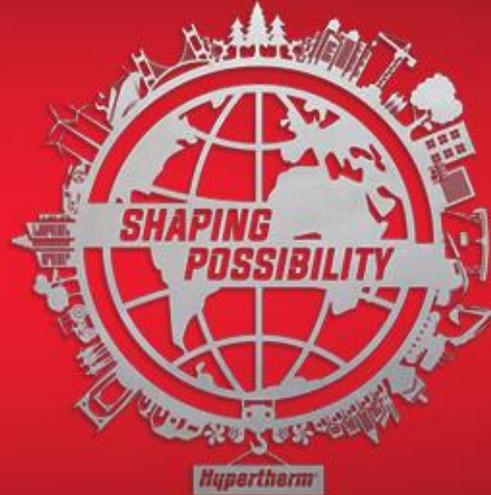




DFMA: An Enabler of a Lean Enterprise

**HELPING YOU
SHAPE THE WORLD.
SHAPING
POSSIBILITY.**



PLASMA | LASER | WATERJET | AUTOMATION | SOFTWARE | CONSUMABLES

Lean is (like) a cult

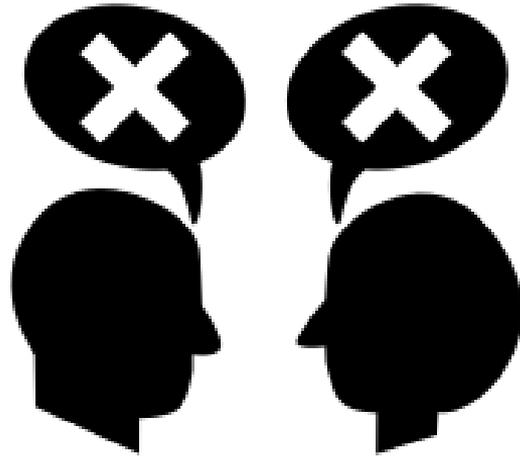
Lean is a cult

DFA and Lean – A Most Powerful One-Two Punch

www.shipulski.com January 27th, 2010



*...the failure modes are emotional,
organizational, and cultural in nature, and are
all about people...*



If you are the **Lean** Gal/Guy...
DFMA is your best friend

If you are the **DFMA** Gal/Guy...
Lean is your best friend

Lean: Make Value Flow to a Customer



Value...what a customer is willing to pay for

Emit light



Sever metal



Wait for parts

Find parts

Sort parts

Transport parts

Count parts

Some non-value add

- Transportation
- Inventory
- Motion
- Waiting
- Over production
- Over processing
- Defects

