WHAT IS H.A.C.C.P. ?

Presented by
Piers Bostock, M CMI

Presented at
THE AUTUMN TECHNICAL MEETING
OF THE
BRITISH SOCIETY OF SUGAR TECHNOLOGISTS
6th September 2006

WHAT IS H.A.C.C.P. ?

Contents **Page no.**

WHAT IS H.A.C.C.P. ?

1. BRIEF SUMMARY

This paper is written to explain the history, rationale and use of H.A.C.C.P. systems as a management tool in the control of processes and product quality with particular reference to the sugar industry.
The paper is intended to increase awareness and understanding of the principles and use of H.A.C.C.P. and its compatibility with Quality Management Systems (QMS).

Some of the information is drawn from "HACCP – A practical approach" by Sara Mortimore and Carol Wallace (ISBN 0-412-57020-30).

2. INTRODUCTION AND DEFINITIONS

H.A.C.C.P. is an abbreviation for HAZARD ANALYSIS CRITICAL CONTROL POINT and has become an abbreviation used frequently in food companies and conferences. Often by people who do not understand what it means and how it should be used.

H.A.C.C.P. focuses on final product quality, but looks at each of the process stages to ensure that they are adequately controlled to minimise risk to the safety of the product.
Thus, at each stage of the process:

HAZARD - What risk is there to the product quality?
ANALYSIS - How serious is that risk?
How far can that risk be minimised by control strategies?
How much can that risk be eliminated by later process stages?
CRITICAL CONTROL POINT - If the risk cannot be reduced, a point where a loss of control has a reasonable probability of creating an unacceptable risk to product quality.

PRODUCT QUALITY is a term that is often mis-used and should be better understood.
Product Quality does not necessarily mean the highest, best, most expensive product, but it does always mean "Fitness for Purpose". For example, bath taps come in all shapes, sizes, colours and materials. Functionally, they all perform the same task – they open to allow water to flow and close to prevent it flowing. The basic taps could be considered to be chrome-plated, individual taps for hot and cold and ones that turn about 10 turns from closed to fully open. At the top of the range, a solid gold mixer tap system with quarter turn taps and thermostatic control of temperature might be considered.
Both perform the same task; both are fit for purpose, but one cost less than the other.

In sugar industry terms, the product quality at one factory may well be different form another factory in the same country or one in another country. It all depends on the market that is being served.

WHAT IS H.A.C.C.P. ?

2.1. Where did it come from?

H.A.C.C.P. started life in the USA manned space programme as a means of ensuring the safety of the food prepared for the astronauts in space. Before HA.C.C.P., food safety was based on testing the product after it was made and it was realised that you could only be certain that the product was safe by testing 100% of the finished product. This was a self-defeating procedure because no product could be produced for sale. This is also End Product Quality Control, where failures in the process are not identified until after the product has been manufactured.
Thus, a failure preventative system was required to give a high level of assurance that the product was safe.
The first system was developed by the Pillsbury Company in conjunction with NASA and was based on the engineering industry system, Failure, Mode and Effect Analysis (FMEA), which looks at what could go wrong at each stage of a manufacturing process along with the possible causes and the likely effect, before establishing effective control mechanisms.
H.A.C.C.P. follows the same principles, but from a point of product safety, i.e. ensuring that the product can cause harm to the consumer.

2.2. Why should it be used?

The main reasons for developing an H.AC.C.P. System are:

2.2.1 <u>Management of product safety</u>

As food manufacturers and producers, the top priority must be the safety of our products. That food is always considered “safe” is an unwritten customer expectation. The products that they eat must not do them harm. The recent incident of Salmonella in Cadbury’s products and their delay in recalling the product was very damaging to their business.
H.A.C.C.P. is a system of product control based upon prevention during the process rather than testing after production.

2.2.2 <u>Limitations of inspection and testing</u>

This is the system in use in many places – what is wrong with it?
The ultimate inspection and testing is 100% inspection where every single product manufactured is tested. In the case of chocolate bars, for instance, there would be no product to sell if you have to check each bar for content and taste.
In a production line where there is a visual inspection of each product, such as pizzas, the inspectors are not able to concentrate sufficiently to

ensure 100% inspection. Discussion of holidays, passing pretty women (or handsome men) will mean that something will be missed.
So, the best that can be done is by sampling, which will inevitably lead to failure at some point.

2.2.3 Government pressures

The European Community Directive 93/43 EC (1993) on the Hygiene of Foodstuffs did not directly quote from the Codex Alimentarius or NACMCF, but Article 3 succinctly collects the Principles together and states that food business operators shall identify any step in their activities critical to ensuring food safety and ensure that adequate safety procedures are identified, implemented, maintained and reviewed.
In the UK, the statutory defence of Due Diligence in the Food Safety Act (1990) requires that the responsible person: "took all reasonable precautions and exercised all due diligence to avoid the commission of the offence by himself or by a person under his control". The personalisation of the Act means that the law will go after the responsible manager, not just the company.

