

The Frugal Ergonomic Engineer

By

Dr. Len Walsh

The Real Problem Is People Come To A Complete Halt When It Comes To Ergonomics

- When there is no budget to remedy problems.
- Give up goals, expectations and sometimes hope.
- When the return on investment (ROI) has to be some huge number, and proved out before anyone acts.
- When people always remember how some other project failed. So everyone wants to avoid bad press!

Webster's Defines

Frugal: as avoiding unnecessary monetary expenditures.

Throw in an equation of course
as all engineers will do

Or Mathematically

? + ! + \$0.00 = \$\$\$

Problem + insight + no budget =
\$\$\$\$!

10 ½ Simple Rules of Being a Frugal Ergonomic Engineer

Rule one

- You always have problems

Rule two

- Problems always outnumber budget

Rule three

- You can proceed on any project you have budget.

Rule 4

- You have no budget.

Rule 5

- You can always get more projects, after you have proven what you can do with no budget.

Rule 6

- Trust in yourself. Prove it, even if it means funding and making it yourself. People like determination.

Rule 7

- Leverage and use the previous project time savings to fund additional projects.

Rule 8

- Publicize.

Rule 9

- Always, always take money offered for other projects once you have proven what you can do with little or no money. People often imagine what you can do given funds, when you have gotten by with none.

Rule 10

- Keep it simple

Rule 101/2

- When they say you can't do something or can't be done do it anyways.

What You Should Do, Is Look at Problems As an Opportunity



To turn a process from a bunch of alligators
into handbags and turn a profit.

L.M. Walsh CDR USN

Principles on Ergonomics

Axiom 1

- Two people down to one.

Axiom 2

- Two hand operation to a single hand

Axiom 3

- Any pinch grip to a power grip [or you go home like a crab and no one likes a crab at home.]

Axiom 4

- No awkward hand positions.
Much less awkward head, arm torso and leg

Axiom 5

- No metal to hand contact

Axiom 6

- No vibration

Axiom 7

- Listen carefully and understand what the operator needs and desires.

Axiom 8

- Name the tool after the operator who uses it as it bring much fortune to the user and designer