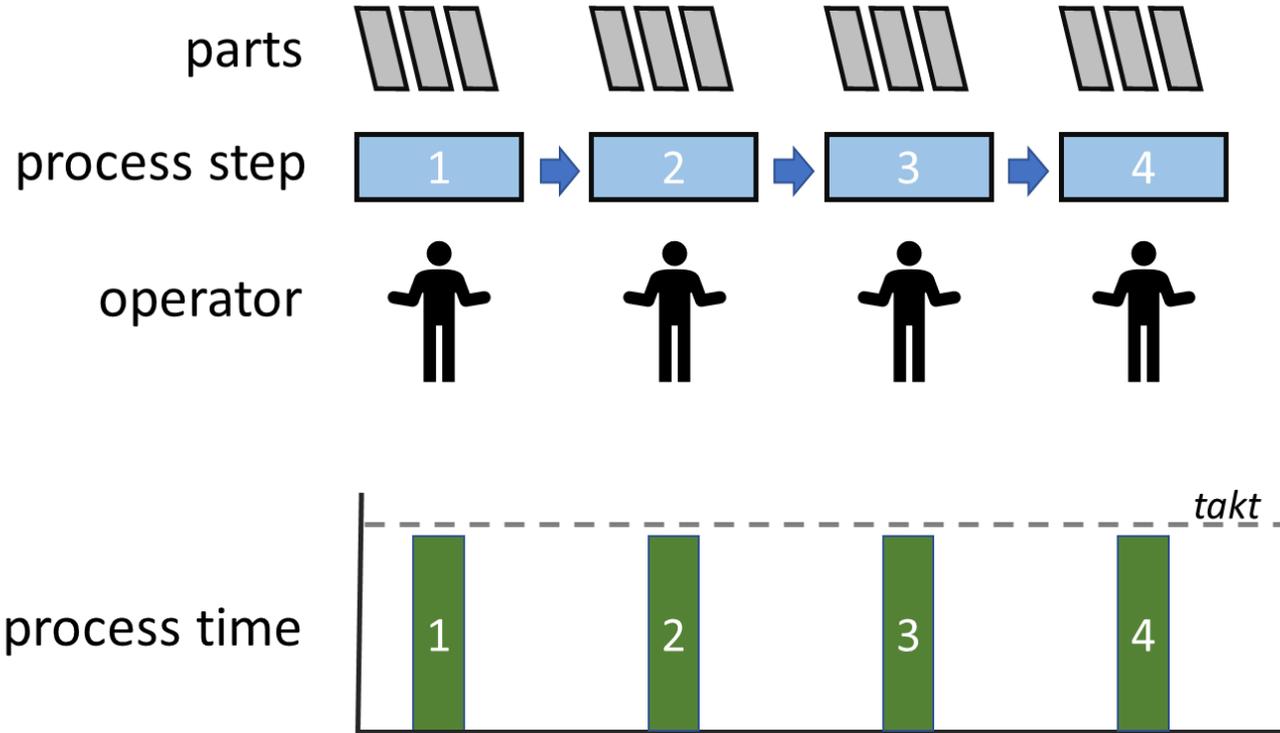


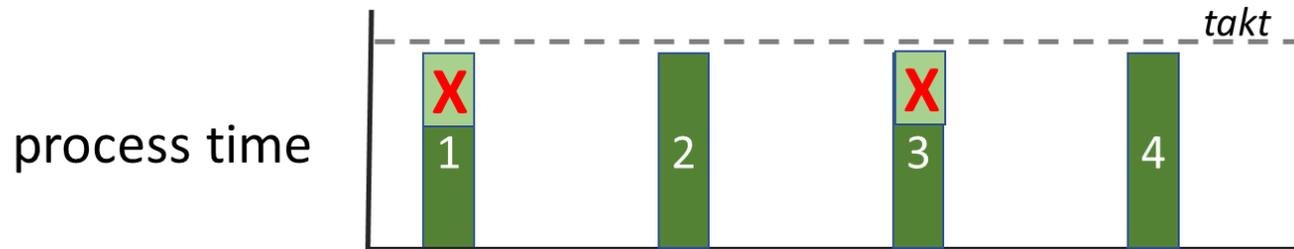
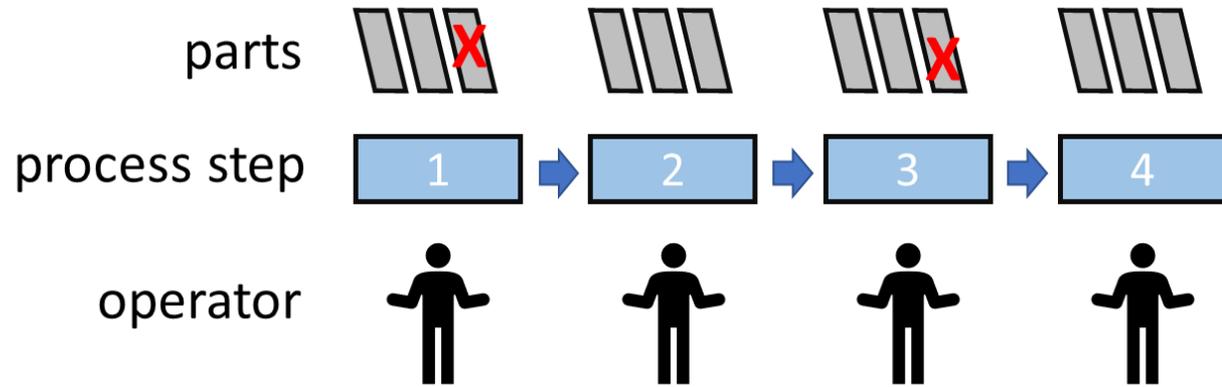
What happens when an operator becomes proficient at identifying non-value add?

