



Quickly Implemented Automotive Cost Reduction Ideas Using Laser Welded Blanks

Paul McKune and Kalyan Palanisamy
Noble International





- General Information and Assumptions
- Ten Laser Welded Blank Cost Reduction Examples
- Timing Considerations
- Obstacles to Implementation
- Summary



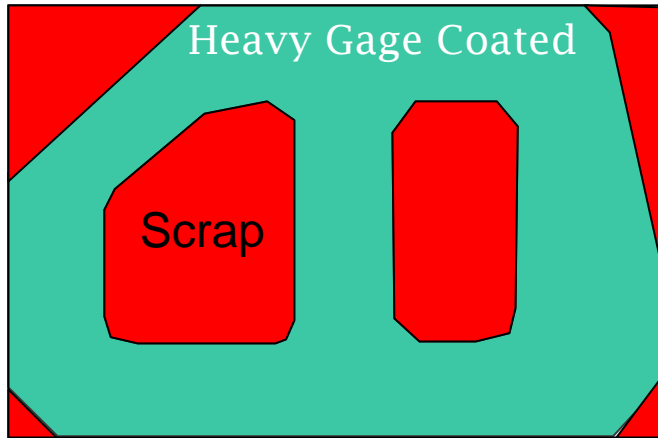


GENERAL INFORMATION

- The following cost reduction applications in this presentation utilize actual blanks from 4 different OEM's.
- Some of the applications in this presentation have been implemented as running change cost reductions, some have running change trials pending, others have been implemented for future vehicle platforms, and a few are concepts where trials are being pursued.
- All blank shapes shown are from actual production parts. But coating, steel grades, gages, and final part pictures are not shown to protect the identity and design information of the OEM.
- Costs and potential savings shown are estimates only and will change with variations in vehicle volume and/or steel cost.
- To simplify presenting, actual cost and steel usage numbers have been rounded to the nearest 0.5 (eg. \$.76 rounded up to \$1 and \$1.24 rounded down to \$1).
- Steel recovery credit (scrap resale) less than \$.25 was rounded down to zero and omitted.

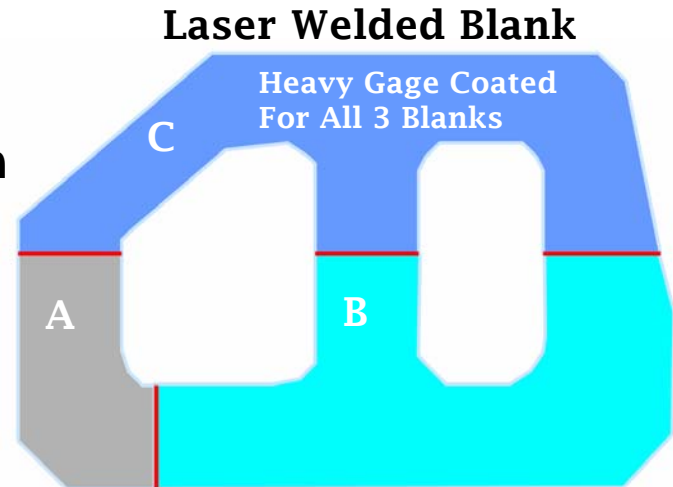


EXAMPLE 1 BODY SIDE OUTER

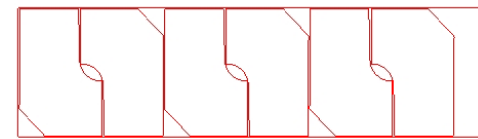


Base Blank
61 kg/Blank

**Improve
Material
Utilization**



Laser Welded Blank



Blank A
6 kg/Blank



Blank B - 18 kg/Blank



Blank C - 29 kg/Blank

Total Steel Usage = 53 kg

Baseline

Steel Usage = 61 kg

Steel Cost ~ \$55

Blanking Cost ~ \$3.50

Steel Recovery ~ \$.50

Total Cost ~ \$58/Part

Laser Welded Blank

Steel Usage = 53 kg

Steel Cost ~ \$48

Blanking Cost ~ \$3.50

Laser Welding Cost ~ \$6.50

Total Cost ~ \$58/Part

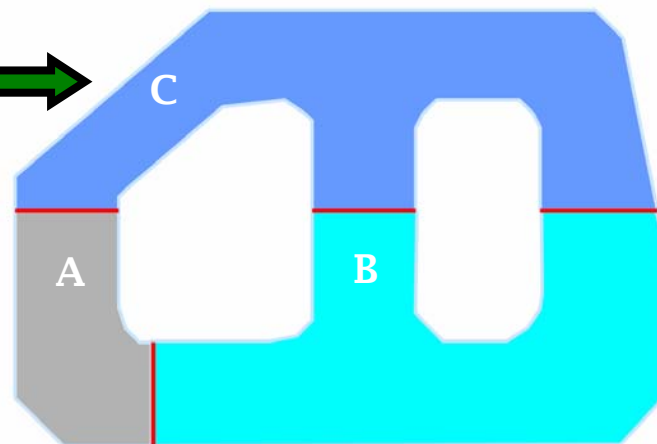
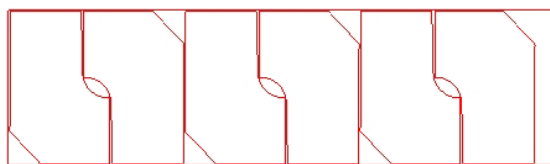
Total Cost Savings = 0



Switch from coated to bare!



Downgauge 15%!



