

# Quality Management System Applied to Timber Drying

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## ABSTRACT

Timber drying is a part of the technological process within a woodprocessing industry, and thus, applying a Quality Management System (QMS) within such a company implies the timber drying process as well.

In order to observe ISO 9001:2001 recommendations with regard to the process approach of quality management systems in any woodprocessing enterprise, we consider that timber drying should be approached as a continuous (flow-type) process. This paper presents some specific documents, such as the process diagram, a model of drying described as operational procedure, a grading report after drying, centralizing documents and graphic interpretations, which are necessary to be set up within the enterprise in order to include drying within the general QMS.

## GENERAL ASPECTS

Timber drying represents the first operation to be performed to solid wood, in order to transform it, by mechanical processing, into furniture or other finished parts.

Timber drying is a part of the technological process within a woodprocessing industry, and thus, applying a Quality Management System (QMS) within such a company implies the timber drying process as well. The importance of this process within the whole processing chain is outlined by the fact that the drying quality determines decisively the quality of the finished product, respectively the maintenance of its dimensional and functional characteristics at the user.

According to ISO 9000:2001 the term “process” is defined as: “*a group of correlated or interacting activities which transforms inputs into outputs*”.

In other words, a process can be defined as “*an assembly of activities and resources coordinated so as to obtain most efficiently the targeted results*”.

In order to observe SR EN ISO 9001:2001 recommendations with regard to the process approach of quality management systems in any woodprocessing enterprise we consider that timber drying should be approached as a continuous (flow-type) process.

## TIMBER DRYING AS A CONTINUOUS PROCESS

According to ISO 9000:2001, in order to simplify the process description, the following abbreviations are used:

If we consider timber drying as a continuous process and part of the overall production process within the enterprise, we have to understand the relation and interaction between drying and the other activities implied by the production process. Therefore, a **synthetic process list** according to the model presented in Table 1 should be drafted. Based on this list, a **process diagram** can be drawn for each process, which actually represents a brief description of this process. Fig. 1 presents the process diagram drawn specifically for the drying process. The abbreviations used within Table 1 and Fig. 1 are listed at the end of the paper.

Each process diagram should comprise:

- the name of the process;
- process objective;
- what must be measured;
- name of responsible;
- field (sector);
- initial activity;
- final activity;

Table 1. Synthetic process list

Code	Process type	Field	Objective	What must be measured and recorded	Recordings and person responsible to keep them
PD_PMA_01	Flow	Production	Zero non-conformities in storage	Number of non-conformities in storage area.	Stock report, working report (MHR), non-conformity report (QMA).
PD_PMA_02	Flow	Production	Usage coefficient min. 60%	Usage coefficient (cbm timber output / cbm timber entered *100)	Production report (PMA), consumption proofs (YR), return documents (QMA), report of non-conform product (QMA).
PD_PMA_03	Flow	Production	Usage coefficient min. 86%; 100% compliance with working norms	Usage coefficient (cbm output / cbm timber entered *100) Loading degree.	Production report (PMA), consumption proofs (YR), return documents (QMA), report of non-conform product (QMA), pallet labels.
PD_PMA_04	Flow	Production	100% compliance with consumptions; 100% compliance with working norms	Consumption. Loading degree.	Production report (PMA), cons. proofs (WR), return documents (WR), report of n.c. product (QMA), transfer doc (PMA).
PD_PMA_05	Flow	Production	Usage coefficient min. 86%; 100% compliance with working norms	Usage coefficient (cbm processed / cbm entered *100) Loading degree.	Production report (PMA), consumption proofs (WR), return documents (WR), report of non-conform product (QMA).
PD_PMA_06	Flow	Production	100% compliance with consumptions	Consumption.	Production report (PMA), consumption proofs (YR), transfer documents.
PD_PMA_07	Flow	Production	Usage coefficient min. 99%; 100% compliance with working norms	Usage coefficient (cbm processed / cbm entered *100) Loading degree.	Production report (PMA), consumption proofs (WR), return documents (WR), report of non-conform product (QMA).
PD_PMA_08	Flow	Production	100% compliance with consumptions; 100% compliance with working norms	Consumption. Loading degree.	Production report (PMA), cons. proofs (WR), return documents (WR), report of n.c. product (QMA), transfer documents.
PD_PMA_09	Support	Human resources	Min. efficiency 95s/employee/hour	Turnover / number of present employees.	Graphic representation of efficiency evolution, daily (PUM).
PD_PMA_10	Support	Purchase / maintenance	Zero useless equipment and materials	Quantity and designation of equipment and materials.	List of necessary equipment and materials (PUM).
PD_PMA_11	Support	Human resources	Trained staff Efficient training	Number of trained staff.	Training report (MHR); periodical evaluation report (MHR).
PD_PMA_12	Flow	Production	100% compliance with consumptions	Consumption.	Production report (PMA), cons. proofs (WR), return documents (WR), report of non-conform product (QMA).
PD_PMA_13	Flow	Production	100% compliance with consumptions; 100% compliance with working norms	Consumption. Loading degree.	Prod. report (PMA), cons. proofs (WR), return doc (WR), report of n.c. product (QMA).
PD_PMA_14	Support	Communic.	Sending report 100% complete in time	Number of reports sent in time.	Periodical activity report (PMA, GM)
PD_PMA_15	Flow	Production	Zero non-conformities in drying sector	Number of non-conformities acc.to final quality control.	Stock report, working report (MHR), non-conformity report (QMA).