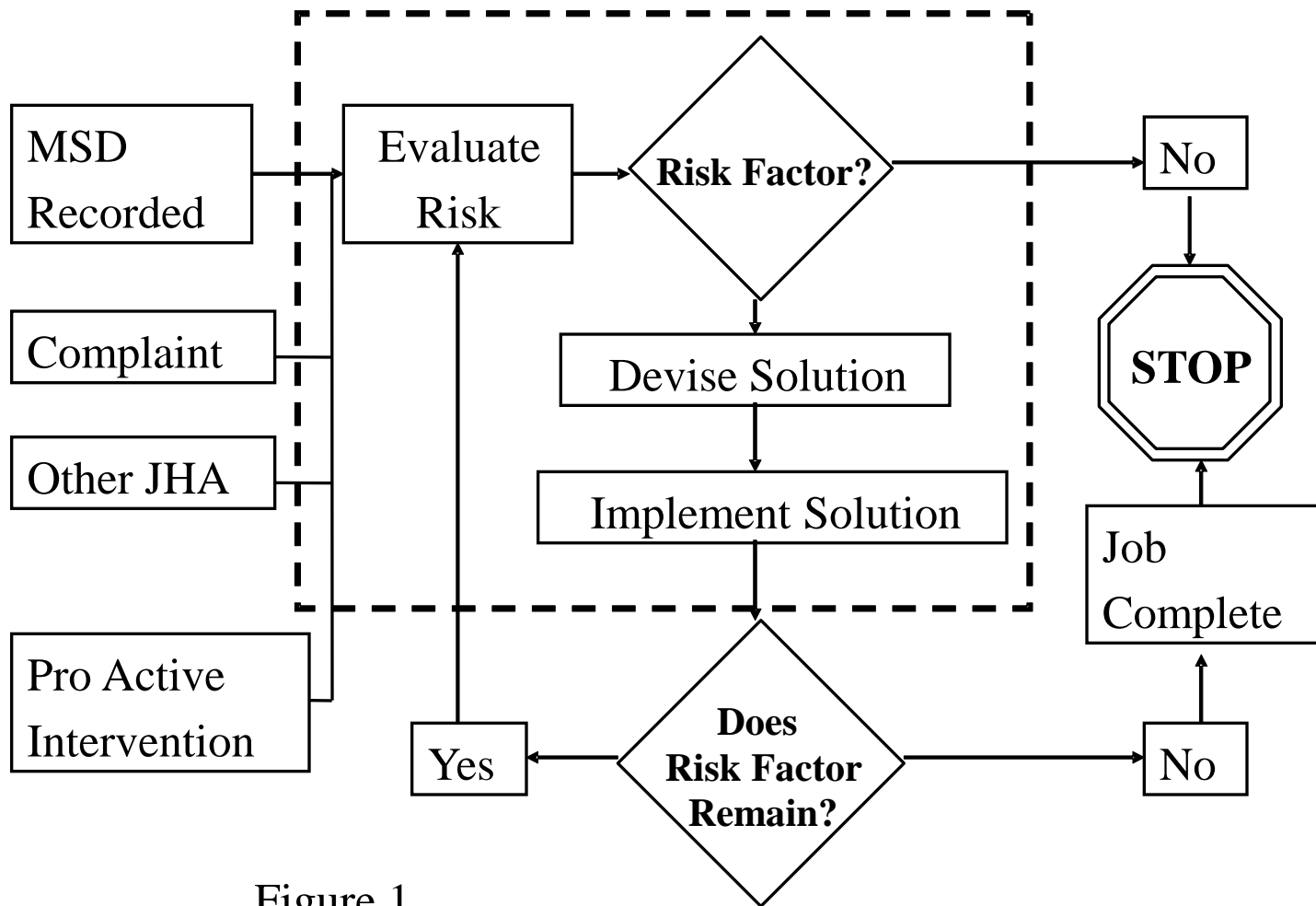


Figure 1