Further Optimization

1. Can any blanks be switched from CR to HR?
2. Can any blanks be switched from coated to bare?
3. Can any blanks be downgaged 15%?

Baseline

Steel Usage = 61 kg

Steel Cost ~ \$55

Blanking Cost ~ \$3.50

Steel Recovery ~ \$.50

Total Cost ~ \$58/Part

Total Cost Savings ~ \$13/Vehicle

Laser Welded Blank

Steel Usage = 52 kg

Steel Cost ~ \$41.50

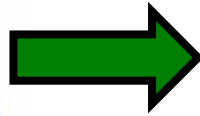
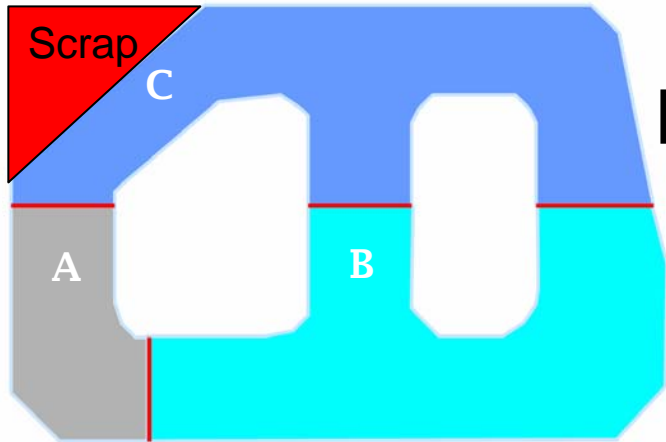
Blanking Cost ~ \$3.50

Laser Welding Cost ~ \$6.50

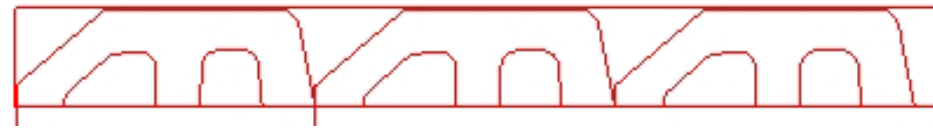
Total Cost ~ \$51.50/Part



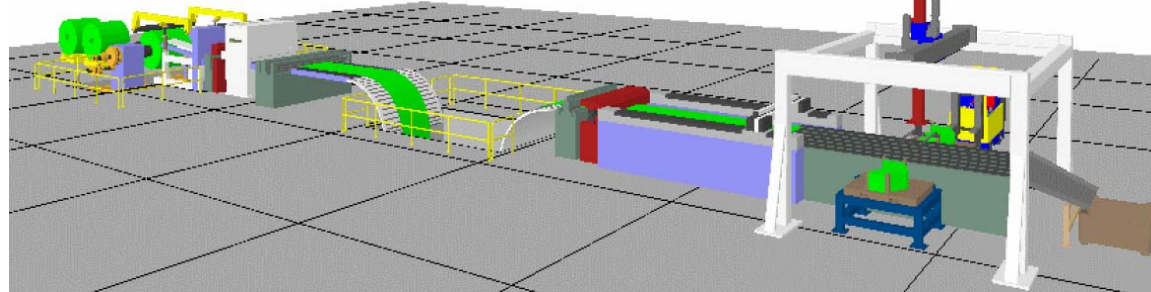
EXAMPLE 1 Cont.



29 kg/Blank



Laser Blanking Line



25 kg/Blank



Baseline

Steel Usage = 61 kg
Steel Cost ~ \$55
Blanking Cost ~ \$3.50
Steel Recovery ~ \$.50
Total Cost ~ \$58/Part

Total Cost Savings ~ \$16/Vehicle

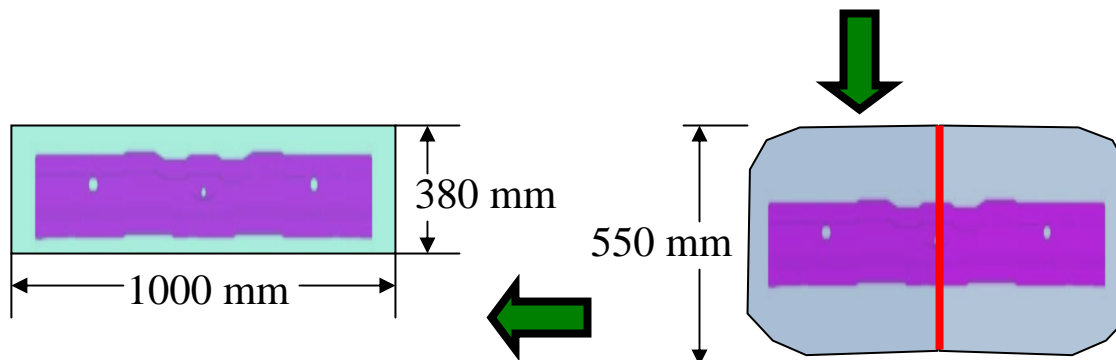
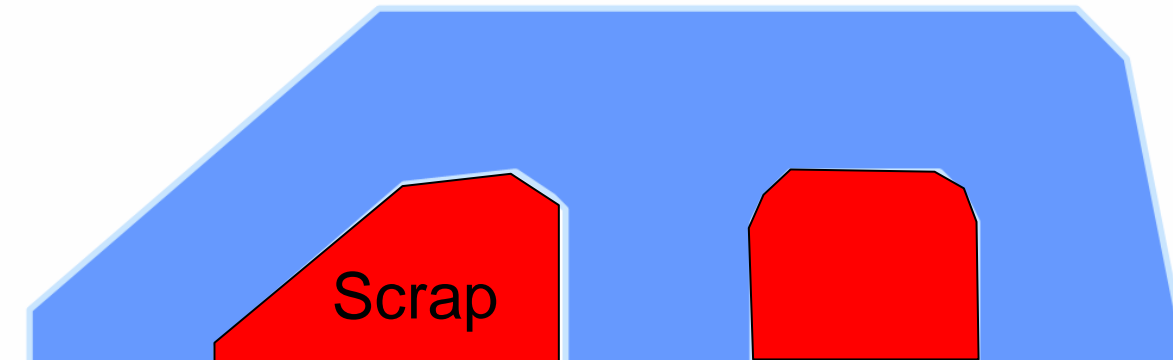
Eliminates Large Blanking Die