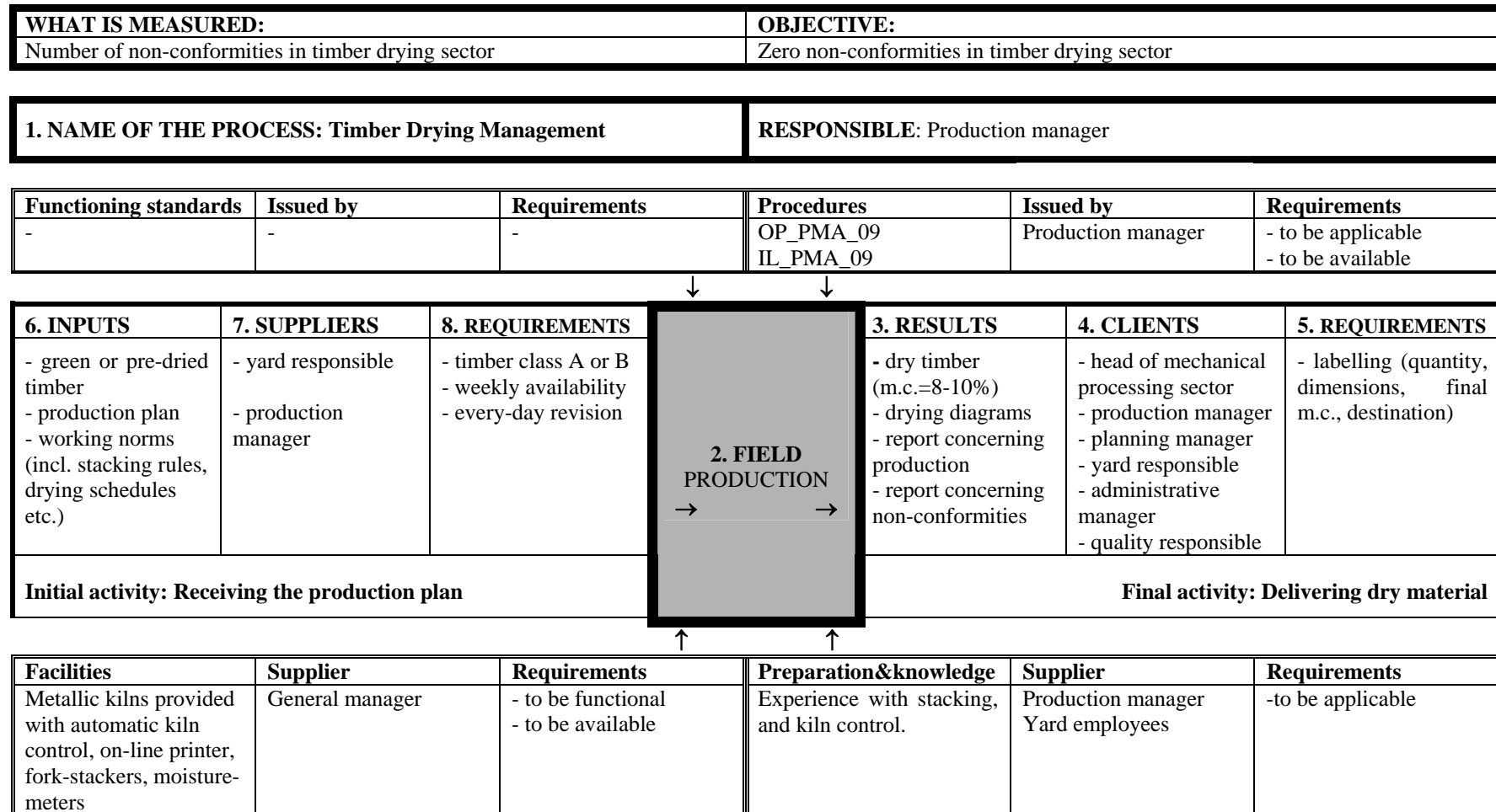


FIGURE 1. Process diagram for the timber drying operation (PD\_PMA\_15) as part of a flow process.

