JUSTIFYING ADVANCED MANUFACTURING TECHNOLOGY

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In September 2000, the US-based AMT–The Association for Manufacturing Technology released a study of the effects new machine tools and advanced manufacturing technologies had on the economy and the country. The study **" Producing Prosperity – Manufacturing Technology's Unmeasured Role in Economic Expansion"** has shown that the unmeasured contributions of manufacturing technologies averaged $200 billion per year for the past five years. Better machine tools and advanced manufacturing technologies have made it possible to improve manufacturing productivity as much as 500% in cases and dramatically improve product quality at the same time.

Reluctance in Adapting New Technologies

It is difficult to understand the hesitation of many manufacturers in taking advantage of the many economic advantages that new technology offers. They do not consider the many hidden benefits that advanced technology has on the entire company's competitive position in the marketplace.

Basic Justification Approaches

There are three basic approaches on how to justify the replacement of machines, tools, and processes. Industrial equipment justification is generally a management decision that is critical to the quality and price of the finished product. It often determines whether a company's product will survive in the marketplace or how long a company will remain in business.

1. The **defensive approach** where no capital equipment, major tools, or manufacturing processes are purchased until something wears out and cannot be repaired.
   - This approach is relatively easy, however it is almost always suicidal because it eventually leads to a loss of the company's position in the marketplace.
2. The **cost-saving approach** is basically a conservative approach that offers some degree of overall progress.
   - A piece of equipment is replaced with a similar one that offers a few manufacturing improvements.
3. The **aggressive approach** takes a critical look at the present equipment and manufacturing processes to see if they are the best ones that will keep them competitive in the marketplace.
   - This approach, the most difficult to justify by a dollar-and-cents formula, may be the only way to generate new revenue and increase the company's competitive position.

It is a proven fact that new technology, properly applied with trained personnel, has a ROI (Return On Investment) of from 6 to 18 months)

Justifying the Investment

The following look at justification is based on a realistic assessment of the impact advanced manufacturing technology has on the manufacturing operation, the organization, and the corporate strategies. New technological investments that involve greater productivity potential must be evaluated on their competitive advantage and related benefits such as:

- Improved and/or more consistent product quality.
- Greater manufacturing flexibility.
- Shorter throughput and leadtime.
- Reduced inventory.
- Less floor space required. – A new technology machine or process generally out-produces two or more machines.
- Reduced indirect manufacturing costs that could include: - Material-handling equipment and personnel.
  - The number of machines required.
  - Scrap, rework, and warranty claims.
  - Maintenance and disposable tooling costs.
  - QC (quality control) personnel.
  - Light, heat, taxes, and insurance.

The following factors and the benefits they offer must be considered:

- 90% reduction in inventory.
- 90% decrease in lead-time.
- 75% reduction in setup time.
- 50% more efficient use of floor space.

A well-planned manufacturing installation can dramatically improve product quality, reduce scrap and rework, and increase the company's flexibility to respond to the changes in production requirements and the marketplace. The goal of new technology should never be to eliminate labor but to increase the flow of product through a plant, improve the product quality, and be able to quickly respond to customer's needs.

A Justification Strategy

Traditional methods do not completely assess the impact of advanced technology may have on the entire company. And without it is impossible to have a well-defined plan. The following points should be considered:

- What is the value of consistent and superior product quality?
- What is the cost of scrap, rework, and large inventories?
- What is the cost of missed delivery dates, lost contracts, and shrinking market share?
- What is the value of greater flexibility and the ability to respond quickly to market changes?
- What is the cost of not being able to hold existing markets or open new markets due to lack of competitive equipment or the capacity of the company?
- What is the value of increased productivity and reduced lead-time?
- What is the cost of product and prototype development, engineering changes, work-in-process, inventory, and inefficient use of equipment and facilities?

Justifying new Processes

New manufacturing processes usually involve the addition of new equipment or tools and the key benefits are not always easy to identify. Rapid prototyping, a process that can involve the use of laser, photochemistry, optical scanning, and computer technology, is used to make a three-dimensional prototype (model) from a CAD file one layer at a time.

Rapid Prototyping allows product designers to see and hold a physical model of a new product in as little as a day after the prototyping begins. Any technology that can improve the ability of a company to compete more effectively is worth the effort it takes to prepare a solid proposal for its acquisition.

A side effect when introducing advanced technology is that although it has an immediate effect on a particular area of the manufacturing operation, its ripple effect can improve efficiency of both upstream and downstream applications.