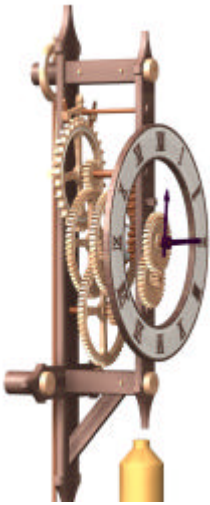


Issue 158 January 21, 2005



## TIME, VALUE, CONDITION

**The three leading measures that we use in asset management are time, value, and condition.**

Time is an absolute; we can add half an hour this week to a month last year, to a six months ten years ago and the total still makes sense. An hour means the same thing to everyone no matter where they are. We calibrate time. Electric power companies generate electricity using alternating current that fluctuates a little from time to time, so any electrical clock will also fluctuate but by comparing the power generator frequency to a GPS-derived reference source, any drift can be identified and adjusted. So we can have faith in our time measures.

Value for us is money, and money as a unit is *not* constant; it can vary up or down with inflation or deflation, but at least we know how to compare money amounts in different periods with indices; we can add amounts expressed in dollars of the same time period

hence the importance of adopting the convention of current valuations (of modern engineering equivalent assets). The earlier convention of adding amounts in dollar values of assets acquired at different times (under the historical costs paradigm) gave a nonsense result.

So **time** is expressed in standard and constant value units that are calibrated and known to all; **dollar amounts** are expressed in standard, although changing, value units but we have conventions for measuring the rate of change and so they can be compared. **But what about condition? Is there a standard? Are condition ratings calibrated? Can they be compared? Can they be added?**

Graham Holland – who provided the delightful cartoon illustration of Darwinian Evolution and Asset Management in the last SAM issue – looks at some of the problems in using—and interpreting—condition assessments.

### Also in this issue

- How culture affects our approach to AM
- ‘Ideas that last’—past SAM articles now available on the website

Enjoy!

**Penny**

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This article by Graham Holland is in response to "Which way do you slice it? (SAM 153, November 12, 2004) where we compared the interpretation of condition grades that were sliced horizontally with those that are sliced vertically. (Both versions can be found in the texts and manuals) He argues here that the problems of interpretation goes beyond the issues dealt with in that article.

## UNDERSTANDING YOUR GRADING SYSTEMS

By Graham Holland  
Asset Manager  
British Waterways

(This is an excerpt from a more detailed paper, with tables and illustrations, that you will find in its entirety on the [www.amqi.com](http://www.amqi.com) website (enter "condition" in the search engine))

### Grading Systems

Every AM text book includes references to grading systems.

Understandably, we asset managers seek to put our assets into neat categories, perhaps related to their condition, to performance, to their usage, to the consequence of their failure and so on.

They help us to manage our data, and to visualise perhaps geographically dispersed asset portfolios which may comprise many different kinds of assets, of different ages and use. They allow us to break down apparent complexity into packages that we can deal with.

Used properly, grading systems can help in strategic and operational planning, in budgeting, and in maintenance prioritisation.

**However, it is easy to succumb to the lure of grading systems without really understanding some of the factors that may result in misinterpretation of the information they give us.**

[*Edi: In his article on the website, Graham Holland uses a five level condition assessment that will be familiar to those of you who have been involved in condition assessment.*

**Very good** = as new, no attention needed;

**Good** = some signs of wear but not affecting function or efficiency;

**Fair** = greater signs of wear and tear, not affecting function or efficiency yet, but needs to be watched,

**Poor** = functioning but inefficient,

**Bad** = not functioning or about to cease functioning.

***I have simplified here, and Graham provides more detail in his web article. To this grading is added a risk assessment. ]***

### Probability + Risk ++

The combination of probability and consequence gives us our first crude measure of risk. However there are other factors to take into account. For instance, our consequence of failure assesses the effect on others, but does not take into account the effect on the broader business. For this reason we are gradually moving towards

replacing the consequence of failure grade with the wider based concept of Business Criticality using a number of weighted criteria.