- beneficiaries of the results;
- clients requirements;
- process inputs (materials, information);
- input suppliers;
- requirements of the responsible towards the inputs;
- control instruments: standards, procedures, facilities and equipment, preparation and knowledge of human resources involved.

In order to evidentiare the phases, the running and control of this process, it is necessary to draft an **operational procedure – OP-1**.

An example of an operational procedure for the drying process is given in Table 2. Within this procedure, the most important criterion to evaluate the process performances is the grading of the dried material.

After this operation, both the suppliers of raw material and the drying quality can be evaluated. The data obtained after grading are daily recorded within a grading report (Table 3) and then centralized electronically in an Excel file (example given in Table 4), which can further constitute the database for several graphis (examples given in Fig. 2 and Fig. 3).

Table 2. Operational procedure (OP\_PMA\_09) for timber drying

Input documents /data	Actions and decisions	Output documents / data	Responsibilities				
			Plan	Do	Check	Act	Report
Kiln loading plan	1. Receiving the kiln loading plan	Plan received	PMA	PMA YR TL	PMA	PMA	PMA
Plan received	2. Purchasing the raw material	Internal acceptance note	YR PUM	TL	YR	YR TL	YR
Raw material received	3. Quantitative acceptance; qualitative grading	Raw material graded and labelled ; non-conformity report ; claim to non-conformity suppliers ; production report	-	TL	YR TL	TL	YR
Classification of non-conform raw material	4. Storage of non-conform raw material	Downgraded raw material	-	TL	YR TL	TL	-
Good-quality raw material	5. Storage of good quality raw material	Raw material waiting to be dried	-	TL	YR TL	TL	-
Raw material prepared for drying ; transfer doc.	6. Drying	Dry timber ; transfer note	-	YR	YR	YR	YR
Dry timber	7. Grading of dry material	Graded dry timber	-	TL	TL	TL	-
Graded dry timber	8. Storage of dry timber	Timber in storage ; transfer note	-	TL	YR AMA	YR	YR PMA AMA

Table 3. Grading report (model)

NAME OF ENTERPRISE		GRADING REPORT GR_PMA_09								
		Date: .....			Shift: .....					
Dimensions	Pallet N°	Supplier	Quantity	Good GLD	Good BLK	For calibr.	For planing	For crosscutting	Defect supplier	Sign.
...	...	...	...	...	...	...	...	...	...	...

Table 4. Electronic file for data centralization as basis for graphical representations (model)

Supplier	Quantity, cbm	Good GLD		Good BLK		For calibr.		For planing		For crosscutting		Rejection	
		cbm	%	cbm	%	cbm	%	cbm	%	cbm	%	cbm	%
N° 1	1,013	660	65.2	44	4.3	44	4.3	88	8.7	88	8.7	88	8.7
N° 2	882	660	74.9	132	15	44	5	9	1	18	2	18	2
N° 3	1,102	792	71.9	88	8	132	12	44	4	4	0.4	40	3.6
N° 4	1,234	880	71.3	220	17.8	44	3.6	22	1.8	44	3.6	22	1.8
N° 5	1,321	924	69.9	220	16.7	88	6.7	22	1.7	22	1.7	44	3.3
N° 6	1,146	792	69.1	88	7.7	44	3.8	44	3.8	66	5.8	110	9.6
N° 7	1,410	968	68.7	220	15.6	88	6.2	44	3.1	44	3.1	88	6.2
<b>TOTAL</b>	<b>8,108</b>	<b>5,676</b>	<b>70</b>	<b>1,102</b>	<b>12.5</b>	<b>484</b>	<b>6.0</b>	<b>273</b>	<b>3.4</b>	<b>286</b>	<b>3.5</b>	<b>409</b>	<b>5.0</b>