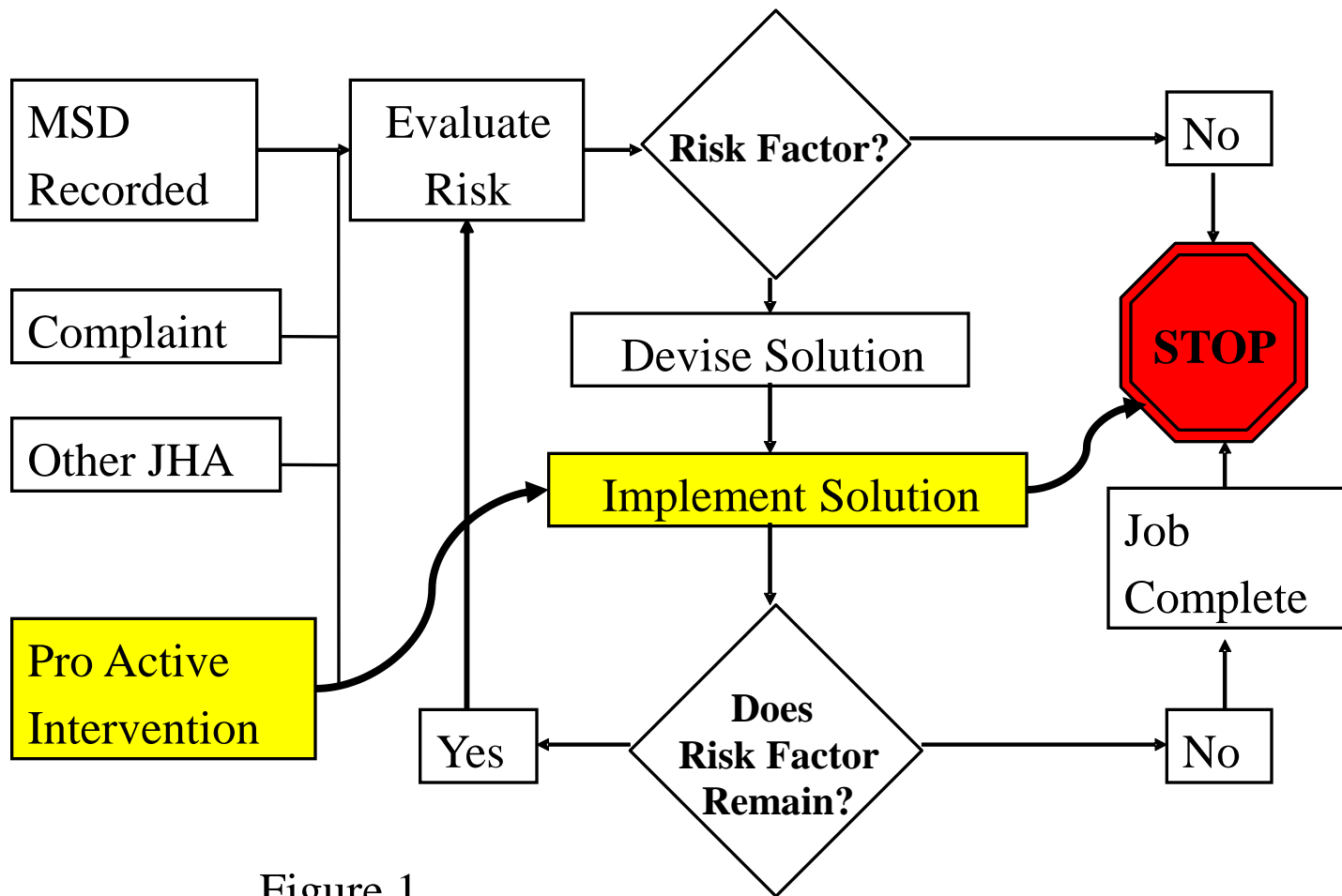
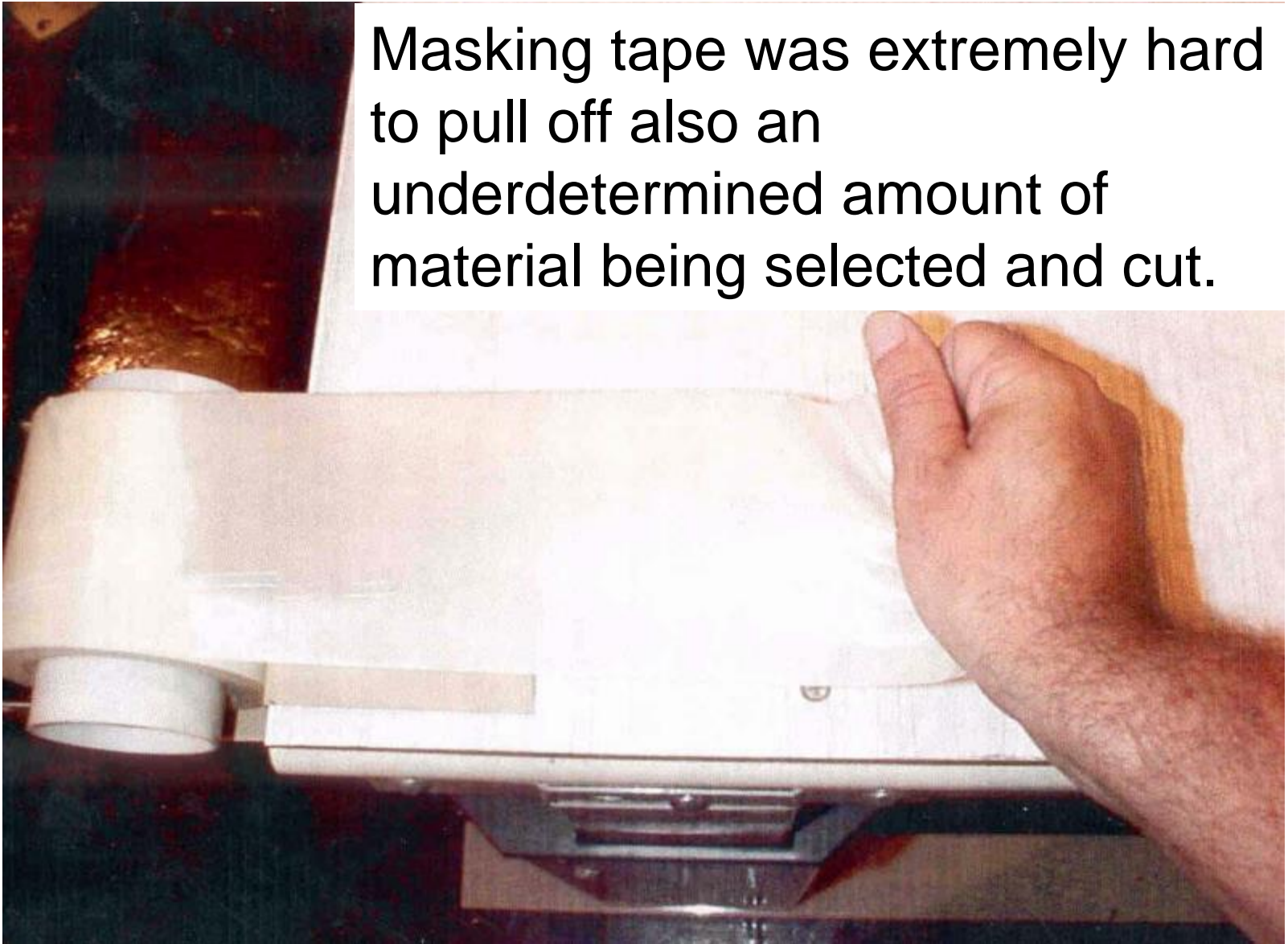