### Subjectivity

One of the problems with this approach is that it reintroduces an element of subjectivity into the calculation. Not all of the criteria can be assessed as part of the inspection process but instead rely upon a detailed knowledge of the wider business. However the benefits probably outweigh the disadvantages.

Other grading systems exist in BW. For instance some may relate to the capacity of the asset, or its usage, to its heritage value, or to its local ecology. Increasingly these gradings will also need to be brought into the picture when making decisions about investment, and the use of the Business Criticality index is a way of doing this. However, the potential idiosyncrasies of these grading systems need to be understood.

### Observations on BW Condition Grades

As an example lets look just at condition grades in BW. (Chart 1) These now exist for all significant assets and are reassessed on regular cycles. For the

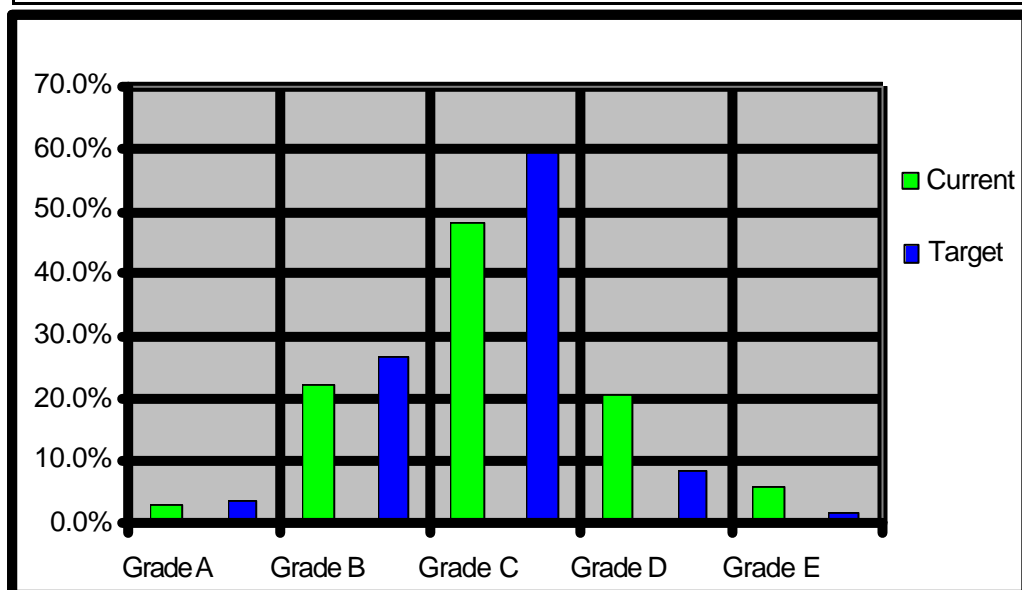
first time we have data to analyse, and to allow the tracking of asset deterioration. A problem we have is that, for most infrastructure assets, the rate of decay is slow, and we only have data on the last 20 years of what may be more than a 200 year lifespan. Care must therefore be taken in extrapolating either backwards or forwards in time

However it has been possible to analyse the data, and to set targets for overall condition grade improvement as a result of the investment being made through to 2012.

The International Infrastructure Management Manual (2002) contains a diagram showing a 'typical' condition deterioration curve for a single asset. (see Chart 2 over the page)

This implies that in normal circumstances an asset is constructed, operated, and gradually deteriorates along a steepening curve to failure after 100% of its effective life has elapsed – the blue line on the graph below. In other words it would be expected to remain in good condition for longer than it is in fair condition and so on. The same type of curve should also apply to a large population of different assets, constructed at different times and with various lifespans.

**Chart 1 Distribution of Condition Grades in British Waterways**



### Why do our assets fall so far short of the theoretical curve in Chart 2 below?

[Given the shape of the theoretical degradation curve and the fact that assets spend most of their life in good condition] Any snapshot in time would be expected to reveal more assets in good condition than those in poor condition.

When BW current condition grades (the bottom line on Chart 2) are plotted on this diagram, a very different curve results. Most of our assets, irrespective of type, currently fall in Grade C. The target profile (middle line) looks even more strange. Why is this?.

