



"A no-holds barred Yankee bullshit experience"

Sandy Munro started life as a toolmaker in Ford. Prompted by Dr W E Deming, he set up his own consultancy to work on reducing cost and improving quality in the design process. His work played a leading part in making Chrysler the most profitable auto-manufacturer and has produced dramatic cost savings on the Boeing C17.

Sandy is nothing if not blunt. He introduced himself by saying that the next hour would be a "no holds barred, yankee bullshit experience". While his experience had been primarily in the automotive and aerospace industries he had learned over the years that there was "nothing, nothing" that could not be touched by the approaches he was going to describe. Lean is not skinny and it is not fat. Lean is toned, agile teamwork.

A company has only one goal, there may be many objectives which contribute but the one goal is to make money for the shareholders. If you do not do that, you do not stay in business.

The opportunity to make money is highest at the knowledge acquisition and concept phases of engineering. After this the opportunity drops, but typically management attention rises. This is because manager direct their attention to the costs,

not to the influencers. Engineering incurs typically 5% of the cost directly but influences between 70% and 90%. This leads to a typical pattern where cash and management attention are directed at projects in huge quantities at the wrong time. So we have to change it. Insanity is doing what we always did with the people we always had and the same rules we always followed and expecting a different result. So we had better change the rules.

The approach is summed up in a quote from Albert Einstein:

"The best design is the simplest that works."

To this Sandy Munro adds:

"The first design is never the simplest."

Say the cost of changing a design at the concept phase is X, then at the design phase it becomes 10X at the tooling stage it is 100X at the test phase 1000X. Once it is in production or in service the ten times rule goes overboard it is much, much more. The logic is inescapable get it right at



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the start, fix any errors early and the result will be better, faster and cheaper. A bad product starts out because the right people did not get involved at the right time. Once this happens we start to fix it, with modifications, more cost, or high-tech manufacturing methods which make any fundamental change almost impossible, so our product stays around for a long time.

Of all the automotive companies Chrysler have been the most committed to this approach. They make a profit of about \$1500 per car, twice as much as Ford who are the next most profitable. By comparison it is easier to take cost out of aerospace products. Whereas in the automotive sector a 30% cost reduction can be achieved, in aerospace 50% to 80% can be had on products with volumes from 10 to 100 units a year. On the C17 the crew door had a parts count reduction of 37% a 49% reduction in assembly hours and a \$300 000 cost reduction. Reducing the parts count on the landing gear pods by 94%, yes ninety-four percent, has resulted in savings over the project of \$45 million.

In manufacturing the "golden thread" is assembly. Starting with assembly touches everything. Rigorous application of simple rules is the secret: do parts move relative to one another, do they need to be of different materials, do they have to be dismantled? The best part for Quality, cost and delivery is the part that is not there. Springs, screws and belts are bad news and should be kept out. The result is some increase in engineering early in the project but big savings at the end and in production. The end result is not to catch the competition, nor to be as good as them. The end result is to annihilate them.

He offered a particular word of advice: in his experience UK companies in particular have two failings: they try to do it cheap and they try to do it slow. If we want the results we have to put in the resource when it is needed, at the beginning. If we don't do it fast our competitors will.

"It is not the big that eat the small, it is the fast that eat the slow."

The best design is the simplest that works.

Albert Einstein

The first design is never the simplest

Sandy Munro