2.2.4 Customer pressures

After some 40 years of use, H.A.C.C.P. is a well-proven system that provides confidence that a business is managing its food safety effectively. This confidence can be easily understood by industrial customers, who will recognise that the business is professionally run and takes its responsibilities seriously.
No company would wish to supply sub-standard product to another company within the food industry and then have that company have a product safety incident which is traced back to the ingredient supplied by the first company. Not only would the subsequent legal action be painful for the supplying company (or for both of them), but both companies would suffer financially and to their reputations if the media took an interest.
Whether the end user or domestic consumer either understand what an H.A.C.C.P. system achieves for them or even cares, unless they suffer from a product failure in the form of food poisoning, is open to debate.

2.2.5 Media pressures

The power of the media has become ever greater. As with the Cadbury's incident earlier this year, the reports were splashed across all the papers with pictures of Cadbury's products, even those not involved in the incident, clearly identified. It does not matter how inaccurate the reporting was, the effect must have been devastating.

Having an H.A.C.C.P. system in place and being able to prove it may help to reduce the effect on you business of a product safety failure. It is hoped that, if the system is fully effective, the failure will be identified before the product leaves the company's control.

2.2.6 Business continuous improvement

The direct benefit is clearly the ability to ensure that the required product safety is maintained throughout production and through the supply chain, so that the customer's expectations are always met.

The ability to provide evidence of safe production practices and safe handling of food products in the event of regulatory inspections, investigations into food safety incidents or prosecutions is an added benefit.

Other benefits that spin off from establishing such a system can be:

a. reduced production of sub-standard product and the cost of re-processing,
b. increased confidence by customers in the company's products, which could lead to more sales and better reputation the market place,
c. increased awareness of product quality issues by staff, leading to:
d. increased awareness of hazards generally,
e. better housekeeping practices,
f. earlier reporting of potential problems
g. greater participation by staff in the company's business management and
h. Identification of training needs and skills shortages within the organisation.

3. THE PRINCIPLES OF H.A.C.C.P.

There are seven internationally accepted Principles which define how an H.A.C.C.P. system should be established, implemented and maintained. These principles have been published by the Codex Alimentarius Commission (1993) and the National Advisory Committee on Microbiological Criteria for Foods (NACMCF, 1992).

3.1 Principle 1

Conduct a hazard analysis. Prepare a list of steps in the process where significant hazards occur and describe the preventative measures.

Here the HACCP team should start by preparing a Process Flow Diagram detailing all the steps in the process. From this, the team should identify all the hazards which could occur at each stage and detail the preventative measures for their control. These could be existing or new measures.

WHAT IS H.A.C.C.P. ?

3.2 Principle 2

Identify the Critical Control Points (CCPs) in the process.

The team here establish the points at which control is critical to the managing the safety of the product. It is also important to differentiate between those hazards that will be corrected later in the process and those that will not be; the latter becoming Critical Control Points.

3.3 Principle 3

Establish Critical Limits for preventative measures associated with each identified CCP.

The critical limits delineate between safe and unsafe product at the CCP. These must be measurable parameters.

3.4 Principle 4

Establish CCP monitoring requirements and establish procedures to adjust the process and maintain control from the results of the monitoring.

The HAACCP team should specify the monitoring actions needed along with the frequency of sampling, the responsibility for action and the action required to maintain the CCP within its critical limits.

3.5 Principle 5

Establish corrective actions to be taken when monitoring indicates a deviation from an established critical limit.

The team will have to specify the Corrective Action procedures and responsibility to ensure its effective correction. This will include action to bring the process back under control and action to determine how to deal with any out-of-specification product produced.

3.6 Principle 6

Establish effective record-keeping procedures that document the H.A.C.C.P. System.

The team will have to establish a system to demonstrate that the system is being operated under control, both the documentation and the records that appropriate corrective action has been taken for any deviation from critical limits.

3.7 Principle 7

Establish procedures for the verification that the H.A.C.C.P. system is working correctly.

In effect, this means establishing an audit system so that an audit trail can be followed for any deviations.

The last two principles lead the user towards integrating the H.A.C.C.P. System with a Quality Management System, if they already have one. The two systems integrate very well, because the H.A.C.C.P. system effectively results in procedures and work instructions for operators to follow and upon which to report.

