

Safety Winery Design in the 21st Century

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Introduction

A modern winery is a **great** investment. While the fundamentals of winemaking may not have changed over the centuries, the design of a functional winery has changed dramatically. They must be able to support the brand image where required but of equal importance need to be efficient in terms of energy and resources, be environmentally responsible and a good occupational health and safety.

These factors will have a major impact on the design of the winery and its surrounding facilities and must be considered at the concept stage before hitting the drawing board. Here we will focus on the small to medium sized wine making enterprise.

Whether you are building a new winery or upgrading an existing facility proper planning at the concept stage is critical. You should develop a design brief which clearly identifies and addresses the stakeholders' requirements, including:

- the philosophy behind the project including environmental, processing and marketing considerations;
- production projections covering all likely eventualities;
- winemaking methods required for each style;
- a project timeline and budget;

While some goal were always considered in each project the problem of safety and health during plan design is a new goal!

For example equipment layout and workflow design must consider the safety of operating and visiting personnel as well as the hygiene requirements of the plant and processes. Other factors to be considered are forklift access, anti-slip floor treatments, operating and maintenance access, lighting, safety showers, chemical storage, fire fighting equipment and personal protective equipment.

When determining the ventilation requirements of the winery, consideration must be given to the dissipation of carbon dioxide produced during fermentation, which, being heavier than air will tend to collect at the low points of the building. Therefore the design of the building must avoid enclosed pits or trenches that cannot be ventilated, such as crushing pits. In areas where carbon dioxide build up is a concern, consideration should be given to installing forced ventilation plus a permanent atmospheric monitoring and alarm system.

This article discusses the factors demanding consideration by the safety law and society when building a winery in according with a low work risk and good welfare for the winery workers. These factors will have a major impact on the design of the winery and its surrounding facilities and must be considered at the concept stage before hitting the drawing board. Here we will focus on the small to medium sized wine making enterprise

Methods

The research was carried out in 15 wineries in the Friuli-Venezia Giulia region and started in

Farms	Vineyard (ha)	Yield hl	Workers	
			Fixed	Temporary workers
Az. N°1	140	17.000	6	5
Az. N°2	100	14.500	7	2
Az. N°3	14	800	2	1
Az. N°4	18	830	3	-
Az. N°5	20	1.200	2	2
Az. N°6	28	1.500	2	3
Az. N°7	200	24.000	6	6
Az. N°8	230	23.000	11	12
Az. N°9	85	8.700	4	5
Az. N°10	13	500	1	2
Az. N°11	140	16.000	9	7
Az. N°12	25	2.200	3	8
Az. N°13	9	650	3	6
Az. N°14	38	1.000	2	9
Az. N°15	6	350	2	2

Table 1 – Sample of Farms.

June until December 2008 following four steps:

- sample planning and compiling check list;
- risk analysis;
- data elaboration with individuation of critical point;
- applied step with new method for safety and health management.

In the first step we have analyzed the farm sample and compiled the check-list following previous study (Gubiani et al, 2007). The check list control fours main aspect:

- formal aspects;
- real aspects;
- technical aspect;
- management aspects.

The second step required to built a scale of values for risk assessment (tab. 2)

Value	Description	Frequency	Assessment
1	not congruity	hgh	max risk
2	critical situation	high	very high risk
3	real deficiency	medium high	high risk
4	structural deficiency	medium	medium high risk

5	deficiency	medium	medium risk
6	low deficiency	medium low	medium risk
7	nothing deficiency	medium low	light risk
8	best practices	medium low	low risk
9	all good	low	negligible risk

Table 2 – Risk scale adopted in this research.

Third step, comprise the application in farm and real time the check list created in the second step, after this the data was put into Excel sheet, controlled and elaborate statistic for create radar graphics.

In the last step was design equipment layout and workflow design must consider the safety of operating and visiting personnel as well as the hygiene requirements of the plant and processes, operating and maintenance access, lighting, safety showers, chemical storage, fire fighting e other factors to be considered are forklift access, anti-slip floor treatment, equipment and personal protective equipment.

For new vinery design was take following items:

- process flow;
- building characteristic;
- plant layout;
- rules for fire prevention;
- material and equipment used in vinery;
- ergonomic and comfort in workplaces;
- plant features for safety and health prevention.

For good design we have take a typical vinery located in Friuli area “DOC Grave” and normal managed with a production about 10.000 hl of wine.

Results

The results are show by three steps.