Figure 1

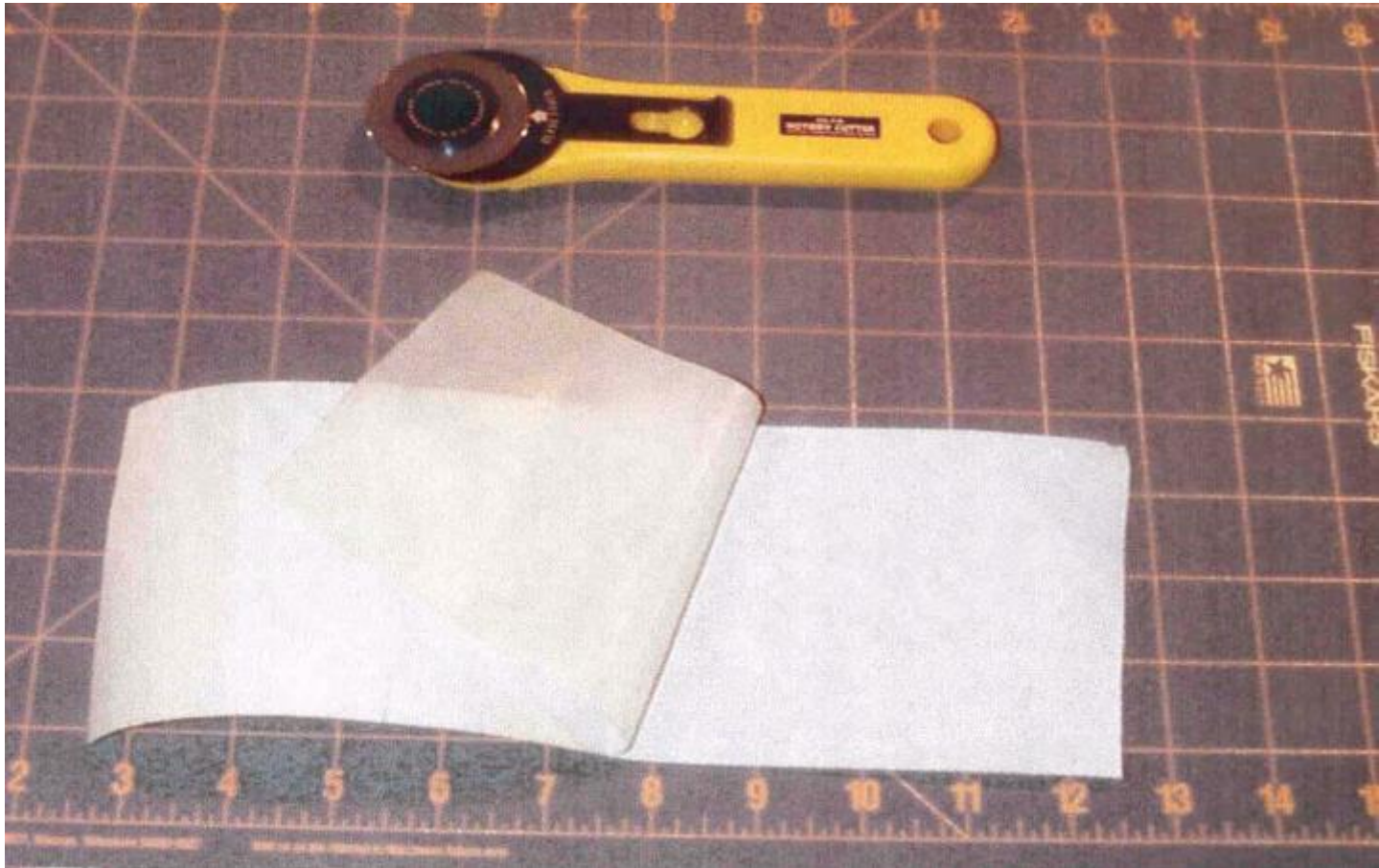
Masking tape was extremely hard to pull off also an underdetermined amount of material being selected and cut.



So how do we cut pizza?



Well a rotary knife of course!



