control – continue improvement of EBR recipes as per engineering process personnel.

♦ Results

Table 1
Manual Batch Record

Lots	Error	Exceptions	Risk
1	11	Incorrect date	Medium Supervisor authorization (2)
1	1	Error without justification	Medium Supervisor authorization (2)
1	9	Incorrect date	Medium Supervisor authorization (2)
1	1	Incorrect weight	None Correct with supporting data and Supervisor authorization (0)
1	1	Wrong quantity weight	Critical. Evaluation of risk is rejected (3)
1	2	Signature in wrong space	None (0)
1	6	Incorrect weight	None Correct with supporting data and Supervisor authorization (0)
7	31		9

Table 2
Electronic Batch Record

Lots	Error	Exceptions	Risk
1	0	Incorrect date	None
1	0	Error without justification	None
1	0	Incorrect date	None
1	0	Incorrect weight	None
1	0	Wrong quantity weight	None
1	0	Signature in wrong space	None
1	0	Incorrect weight	None
7	0		0

Table 1 and Table 2 present the comparison for the manual and EBR process obtained during the evaluation of the batch record and the risk obtained for the approved of the lots data.

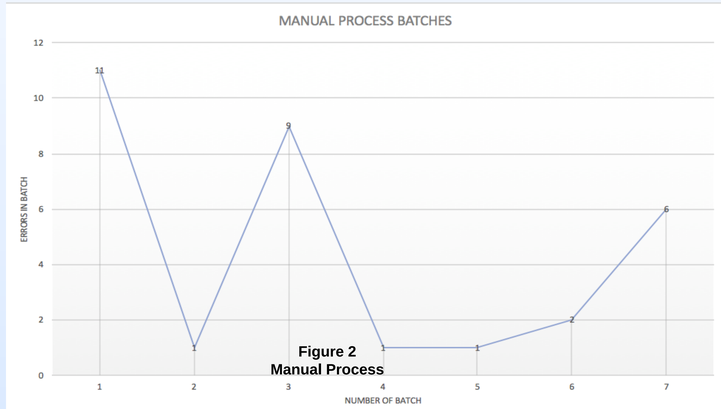

Figure 2
Manual Process

Figure 2 summarizes each lot evaluated versus documentation error found. During the manual process, seven (7) auditable batch records were evaluated in which errors were found and specified.

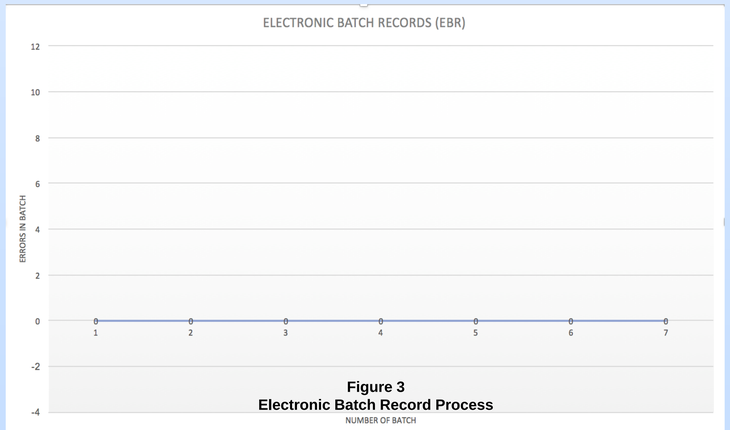

Figure 3
Electronic Batch Record Process

Figure 3 shows the use of EBR. The probability of finding errors during the granulation process was reducing, or none (in this case) since the systems were validated to avoid error. It was important to mention that these be strictly evaluated during the execution of the trials.

♦ Discussion

During the research evaluation at the granulation area, it was found inefficiency in the documentation step during the process. The manufacturing area executes the granulation documentation by using two systems; manual and EBR. When EBR system is used, the pharmaceutical industries must prove that they comply with all regulations established for the use of those electronic records. Many controls are required to ensure security, integrity and be trusted. The user can be identified by a unique user and password to determine who performs the task. EBR can be designed with the different level of documentation and approval: record administration, review, and approval must be included as part of the various responsibilities to ensure the excellent practice during the design and implementation of the electronic batch recording systems. Many benefits were obtained that reduce the risk of non-compliance with the use of EBR; reducing documentation errors and the missing entries are eliminated since the system was covered with an alert to avoid those situations from the system that the user did not pass to the next steps without completed the first. The process of each batch of products is audited and regulated to ensure quality. FDA recommends that audit trails that capture changes to critical data be reviewed with each record and before final approval of the record. When generated to satisfy a cGMP requirement, all data become a cGMP record. Every employee must document and save the data at the time of performance to create a record in compliance with cGMP requirements and ensure the quality of the product that finally will be sent to the customer.

♦ Conclusion

The use of EBR improve the quality of the products due to the risk to obtained error was not probably. In the manual documentation, risks and errors are higher, and the supervisor needs to evaluate each error to take the risk of approving or rejecting the stages performed. In the EBR, there are no risks because the system evaluates and alerts the user to perform the task as established during the validation of them and did not permit to continue to the next step of the process. The use of EBR during the process makes it continuously and on time. As a recommendation for future research, the EBR can be implemented in other stages of the process for the same product to complete all the manufacturing and packaging stages (compression, capsule filling, and packaging, among other).

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♦ References

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