#### There could be a number of reasons:

The assets being analysed are substantial infrastructure assets with potentially very long life spans (mostly in excess of 200 years). They were built long before the concept of design life and were very much built to last.

Unlike the assets represented in the theoretical curve, they were constructed over a relatively short period of time (1780 to 1840) and have not been replaced since. In effect they are getting old together at a similar rate

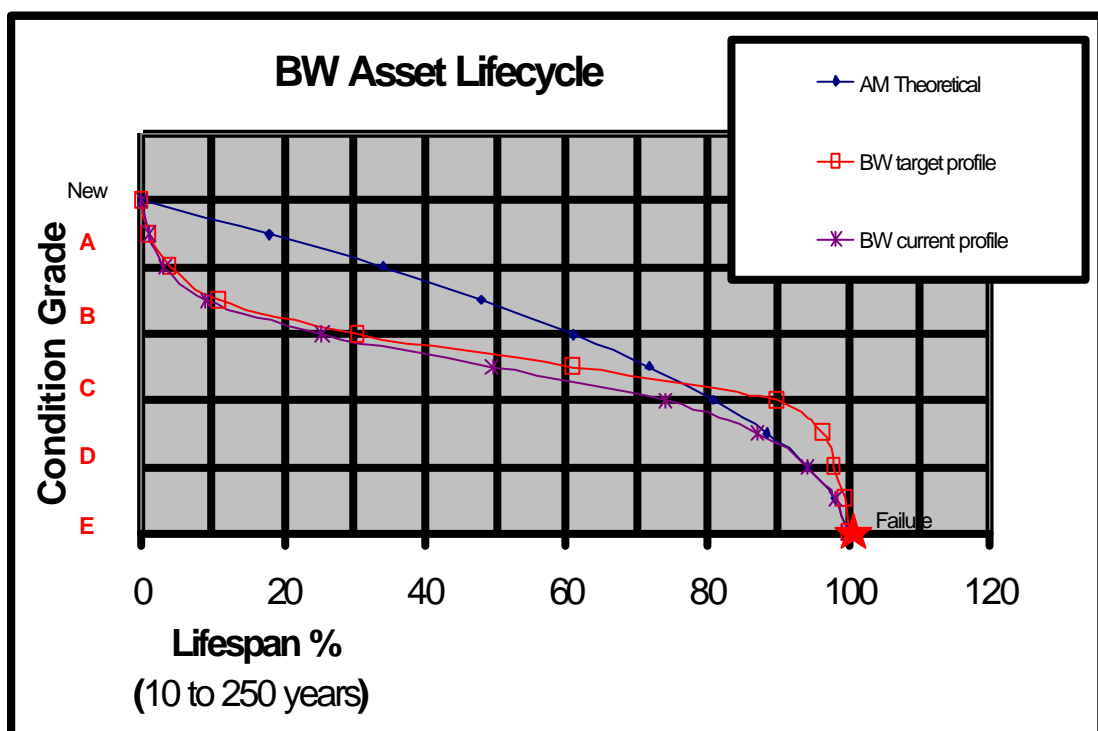
For the most part there are no records of construction, or of any subsequent maintenance or repairs. But we can see that many of the assets have had at least some repair work over their life, at different times, and what we are seeing now is a reflection of this reality.

#### The main explanation—Caution in Condition Grading?

My belief though is that the main explanation for the difference is more simple and fundamental. Inspections are carried out by experienced engineers who take a largely pragmatic view of the defects evident in the assets.

Unless an asset is newly built or is on the point of failure they will be unlikely to ascribe condition grades A or E. For the majority of assets this leaves them with a choice of 3 other grades.

Significant defects should normally be enough to ensure a D grade is awarded, but what do we mean by significant? Many of these engineers, myself included, were with BW when there was very little money to be spent and some very hard choices had to be made. They almost certainly have a very different view of what is meant by



significant than say a newly appointed graduate engineer. They have also seen these same assets living with defects that would not be acceptable say in a modern highway structure. Unless things are really serious, or the engineer has concerns in the short term, there is a temptation to go for grade C.

There is nothing wrong in this, it simply reflects pragmatic engineering judgement.