Reduced Vibration



Vibration was reduced on this pencil vibro-peen marker by the use of a vibration absorbing Visco-elastic material. To hold the material in place medical tape was used.



Vibration on Hand Sander



Grip of the hand is such that it induces as
a “Mechanical Coupling”
Inducing vibration into the hand directly
and cold exhaust air to extremities



Isolation via Hook & Loop material



What can you do with a swivel jack.....



Rolling mechanism replaces Impact and vibration

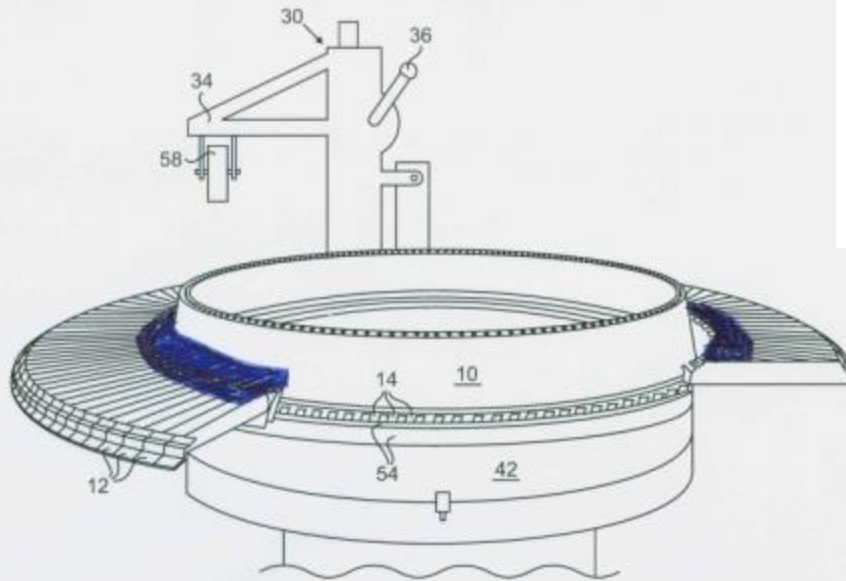


FIG. 3

The original was made from a rotary table, swivel jack from Tractor Supply and completed in less than 3 days. Nothing is impossible except someone stopping you.

3/3

US and foreign patents
7,971,334

New add on device develops up to 50% more force.
Arm is isolated “decoupled” from the shock loading
and induced vibration more importantly avoids that
painful pinch!



Patent no.
7,093,669

Easiest (Shortest?) distance between two points is not always a straight line



Easiest (Shortest?) distance between two points is not always a straight line



Zig zag is preferred

Robotics First Competition



This is great because the shortest distance will not matter because a robot can do it.

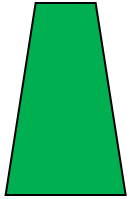
Tool Suspension System



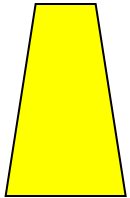
Low Cost Tool Support



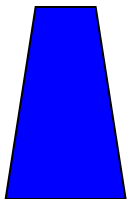
Cell Status



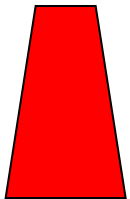
Running fine.



Almost out of stock.
In need of assistance.