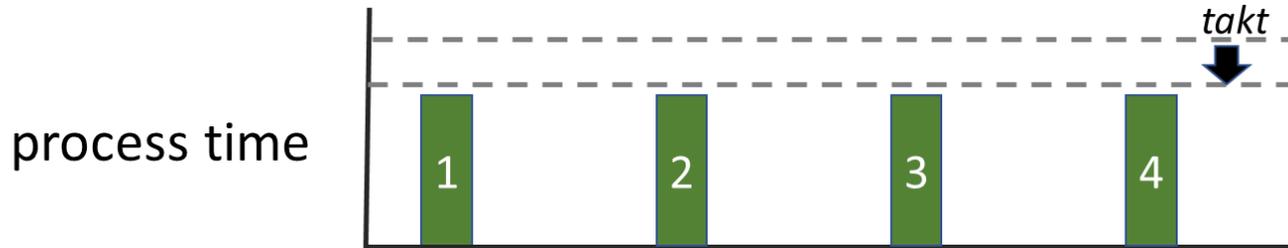
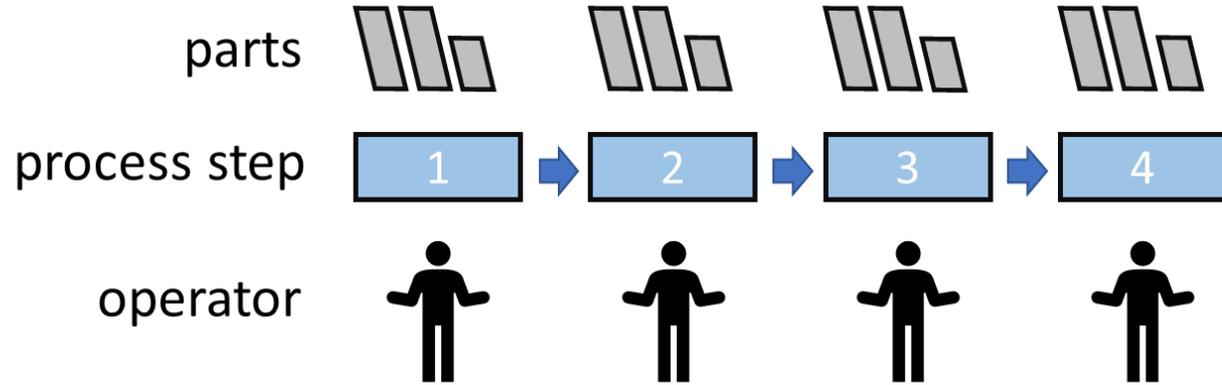
...as a designer I can create more waste much more quickly than a Lean expert can eliminate it...

...there can be many more Lean experts than designers...