**But what it means in effect is that the condition grade bandwidths are not even** (as in the diagram).

**Grade C is a wider bandwidth than grades B and D, and probably represents 50% of the total available bandwidth (perhaps we could call it a comfort zone for assets?).**

In turn, grades B and D are wider than grades A and E.

By adjustment of the bandwidths it is possible to bring the overall profile back to something that approximates to the 'typical' or theoretical curve.

## Lessons

As asset managers we use a variety of grading systems to help make decisions on priorities. However we need to take a careful look at what the data is telling us, not only about the assets themselves, but also about the humans who are tasked with assessing them.

**We must be very careful about reaching potentially wide ranging conclusions based on what at first sight seems like good quality data, backed up by carefully designed processes.**

We need to delve a little deeper to understand what it all means.

Even with tight parameters and the clear definition of the grades we use, we are all influenced strongly by our acquired knowledge, our work and life experience, and certainly by our professional backgrounds. We like to think of it as good judgement. Sometimes it pays to take stock of how those many influences may be affecting it. ;

## Degradation Curves – Illustration or Tool?

We are all familiar with the 'theoretical' degradation curves for infrastructure assets that show slow decline for a long period of time followed by rapid decline at the end of a long life. The general shape of the curve gels with our practical experience of such assets but how are we to use such a curve? If it is to be more than simply an illustration of general tendencies of infrastructure assets, we need to ask, in respect of our own asset portfolio

- How slow a decline in the initial years?
- How long does this period last?
- How rapid a decline at the end of life?
- And what warning do you get?

This means CALIBRATION. Are you using degradation type models – for example, pavement management models – that have been built up using someone else's asset portfolio? Do you know the characteristics of the reference portfolio and its similarities or differences to your own? If not, you cannot answer the questions above *for your portfolio*.

And if you are not estimating and recording the actual age of your assets, you will never be in a position to calibrate. In this case your degradation curves are not tools, they are like pictures in a children's picture book.

## HOW DOES CULTURE INFLUENCE ASSET MANAGEMENT? : 3 Stories

Each of us tackles asset management in our own way, pre-conditioned by our values and by our life experiences. And so it is with regions and with countries. Understanding a country's basic approach to life will help in understanding how it will react to asset management.

This is important to those who wish to export asset management from their own countries to others as well as to those who may be looking overseas for ideas to adopt for themselves.

For example, Americans are now taking up the challenge of asset management and, with their characteristic enthusiasm and vigour, their size and their funding capability, it is reasonable to imagine that asset management will expand rapidly in the USA. But the 'brand' of asset management may be very different from that, say, of Australia or New Zealand (two countries that have been recognised in the USA as having acquired some expertise in asset management.) If you want to understand what is happening in the USA with AM at the moment, it may be that Michael Leeden, Freedom Scholar at the American Enterprise Institute, has something to offer you. He was interviewed recently on the ABC (Dec 7 2004) and this is the subject of Story 1.

Each organisation is different, argues Norm Eason, in his book "Maintenance and Asset Management Systems" which was originally serialised for members of the Virtual Asset Management Community but is now available for all [on www.amqi.com](http://www.amqi.com). This is the subject of Story 2.

Finally, we have a practical illustration of what Norm is talking about and a warning for those who wish to impose asset management uniformity from on high. See Story 3.

### Story 1: "Most People Don't Understand Americans"

Michael Leeden, Freedom Scholar, American

**America, Michael points out, is a dynamic, churning, type of society – continually engaging in 'creative destruction'.** "We don't have stable elites. People rise and fall. Families famous today were not heard of five years ago. Look at the richest families in American, they're new and they're always new and they're invariably new. Nobody has seen a Rockefeller outside West Virginia for a quarter of a century. And the Kennedy's are now passing into history."

### Programmed Obsolescence is a way of life.

Leeden says that while Ralph Nader tried to show that programmed obsolescence was the diabolical creation of General Motors making inferior cars so they wouldn't last too long and people would have to buy newer models, actually programmed obsolescence has always been part of the American way and he tells two stories of Alexis De Toqueville who visited America in 1831 and wrote "Democracy in America", which is still a much quoted political work today, to illustrate this fact.