Laser Welded Blank

Steel Usage = 48 kg
Steel Cost ~ \$38.00
Blanking Cost ~ \$5.50
Laser Welding Cost ~ \$6.50
Total Cost ~ \$50/Part



EXAMPLE 1 Cont.



Baseline Cross Member
Steel Usage ~ 5 kg
Steel Cost ~ \$3.50

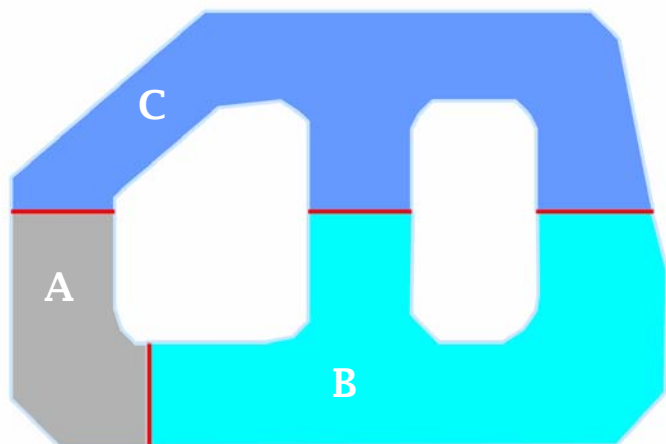
Laser Welded Offal Cross Member
Steel Usage ~ 8 kg
Steel Cost = \$0
Laser Welding Cost ~ \$1.50
Savings ~ \$2

Total Cost Savings ~ \$18 / Vehicle





EXAMPLE 1 BODY SIDE SUMMARY



Savings Summary

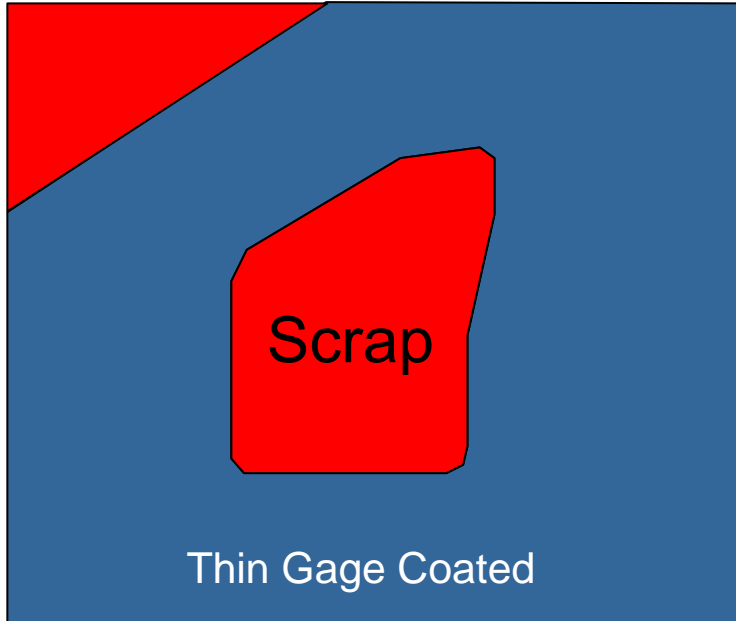
	<u>Vehicle Cost Impact</u>
1. Using LWB	\$0
2. Bare Blank 'C'	\$11
3. 15% Downgage on 'A'	\$2
4. Laser Blanking 'C'	\$3
5. <u>Laser Welded Offal X-Mbr</u>	\$2
	Total \$18 Saved



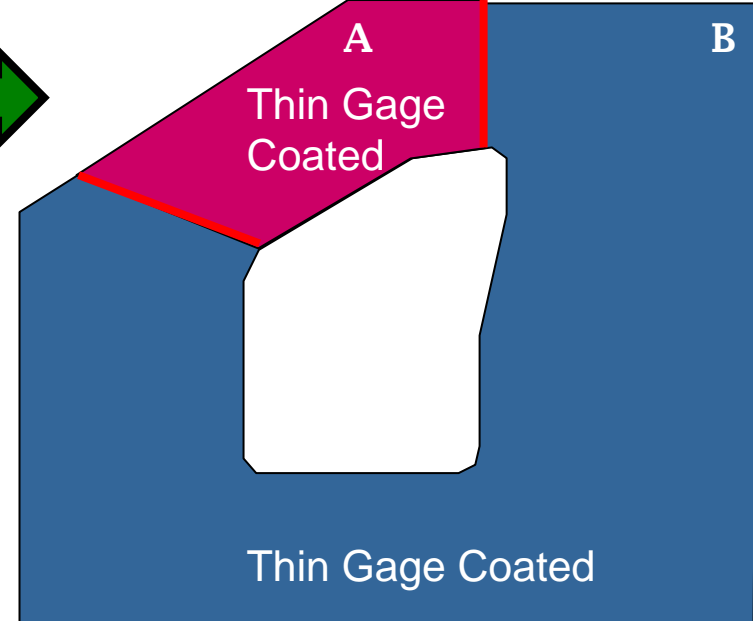
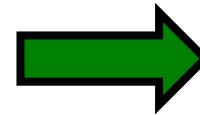
EXAMPLE 2