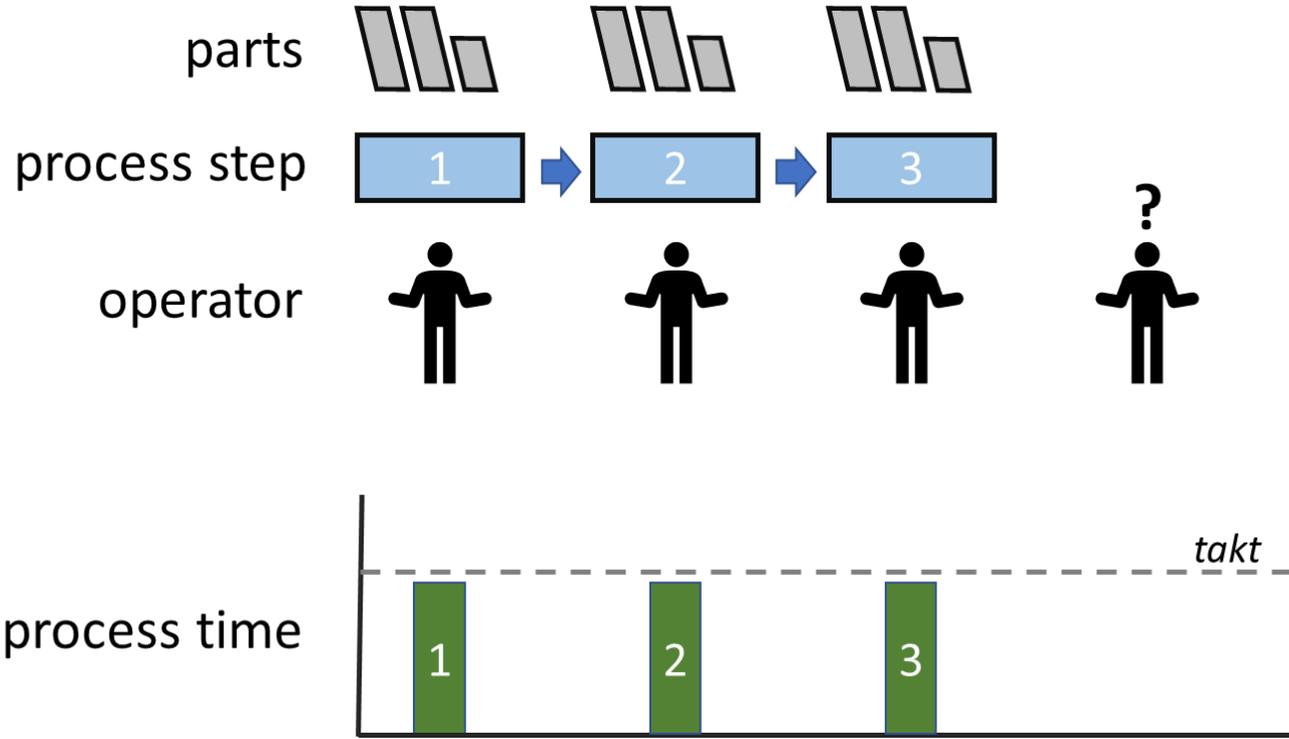
How do DFMA and Lean Complement...



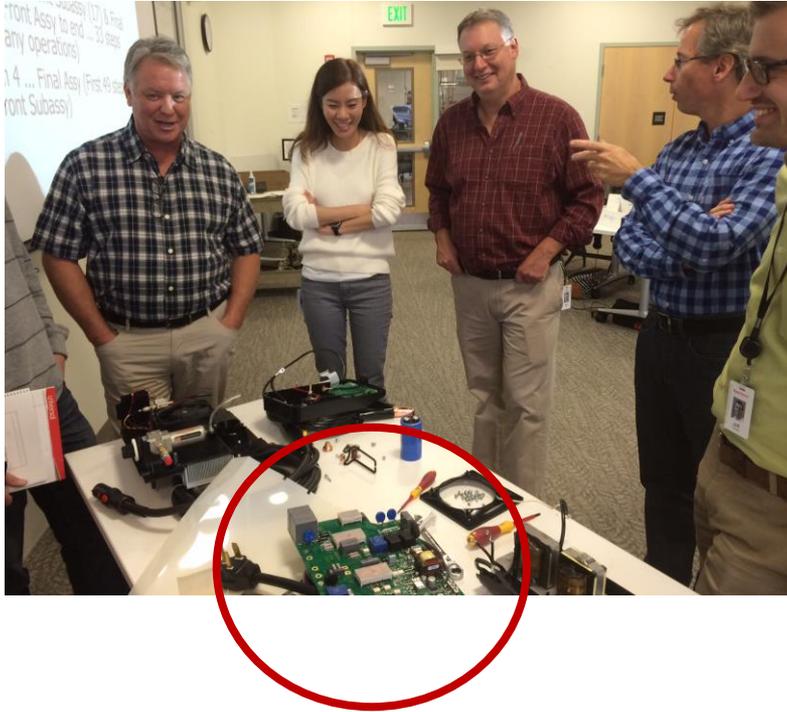




+15%
productivity



Circuit Board DFMA



- All components on one side
- Orthogonal orientation
- Spacing for pick/place automation
- Standard component footprints and pad sizing
- Interface connectors for reflow solder
- Board cost drops 12%
- Warranty drops 34%
- Eliminate a test step

Eliminate Parts =

Material Savings

Eliminate Operations =

Operating Expense
(Labor) Savings

EBIT = Revenue
- Materials
- Operating Expense

EBIT = Revenue

- Materials
- Operating Expense





Part in a product

- Space to store it
- Design documentation to specify it
- Manufacturing documents to make/assemble it
- Supplier data to source it
- ERP data to keep track of it in inventory
- Purchase Order to order it
- Invoices to pay for it
- ECO to change it
- Quality doc to check it
- Records to demonstrate compliance...