In the risk analysis step were divided in some main points:

- 1- access area, viability, gateway and inner passage. In this checklist question was observed some risk in ladder because don't exist a best practices to use it (fig. 1).
- 2- buildings, structures, stores. In this case often we show scarcity of lighting and the bath not divided in man/woman. The pesticides stores not are signed and closed and often so little (fig. 2);
- 3- services plant. Not find a risk in this area (fig 2).
- 4- harvesting and processing area. The risk is high because a lot of worker are present during grave harvesting and often not use PPT and are also some foreign. Also in this area where find the critical point show not sufficient management and organization to the workplaces and space in the winery (fig. 2).
- 5- safety management. This area show how the little winery have more problems to management of safety than the largest winery where can have one or more manager for safety (fig. 3).

In general show others risk problems related to the logistics of grape receipt (risks include slips, trips and falls, being hit, or hitting an object, body stressing and manual handling), Crushing/pressing (risks include plant, manual handling, body stressing) grape receiving, the specific requirements of the processes to suit the style of wine to be produced, efficient workflows, the impact of the site conditions, environmental considerations, efficient energy systems cause low attention in safety.

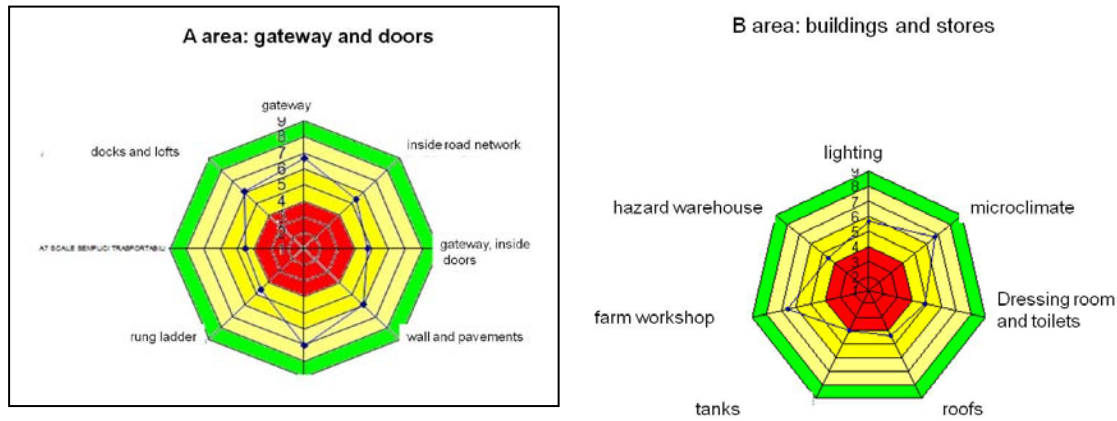


Figure 1 – Radar graph for risk in area A e B.



Figure 2 – Radar graph for risk in area C and D.

E area: safety management



Figure 3 – Radar graph for risk in area E.

In the last step the research show that when the design was make considering also safety requirements is possible:

- one reduction of the costs for safety managements;
- better control of workflow;
- management rationalization in the winery.

For to get this goals we have design a winery on two floors, the basement is assigned to ageing located under storage and bottling area while the other floor is assigned for wine production.

The building is divided in two main area, one for grape receiving and wine processing and is 45 m long and 22 wide. The second area include bottling , storage and offices and as 27 m long and 20 wide. The wall was in reinforced concrete while the roof is in wood beam and roof tile (fig. 4).