DOOR OPENING PANEL 1

Base Blank

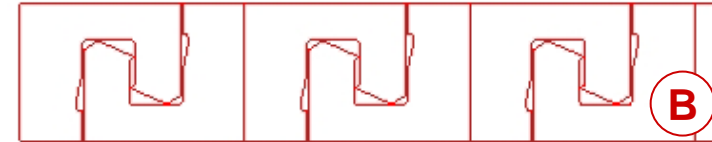


Laser Welded Blank



Baseline

Steel Usage = 25 kg
Steel Cost ~ \$22.50
Blanking Cost ~ \$1.50
Total Cost ~ \$24/Part



Total Cost Savings = \$2 / Veh

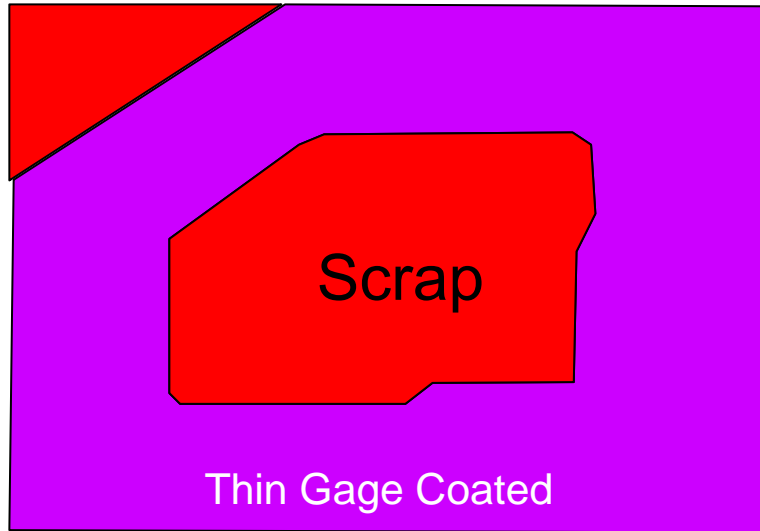
Laser Welded Blank

Steel Usage = 20.5 kg
Steel Cost ~ \$18.50
Blanking Cost ~ \$1.50
Laser Welding Cost ~ \$3
Total Cost ~ \$23/Part

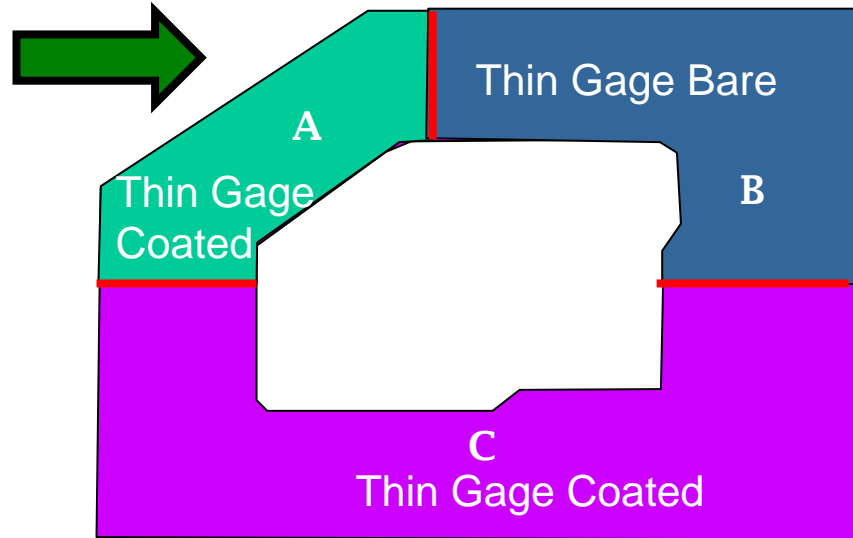


EXAMPLE 3 DOOR OPENING PANEL 2

Base Blank

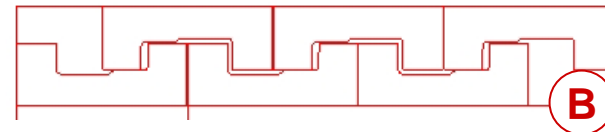


Laser Welded Blank



Baseline

Steel Usage = 30 kg
 Steel Cost ~ \$27.50
 Blanking Cost ~ \$2
 Steel Recovery ~ \$.50
Total Cost ~ \$29.00/Part



Laser Welded Blank

Steel Usage = 22 kg
 Steel Cost ~ \$19.50
 Blanking Cost ~ \$2.50
 Laser Welding Cost ~ \$6.00
Total Cost ~ \$28/Part