Engagement

'...I am encouraged to come up with better ways to do things...'

Cross-functional workshops

Theme: Creative design ideas to reduce complexity and costs

Design engineers

Manufacturing engineers

Marketing specialists

Operators

Assemblers

Technicians

Quality engineers

Procurement/Supply Chain

Suppliers

Finance (?)

Solve problems
Break down silos



Hypertherm[®]
SHAPING POSSIBILITY™

Our Experiment: Sample size of one...Company

Company	2013	2014	2015	2016	2017	2018	2019
Sales	100%	108%	99%	96%	109%	120%	
Material	100%	109%	99%	91%	97%	106%	
OE	100%	101%	98%	101%	107%	117%	
EBIT	100%	122%	101%	92%	136%	157%	

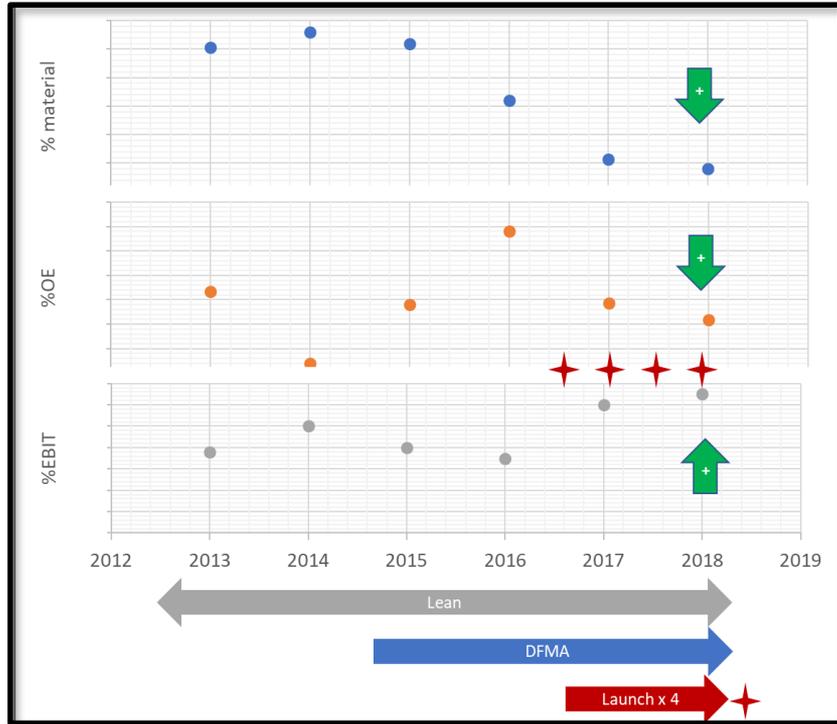
Launches
2020-2021



Sample size of one...company

Company	2013	2014	2015	2016	2017	2018	2019
Sales	100%	108%	99%	96%	109%	120%	
Material	100%	109%	99%	91%	97%	106%	
OE	100%	101%	98%	101%	107%	117%	
EBIT	100%	122%	101%	92%	136%	157%	
%material	37.1%	37.6%	37.2%	35.2%	33.1%	32.8%	
%OE	45.3%	42.4%	44.8%	47.8%	44.9%	44.2%	
%EBIT	100%	114%	102%	97%	125%	131%	

Our take-aways, so far...



- Lean + DFMA >> either alone
- EBIT for Executive Support
- Engagement = leader support
- Cross functional workshops

In the end...

DFMA + Lean >> DFMA

and

DFMA + Lean >> Lean

Charlie Hackett

Director Corporate Improvement

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