Toqueville in 1831 visited Salem Massachusetts and spoke to a ship builder. American clipper ships at the time were the fastest in the world and Toqueville complimented him on his beautiful ships but asked why he did not make them out of stronger wood so that they would last longer.

"Now why would I want to do that", replied the ship builder, "When I know that in five years time they will want a new model" And that was in 1831!

**Canadians and Americans** De Tocqueville also went to the Canadian border, which in 1831 was around about Buffalo, New York, and on both sides of the border, he says, the people were the same, they had the same origins, yet on the Canadian side everything was orderly, the streets were well laid out, the houses well built. On the American side everything was chaotic, houses just thrown together because the people knew that come the Spring they would be moving on west. So people chose the side of the border that reflected the way they wanted to live!

Americans are like that, says Leeden, - he calls them successful revolutionaries.

**What kind of asset management is appropriate to 'successful revolutionaries', to a dynamic, churning, society where programmed obsolescence is a way of life?**

## Story 2: Organisational Culture

In his book on *Maintenance and Asset Management Information Systems*, Norm Eason though the issue of culture significant enough to devote an entire chapter to it.

In Chap 9 (and you can access the whole book from the [www.amqi.com](http://www.amqi.com) website, see over the page) he writes:

"Undoubtedly, one of the most important areas that needs to be considered is the **culture** of the user organisation. This is perhaps best described by the German word *weltanschauung* which, when translated into English means **how you see the world**. All of us, singly and collectively, see the world in different ways. One of the biggest assumptions, and mistakes, made by many vendors (and consultants!) is the compartmentalisation of users into categories that are either traditional in their origin or are what the vendor or consultant would wish them to be!

I will refer the reader to a quotation by Douglas Adams that I used at the beginning of Chapter 3: **Assumptions are the things that you don't know you're making.**

Wrong categorisation of users and failure to take note of how they are constrained to operate or would like to operate is a major reason for failure of systems. Of course, you can try to indoctrinate users by training courses, seminars and workshops and no doubt these will often be successful, or **appear to be successful**.

But we are talking about a fundamental change in the way that users are being asked to work. (If we are not doing this, are we just automating old procedures?) So if it isn't addressing the hearts and minds of the users, it isn't going to achieve what is expected of it. A collective term for the hearts and minds of the users is **culture**.

## Story 3: Culture will always win out!

Norm Eason's caution on winning hearts and minds over the long haul might account for the following story.

A number of years ago, the local government engineers association in New Zealand won an Excellence Award in the International Asset Management Competitions for getting councils to work together to jointly commission a common asset management information system to be used by all councils in New Zealand. It was a good product, well designed and to specification.

When I visited some 18 months later I found that, although councils had received the software, there were a number who hadn't even taken it out of its box!

A few years later, and of those who had adopted the general system, a number had already moved away, either back to something they had used before, or onto something else!

## IDEAS THAT LAST

Some topics remain current long after they were written. I have selected some of these on the topic of Asset Information Systems and IT from earlier issues of "Strategic Asset Management" and made them available on the [www.amqi.com](http://www.amqi.com) website - on the Resources Page.

### What You Need to Know Before You Choose Your AIS

A 5-part series, originally published in 1999:

- 1: Why it pays to be lean and mean
- 2: Never get a system cleverer than you are
- 3: What has your asset management system done for you lately?
- 4: To integrate or not to integrate
- 5: Clean up your act.

### Maintenance and Asset Management Information Systems, by Norm Eason

This is the closest thing to a personal mentor that you will ever get . Norm (the founder of the Institute of Asset Management in the UK) got into the area of computerised maintenance management packages in the 1970s. So successful was he that he won a number of European Awards for his designs.

Over the years as he worked with organisations to implement systems he noticed that companies were buying computer maintenance packages without a maintenance strategy and without linking their information requirements to the business. This book is the culmination of almost 30 years experience in the world that evolved from maintenance management into asset management (he explains the difference and why a different focus is needed for each)

This was originally serialised for members of the Virtual Asset Management Community but it is now available in its entirety. Download the lot, or individual chapters as suits your need.

#### ***Strategic Asset Management***

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