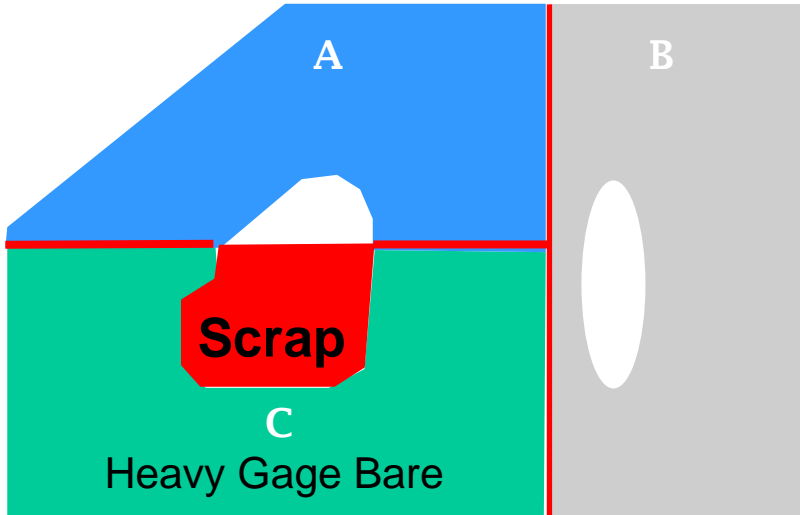
Total Cost Savings = \$2 / Veh



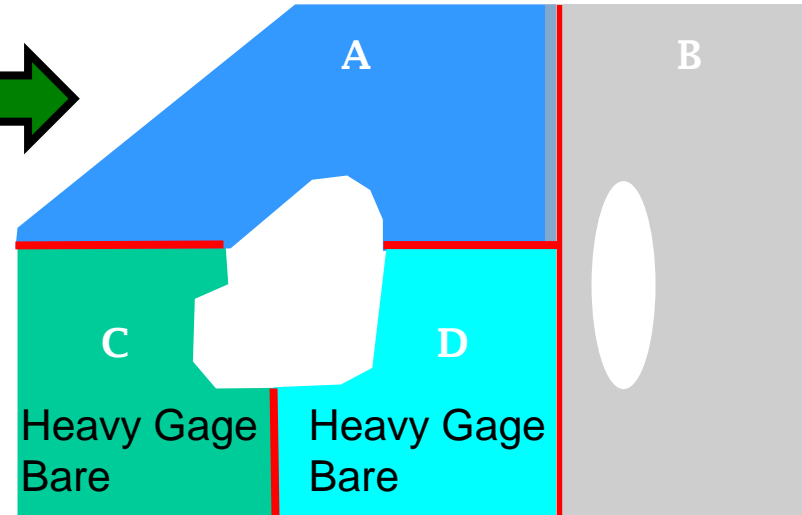
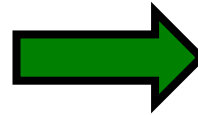


EXAMPLE 4 BODY SIDE INNER

Base 3-Pc Laser Welded Blank

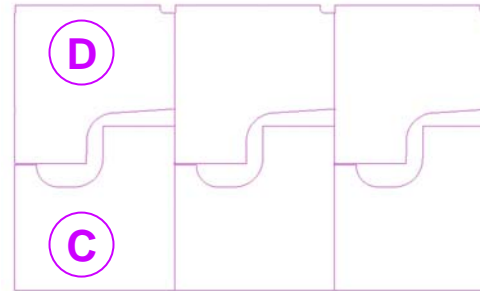


New 4-Pc Laser Welded Blank



Baseline

Steel Usage = 49 kg
 Steel Cost ~ \$39
 Blanking Cost ~ \$3
 Laser Welding Cost ~ \$6
Total Cost ~ \$48/Part



Laser Welded Blank

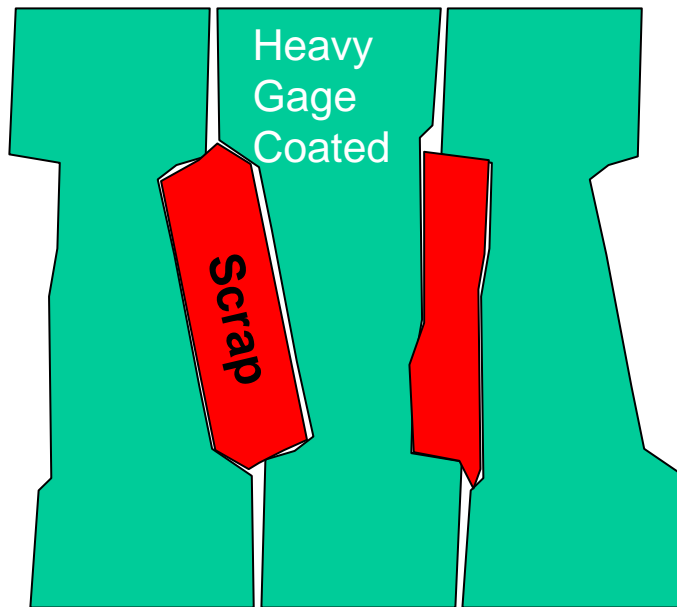
Steel Usage = 46 kg
 Steel Cost ~ \$36.50
 Blanking Cost ~ \$3.50
 Laser Welding Cost ~ \$7
Total Cost ~ \$47/Part