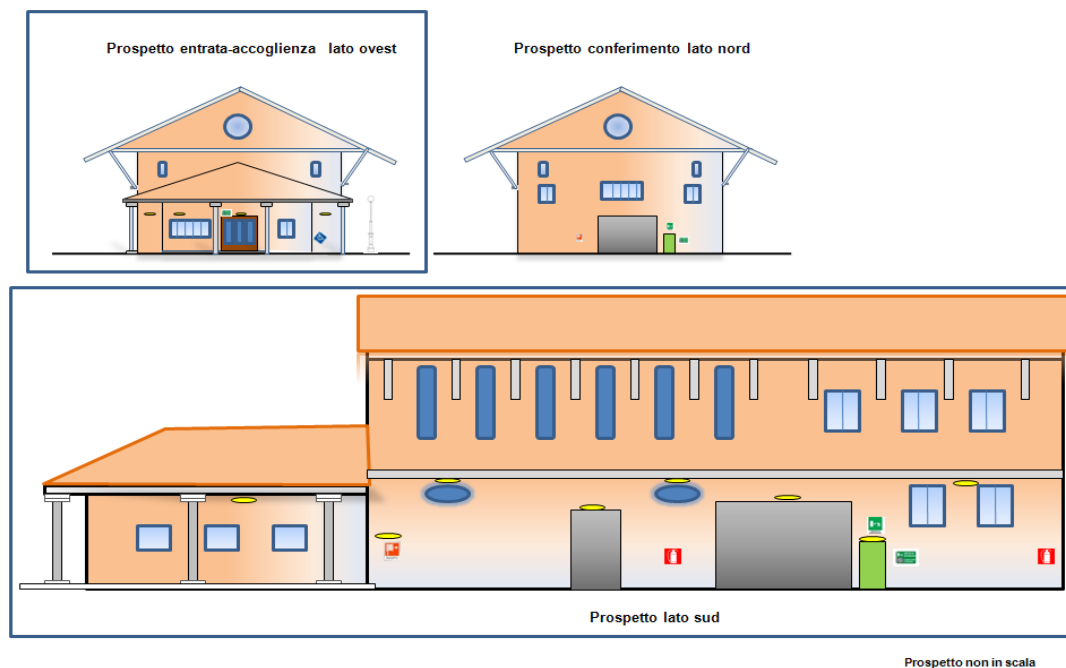


Figure 4 – Project view to building of winery, in particular show safety solutions

On the north side of the building is located the receiving area with this equipment:

- weighbridge;
- crushing machine;
- winepress;
- berry store;
- store exhausted bunch.

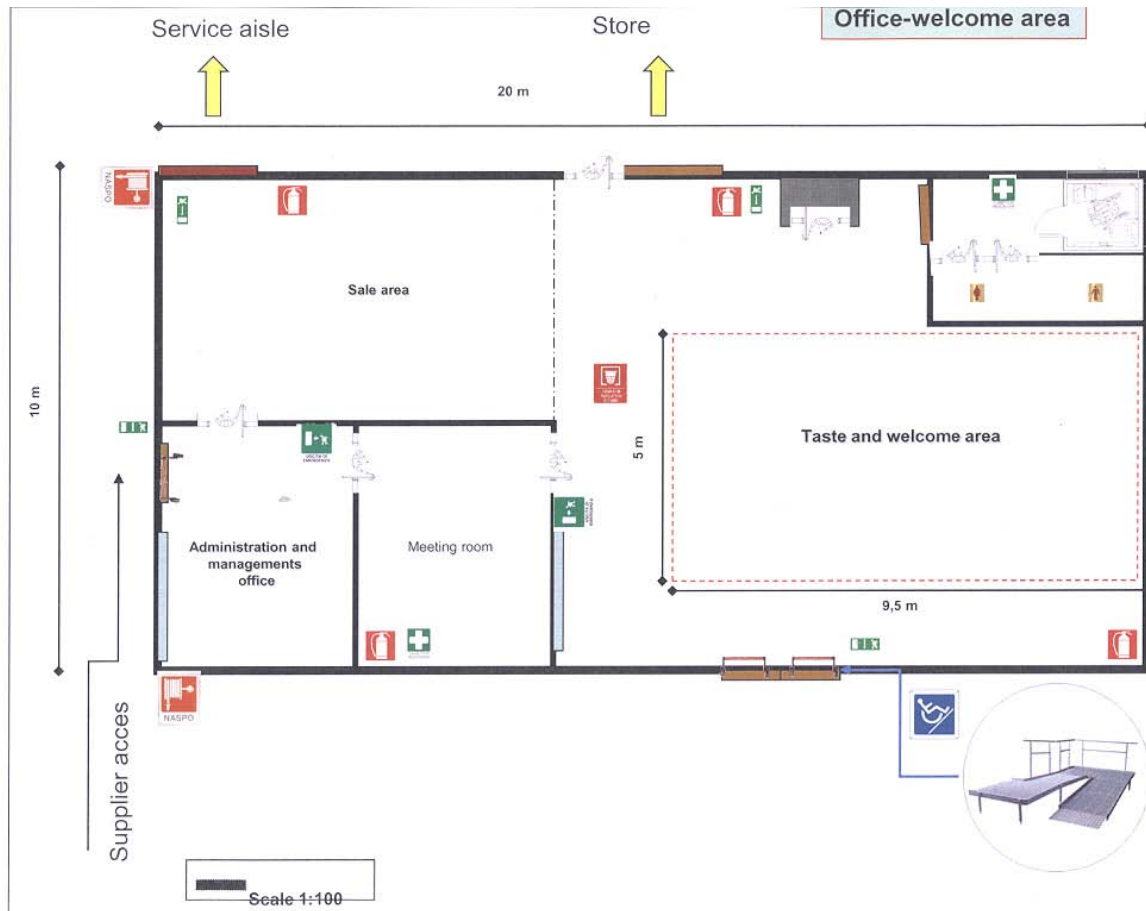


Figure 5 – Plant of second building with office and welcome area

In the south of winery building is located the wine processing area and the layout have laboratory, bath for m/f and kitchen for workers.

In the secondary building is located the bottling room, main store and office and reception area. This last area is composed (fig. 5):

- offices;
- toilettes;
- wine tasting room;
- sales room.