4. IMPLEMENTING H.A.C.C.P.

Because H.A.C.C.P. is a management tool aimed at food safety incident prevention, the involvement, active participation and full support of the senior management team of the company is an essential pre-requisite of successful implementation. Their full understanding and real commitment to the project is the beginning of the process. To that end, they will the first ones to attend, as a team, an H.A.C.C.P. briefing, following which their decision to go ahead with the project must be clearly announced.
Once this stage has been passed, senior management must continue to support the project actively. If one departmental manager undermines the effort by paying lip service to the project, the process is likely to fail.

4.1. The Team

The team will need to be multi-disciplinary, covering all aspects of the business, including Quality Assurance, Production, Engineering, Process Technical / Laboratory and Logistics.
It may also be appropriate to bring in Research and Development, Purchasing and Agricultural elements into the team.
From external sources, you may wish to add a Microbiologist or Toxicologist to give advice, as well some Statistical Process Control expertise and last, but not least, an H.A.C.C.P. “expert” or consultant, who may be able to move the team up the learning curve more rapidly.

One of these members is likely to become the Team Leader, reporting to senior management on progress as well as keeping the momentum of the team flowing.

The size of the team will depend on the task. In a small company, a team of six internal members might be appropriate, with advisers available. In a larger organisation, it might be suitable to have 2 or more teams of six and to divide the work into areas. In this case, it is important that the areas overlap, so that the teams co-operate and link together.

4.2. The Planning

As we all know, planning is everything. Implementing H.A.C.C.P. is no different and if it is rushed into with short deadlines, lack of finances and the requirement to “have

it completed yesterday", the implementation of the system will be incomplete because of failures and omissions.
Thus, the team has to be given time to assess the extent of the work, allocate resources and plan the execution. Most importantly, the team members may have to be relieved of some or all of their other duties for the duration of the implementation.

4.3. The Execution

The execution of the project also has to be carefully planned. Not only has the team to perform its tasks in establishing the system and preparing it for implementation, but the team will also have to train the operators and other staff in the principles involved and how to use the system, once it is ready for use.
This may well involve changes in working practices, changes in dress standards, additional monitoring and sampling and additional reporting. People generally are resistant to change and these changes will have to be handled with care and sensitivity if successful implementation is to be achieved.
Failure either in management commitment and support or in appropriate time and energy to train the staff is likely to result in ineffective implementation and costly subsequent efforts to recover the situation.

5. H.A.C.C.P. AND QUALITY MANAGEMENT SYSTEMS

Quality Management Systems (QMS) are already in place in many organisations and are established to encapsulate all the activities which occur in a company to ensure that it meets its quality objectives. Its aim is to prevent and detect any non-conforming product during production and distribution to ensure that it does not reach the customer and ensure that all products reaching the customer are within specification. It also aims to take corrective action to ensure that the non-conformance does not occur again in the future, by initiating changes in procedures where necessary.
The obvious danger here is that, if an unsafe product is specified, the QMS will ensure that it is produced every time.
Thus, if H.A.C.C.P. is added to the QMS and integrated into the system, it will be possible to specify and produce a safe product every time; by using H.A.C.C.P. and by managing it using a Quality Management System.
Many companies base their QMS on ISO 9001:2000, which is the current international standard. This system can be used as an internal tool or can be accredited using a third party accreditation body.

WHAT IS H.A.C.C.P. ?

All 20 clauses of ISO 9001:2000 have relevance to H.A.C.C.P. and most of them are stated or implied in the seven Principles. In particular, the following clauses directly relate to H.A.C.C.P.:

ISO 9001 clause	Clause Title
4.1	Management responsibility
4.2	Quality system
4.3	Contract review
4.4	Design control
4.5	Document control
4.8	Product identification and traceability
4.9	Process control
4.10	Inspection and testing
4.11	Inspection and testing equipment
4.13	Control of non-conforming product
4.14	Corrective action
4.16	Quality records
4.17	Internal quality audits
4.18	Training
4.19	Statistical techniques

Most of the other clauses have some relevance, but these ones strike at the core of H.A.C.C.P. and what it stands for.

6. SUMMARY

5.1 H.A.C.C.P. is an organised and planned method of ensuring that a "safe" product is always produced.

5.2 H.A.C.C.P. was developed from the need for safe food in space.

5.3 This system needs to be used because of international, government, business, media and consumer pressures for safe food.

5.4 Seven Principles are used to define how an H.A.C.C.P. system should be implemented.

5.5 Implementation of an H.A.C.C.P. system requires top management commitment and support. It also needs total involvement from a company's staff.

5.6 H.A.C.C.P. systems integrate easily with Quality Management Systems, such as ISO 9001:2000. The mutuality and compatibility of the two systems make for a stronger control of production processes.

Piers Bostock
24th September 2006