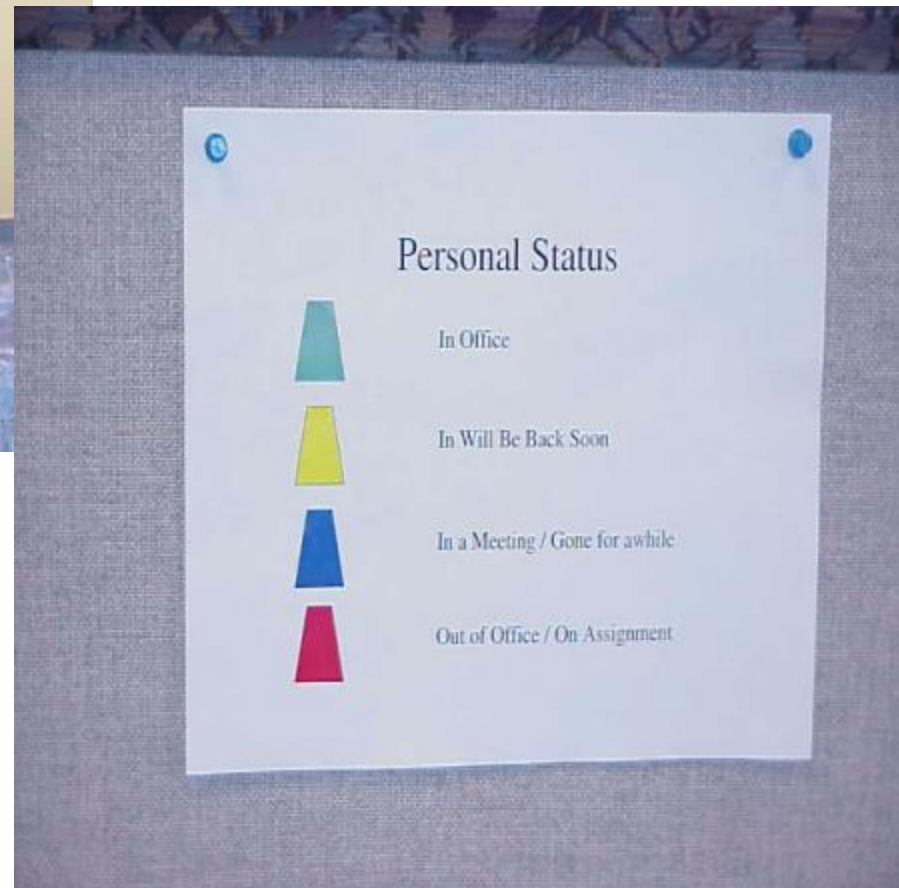
Temporary halt, break or lunch.
Change over of product
or tooling change.



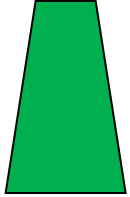
Out of material, machine
stopped.
In need of immediate
assistance.



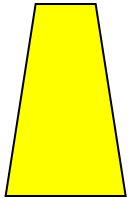
Personal Status Indicator



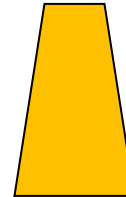
Home Status placed on the book case



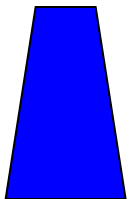
TV time 120 minutes.



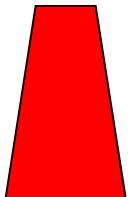
Reading Time 30 minutes



Meal time



Homework time 90 Minutes.



Bed time.



Trash Container Problems?

Plastic bag remains seated in position unless pushed down relieving air.

Moreover, difficult to remove when full.

Modified With Breather Holes Allows the Trash to Be More Easily Removed



Holes



Under a Kitchen Cabinet!



Mounted under a kitchen cabinet, the envelope cutter now serves to open foil lined pouches like instant soups and plastic bags.

Changing burrs



Which came first the tools or the chicken dance?

More Wrenches



Replacing a Deburring End Mill



Two Wrenches Used?



Stress due to awkward hand position. And repetition of changing the tools out.

Solution





Slot allows
the use of
one hand
to loosen
and tighten

Fabricated from local materials
the angle iron slot can be
mounted at the deburr station
either horizontal or slightly tilted
in the vertical.



Small Scraper



Pinch grip
obviously not
desired



Plastic egg
converted with a
slot to accept the
small scraper

The egg is filled with
RTV material and a nail
added for structure and
rigidity. Pinch grip to
power grip.



Metal to Hand Contact



Hard on the Hands Tap Handle? Modify the Handle!

Use a short length of rubber hose material



Small Allen Wrench





Modified With
Rolled Paper
and a Soda
Straw





Spray Cans

Small spray tubes that are attached with tape get lost frequently and are hard to grasp.



With just a roll of tape and a soda straw...



(above) Can with small tube attached (right) can is outfitted with a bent soda straw to allowing easy retrieval of a small diameter spray tube. No more lost tubes and storage problem solved.



Lifting of Step Ladder



Sharp
edge
on
fingers

Modified with a piece of foam
to lessen impact to hand



Modified Scoop Easier on the Back



(above) Overall length of the scoop was 33 inches, much too short for taller people to use without stooping over. (right) Modified scoop with 10 inch (25.4 cm) extension handles.



Conclusion

Everyone will tell you to think out of the box. However, I believe that is well overused such that everyone is doing that. What you need to do is “~~think outside your industry~~” for logical answers.

Think Outside your time Zone
Dr. Len Walsh

Conclusion

Sure you can spend money on ergonomics, that is not the point. Fund and prove budgets for ergonomics by making a difference to the bottom line with frugal fixes and when extra budget is required you have precedence. Practical, simple and easy on the operator has always been the goal.

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