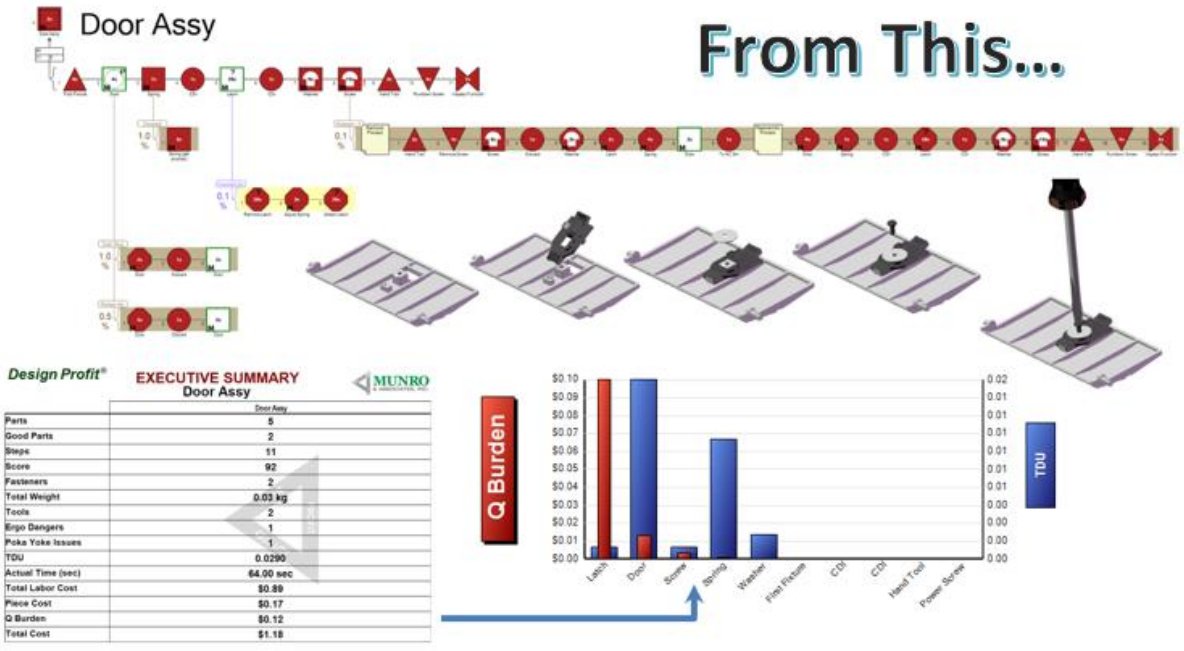
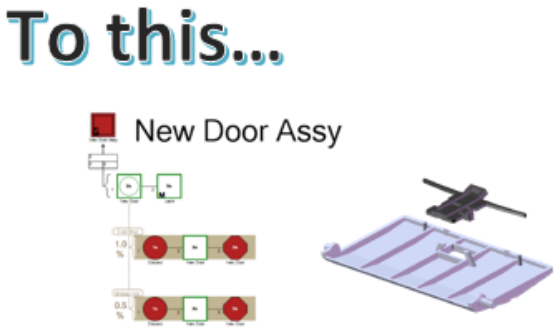
DID YOU KNOW...

... Design Profit® contains a rule based system for identifying where opportunities exist to improve the design and assembly process.

Design Profit® is based on the Munro Lean Design® principle ***"The Best Design is the Simplest Design that works".*** Below is a simple example of Lean Design®. When applying Lean Design® to a more complex system, the rewards can be quite large.



Door Assy	
Parts	5
Good Parts	2
Steps	11
Score	92
Fasteners	2
Total Weight	0.03 kg
Tools	2
Ergo Dangers	1
Poka Yoke Issues	1
TDU	0.0290
Actual Time (sec)	64.00 sec
Total Labor Cost	$0.89
Piece Cost	$0.17
Q Burden	$0.12
Total Cost	$1.18



Design Profit® EXECUTIVE SUMMARY Door Assy MUNRO

	Door Assy	New Door Assy	% ↓
Parts	5	2	60%
Good Parts	2	2	0%
Steps	11	2	82%
Score	92	7	92%
Fasteners	2	0	100%
Total Weight	0.03 kg	0.03 kg	4%
Tools	2	0	100%
Ergo Dangers	1	0	100%
Poka Yoke Issues	1	0	100%
TDU	0.0290	0.0150	48%
Actual Time (sec)	64.00 sec	7.00 sec	89%
Total Labor Cost	$0.89	$0.10	89%
Piece Cost	$0.17	$0.15	12%
Q Burden	$0.12	$0.00	98%
Total Cost	$1.18	$0.25	79%
Annual Q Cost	$33,185.21	$663.24	98%

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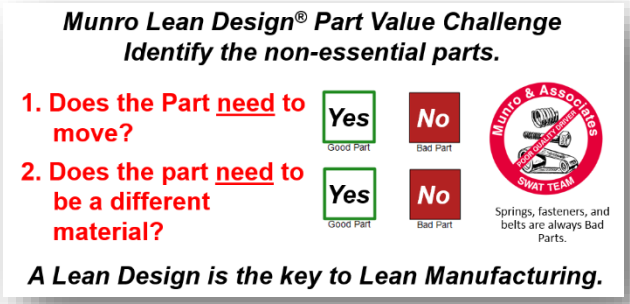
DID YOU KNOW...