Total Cost Savings = \$2 / Veh



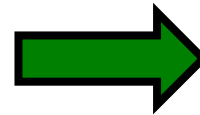
EXAMPLE 5 B-PILLAR

Base Blank

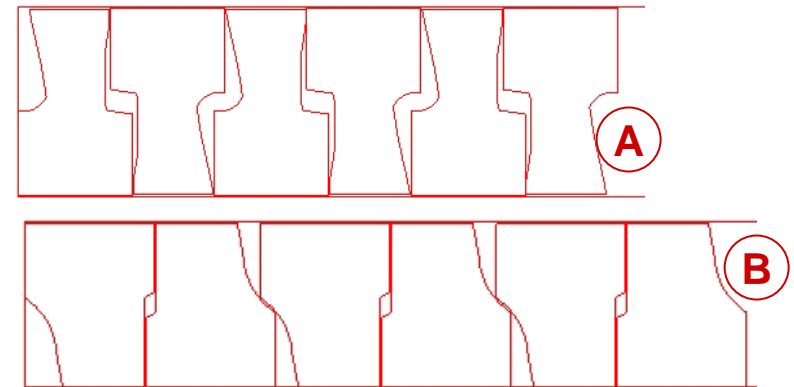
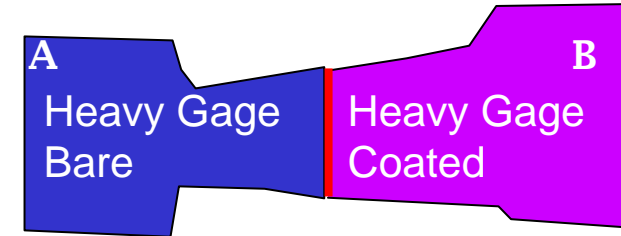


Baseline

Steel Usage = 15 kg
Steel Cost ~ \$13
Blanking Cost ~ \$1
Total Cost ~ \$14/Part



Laser Welded Blank



Laser Welded Blank

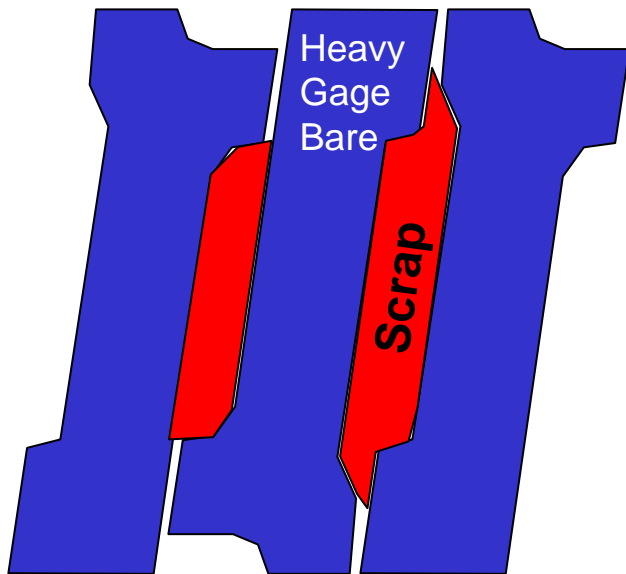
Steel Usage = 12.5 kg
Steel Cost ~ \$10.50
Blanking Cost ~ \$1
Laser Welding Cost ~ \$1
Total Cost ~ \$12.50/Part