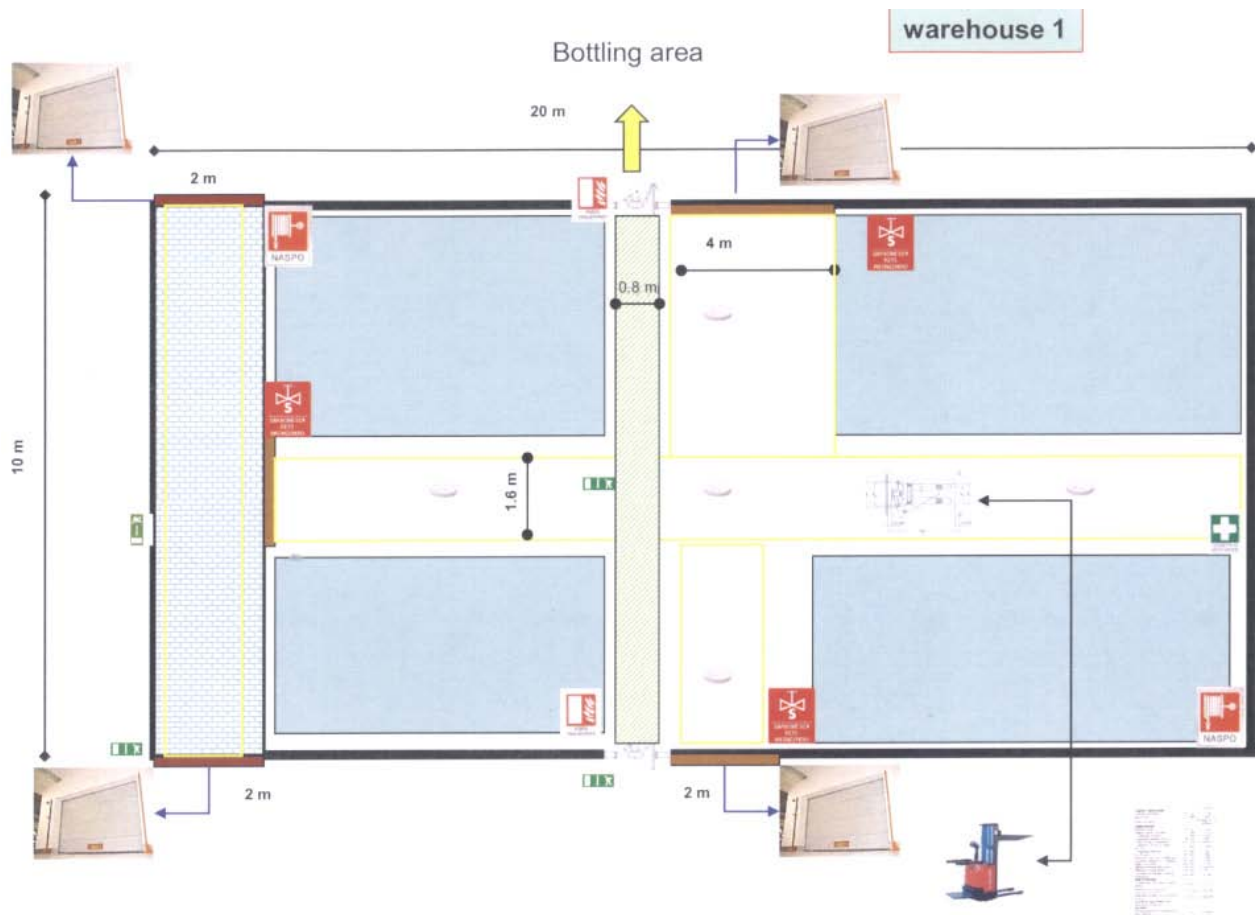


Figure 6 – Plant of bottling area

All the room in the winery were designed for:

- allow all the operations in safety mode;
- easy crossing by the fork lift or workers with equipment specially in bottling room where the materials is moved more (fig. 6);
- safety path for touristic visit in the winery.

The winery outside area is composed with green area and exhibition vineyard for the tourist people. Near the winery buildings is also the building for machinery and equipment used for vineyard working and store for pesticides. Particularly attention was make for design access to winery with different path for car, tractors and truck.

After structure design was also design equipment to winery. The wine tanks is all in stainless steel with temperature control and a safety system for inspection with a boardwalk with parapet about 100 and layer for stop foot about 15 cm.

Conclusions

The audit demonstrates that the areas presenting the greatest risks to employee health and safety related to:

- plant risk control;
- working at heights;
- chemical storage and use.

A significant number of notices were issued for safety breaches in these areas and more in little winery.

One better design of winery allows:

- to reduce safety management costs;
- better control of processing flow;
- rational management into winery.

This work like to demonstrate how one good design of the winery can rise the work productivity and increase the welfare of the workers.

Spending time for project on health and safety will help create a better work environment and a better quality in wine.

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