Regardless if it's an existing design or a concept design, the goals are similar; to reduce the total accounted costs while improving the quality, producibility, and profitability of the product. Munro has demonstrated that on average 70% of the products ability to generate a profit is determined by the design. Therefore to meet these goals we need to focus on the product design.

The first area of focus is on product simplification (Lean Design®); use as few parts as possible to achieve the product requirements. Design Profit® provides a process for identifying the fewest number of parts, the "**Munro Lean Design®** ***Part Value Challenge***".

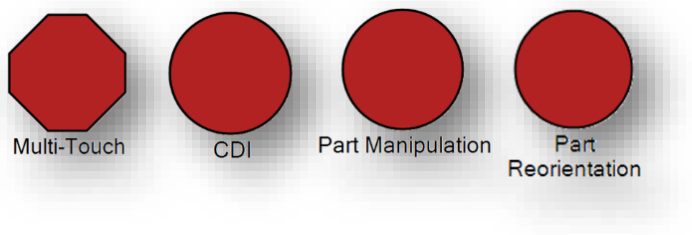


These 2 questions are essential in achieving a minimal part count and a Lean Design®. The questions are posed to create a dialogue to determine which parts are needed to meet the functional requirements. All other parts are merely there to support those parts.

The part value challenge drives creative thinking which leads to innovative designs. It forces us to think in different ways to meet design requirements while focusing on simplicity which in return reduces total accounted costs.

Design Profit® uses a symbol based process to convey the products design and assembly steps. The door assembly illustrates the symbol model. The process in itself of modeling each part and assembly step forces us to question the status quo, which again creates a dialogue that leads to change. During the modeling process several symbols are used to help visualize bad assembly processes which are often necessitated by the design. The first of these symbols is the "Multi-Touch" represented by a stop sign. Multi-Touch as indicative by its name is used when you touch

a part more than one time. Anytime you touch a part more than one time it can lead to quality issues, processing difficulties, and automation difficulties. The next two issues are covered by the operation symbols CDI (Change Direction of Insertion) and Part Manipulation. Both of these assembly steps require the part to change the direction or orientation of assembly from the previous part or requires the part to be manipulated or adjusted during assembly.



These process steps may seem insignificant, but they lend to the cost of fixtures, automation, added quality control, and to the assembly learning curve. These steps are "Non-Value-Added" and go against the Munro "Good Design Principles". Eliminate these process steps by design, not by clever processes or automation, but by appying the Munro "Good Design Priciples":

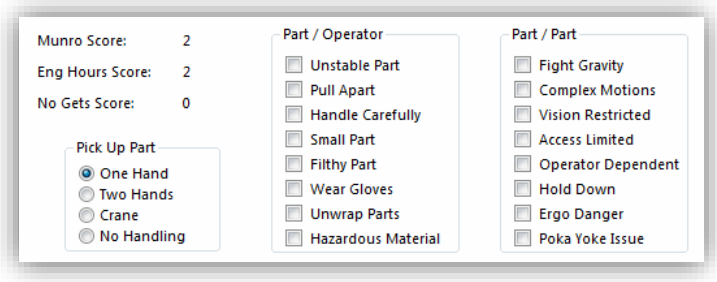
- Teamwork – The difference between good and bad designs
- Minimize the number of parts
- Avoid expensive secondary fastening operations
- Design out handing problems, "Think bulk storage"
- Use gravity, don't fight it
- Design parts that are easy to self locate
- Design the parts to fixture themselves one to another
- Design the product for "Poka-Yoke", error proof assembly
- Question servicing and simpplify or eliminate packaging
- Eliminate movements, adjustments, reorientations, and ergonomic problems.

Also lending to a better product design, Lean Design® includes a process for measuring the assembly efficiency; the "Munro Score". The Munro score (time) is setup to penalize poor design decisions. Each part or assembly is evaluated independently.

DID YOU KNOW...

The scoring process is broken into 3 groups:

- Picking up the part
- The part to operator complexity
- The part to part complexity



Each penalty is posed as a question. As each penalty is identified, the Munro Score increases. The higher the score the less producible the design is, the lower the score the more producible the design.

To increase assembly efficiency and quality, the issues driving assembly penalties need to be inherent within the design. For each penalty we need to consider how it can be designed out, or addressed within the design.

There are 3 way to report the penalties:

1. Munro Score - The Munro score provides the total time to assemble the part. It includes getting the part and assembling the part to the next part or assembly.
2. Engineered (Eng) Hours Score – The time it takes to get the part and to assemble the part to the next part or assembly. It does not include the part to operator penalties.
3. No Gets Score – The time it takes to assemble a part to a part. No gets assumes the part is already in the operators hand. There is no manufacturing assumptions and the time it takes to assemble the product is by design. To improve the assembly time, the design must be changed.

Every 1 hour of time that can be removed from either the Eng. Hours or No Gets Score can be translated to a 3 hour reduction in total time. To achieve true Lean Manufacturing, the design must first be lean.

The part value challenge and the scoring process drives our thought and creativity process beyond quick hit ideas. It focuses our attention on how to meet functional requirements with as few parts and processes as possible. The answer can often be found in simple solutions or in new innovative and patentable ideas.

The last tool and most important tool to reduce complexity and drive innovation is teamwork.

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DID YOU KNOW...

*"**Coming together** is a **beginning**; **keeping together is progress**; **working together is success**.*

Henry Ford

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