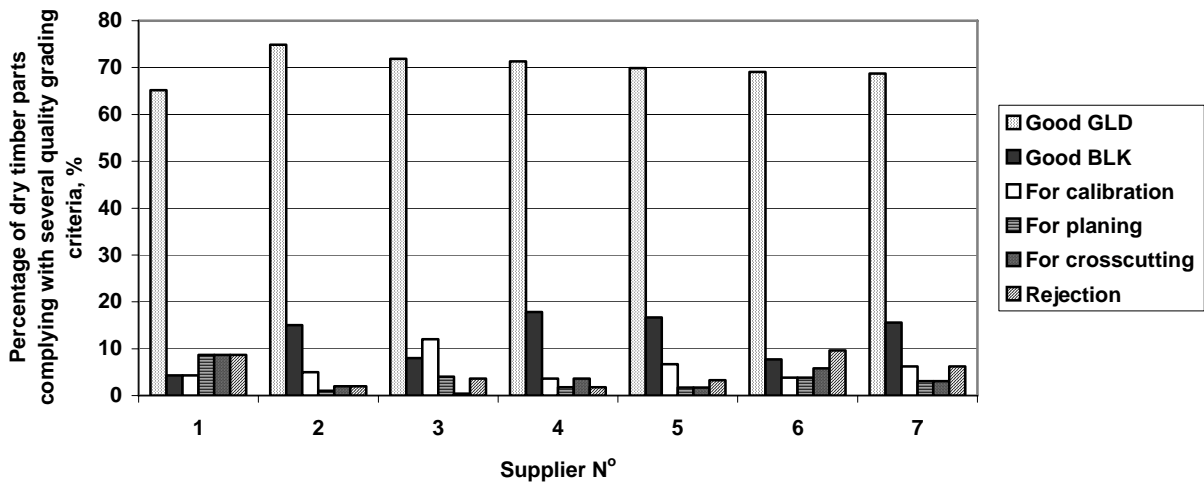


FIGURE 2. Graphic representation of dry timber grading results as function of supplier and quality criteria with a view to further processing.

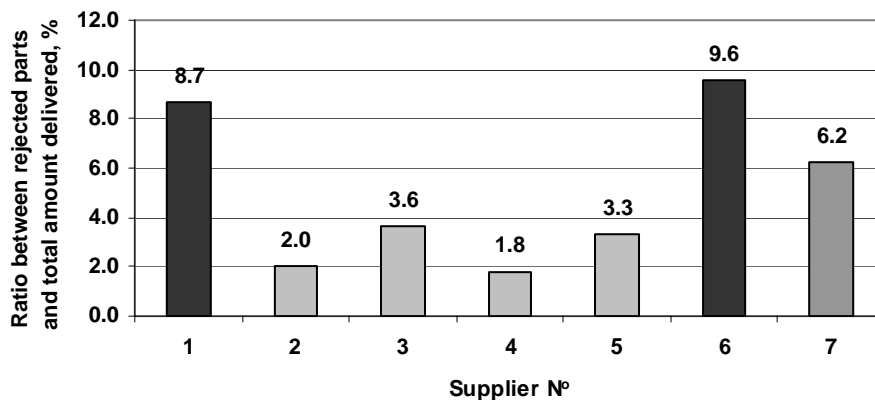


FIGURE 3. Graphic representation of satisfaction degree (ratio between rejection / total delivered quantity) with regard to different suppliers.

## CONCLUSIONS

Processes are the base of a Quality Management System. Implementing a QMS within an organization must begin with **identifying the necessary processes** and then, the **determination of the sequence and interaction** between these processes.

Drying is an important part of the woodprocessing technology. Approaching it as a flow process allows its monitoring within a general management system. This is in accordance with SR EN ISO 9001:2001 which refers to the fact that the desired result is more efficient when the activities and resources are lead as ONE PROCESS.

## ABBREVIATIONS (in alphabetical order):

ACC - accountant;  
AMA - administrative manager;  
BMA - economic manager;  
EMA - executive manager;  
GMA - general manager;  
MHR - manager of human resources;  
MMA - maintenance manager;  
PLM - planning manager;  
PMA - production manager;

PUM - purchase manager;  
QMA - quality manager;  
QMS – quality management system;  
SMA - sales manager;  
WSR - work safety responsible;  
GLD – for transparent finish;  
BLK – for black finish;

n.c. – non-conformity;  
GR – grading;  
OP - operational procedure;  
PD – process diagram;  
TL – team leader;  
WR – warehouse responsible;  
YR - yard responsible;

## REFERENCES

\*\*\* ISO 9000:2001. Quality management system – Fundamental principles (4<sup>th</sup> edition).  
\*\*\* SR EN ISO 9001:2001. Quality management system – Requirements (4<sup>th</sup> edition).