

"Little-forgotten *Value Engineering* by iconic
GE design engineer, *Lawrence D. Miles*"



Furthered as a corollary by name of Function-Cost-Analysis (FCA), Value Engineering (VE) is an excellent concurrent product/process design methodology and a rapid STEM training technique. Lighter, smaller and low-energy consumption technical systems are outputted, we call them 'trimmed' or 'neatly convoluted'. Deep down, the FCA methodology uses a perfect combination of (approximate) laws of evolution of technology, (exact) laws of physics, shedding psychological inertia by lesser known mechanisms, hands-on engineering by design approach to raise the level of inventive problem solving.

As examples, my humbly invented healthcare instruments, such as hot/cold dynamic, transversely segmented shaving razor, and more recently, Crowd Adaptive Mask are presented. All these devices have commonalities: trade off and compromises are avoided ; mass, dimensions & energy consumed are minimized without imposing penalty on most useful functions performed (trimming or convolution is achieved) ; ability to work under extreme conditions of rapid acceleration & deceleration ; ergonomic design ; rapid, efficient performance in time & space. Apart from well-known structured brainstorming, design-thinking tools like Miniaturized Modeling, Space Time Cost Operator, etc. in shedding off psychological inertia are used many places in embedded manner.

On other end of spectrum, examples from mega projects implemented for corporations, in which I was a team member, are demonstrated. These include project Gauss for P & G, Cincinnati wherein optimum detergent grain size was computed and manufactured (product & process innovation design in concurrence); project for Sanyo Japan to suppress noise level of a vacuum cleaner below a threshold