Total Cost Savings = \$3 / Veh

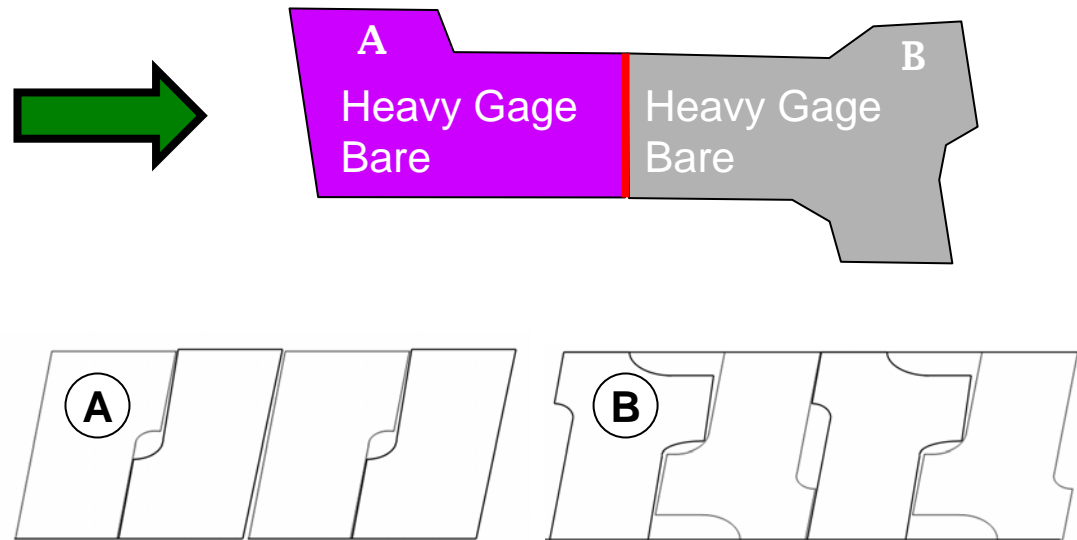


EXAMPLE 6 A-PILLAR

Base Blank



Laser Welded Blank



Baseline

Steel Usage = 15 kg

Steel Cost ~ \$9

Blanking Cost ~ \$1

Steel Recovery ~ \$.50

Total Cost ~ \$9.50/Part

Laser Welded Blank

Steel Usage = 9.5 kg

Steel Cost ~ \$6

Blanking Cost ~ \$1

Laser Welding Cost ~ \$1.50

Total Cost ~ \$8.50/Part

Total Cost Savings = \$2 / Veh



EXAMPLE 7 HOT STAMPED A-PILLAR / ROOF RAIL

Base Blank



Heavy Gage Bare

Baseline

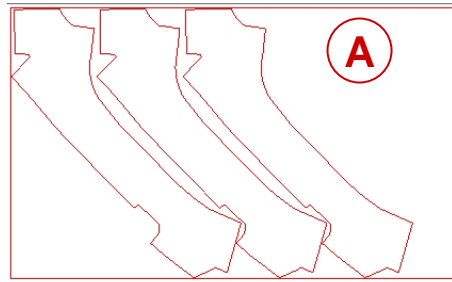
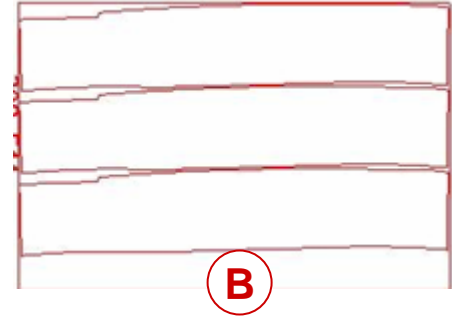
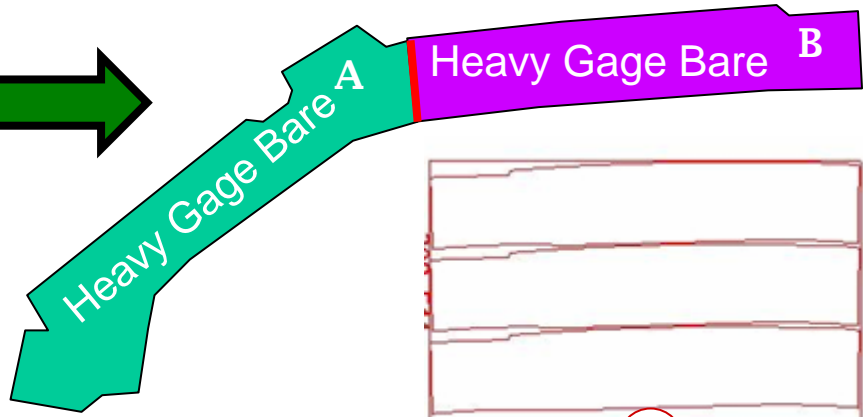
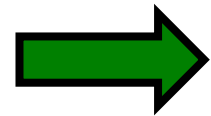
Steel Usage = 12 kg

Steel Cost ~ \$9.50

Blanking Cost ~ \$.50

Total Cost ~ \$10/Part

Laser Welded Blank



Laser Welded Blank

Steel Usage = 8 kg

Steel Cost ~ \$6.50

Blanking Cost ~ \$1

Laser Welding Cost ~ \$1

Total Cost ~ \$8.50/Part

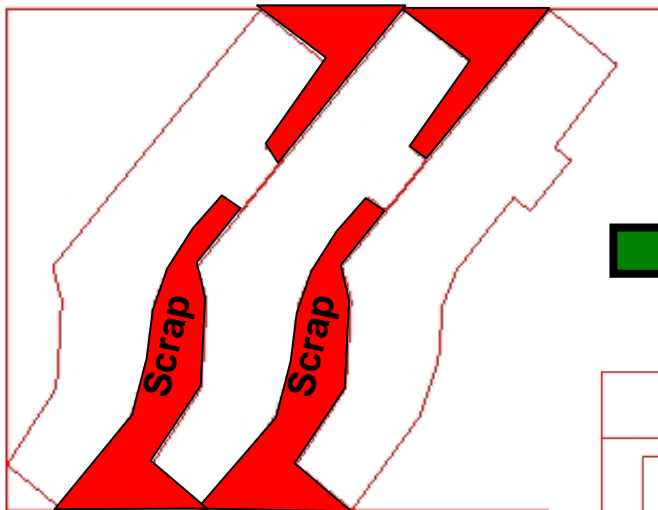
Total Cost Savings = \$3 / Veh





EXAMPLE 8 FRONT RAIL

Base Blank

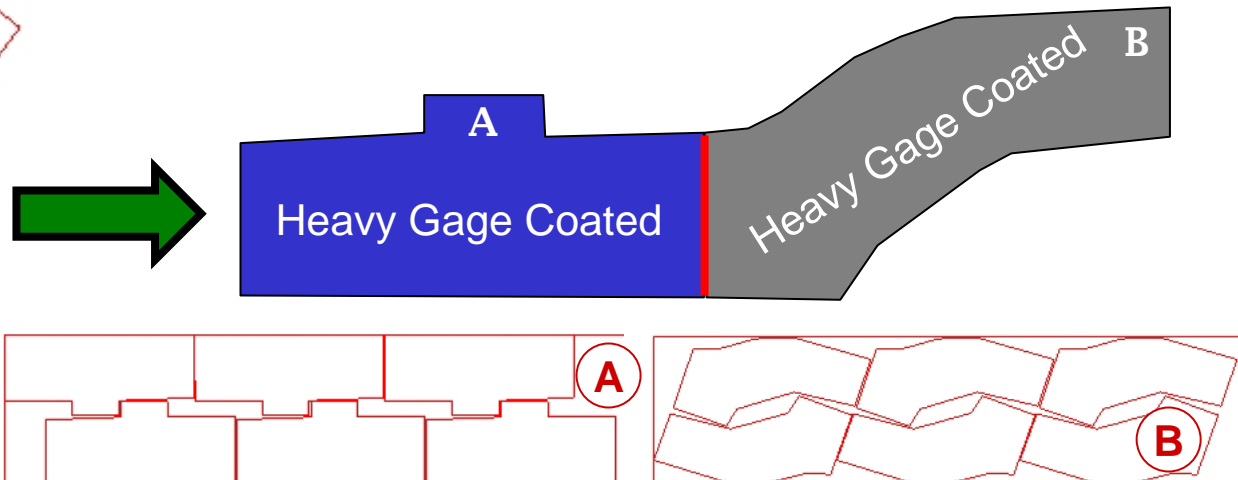


Heavy Gage Coated

Baseline

Steel Usage = 16 kg
Steel Cost ~ \$12
Blanking Cost ~ \$1
Total Cost ~ \$13/Part

Laser Welded Blank



Laser Welded Blank

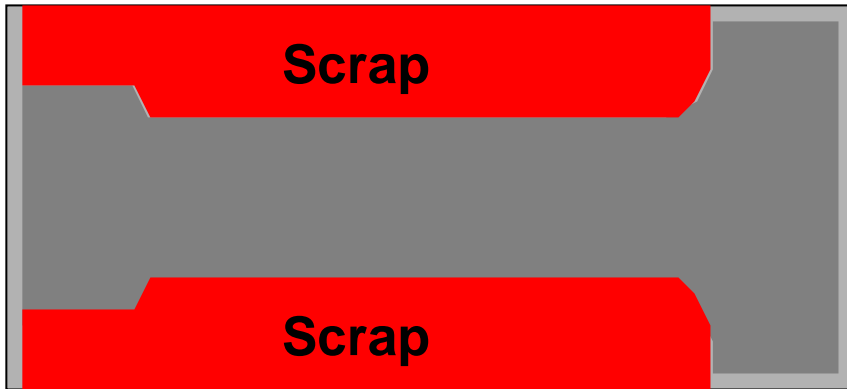
Steel Usage = 12 kg
Steel Cost ~ \$9
Blanking Cost ~ \$1
Laser Welding Cost ~ \$1
Total Cost ~ \$11/Part

Total Cost Savings = \$4 / Veh



EXAMPLE 9 Side Sill (Rocker Inner)

Base Blank (2-Out)



Heavy Gage Coated

Baseline

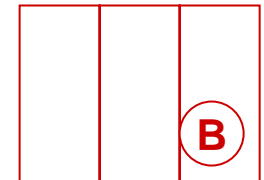
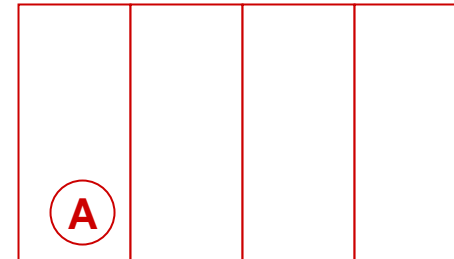
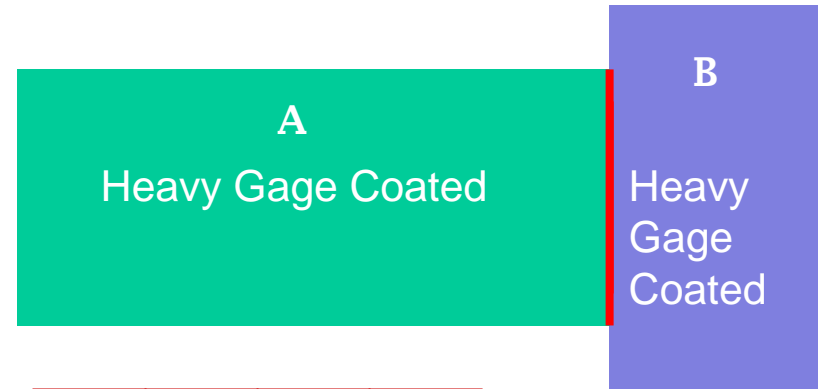
Steel Usage = 21.5 kg

Steel Cost ~ \$19

Blanking Cost ~ \$1

Total Cost ~ \$20/Veh

Laser Welded Blank



Laser Welded Blank

Steel Usage = 18 kg

Steel Cost ~ \$15.50

Blanking Cost ~ \$1

Laser Welding Cost ~ \$1

Total Cost ~ \$17.50/Part

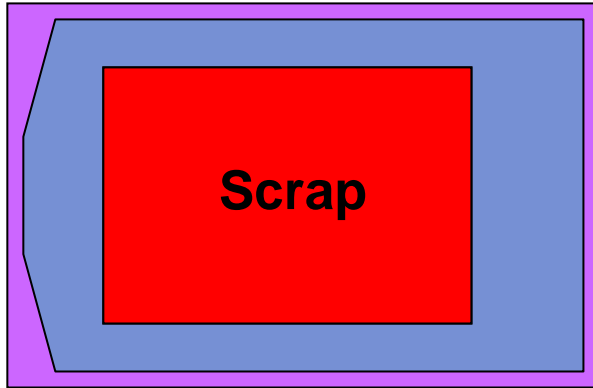
Total Cost Savings = \$2.50 / Veh





EXAMPLE 10 SUNROOF RNF RING

Base Blank

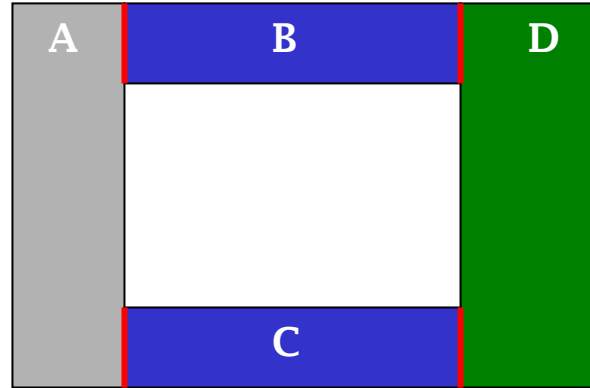


Light Gage Bare

Baseline

Steel Usage = 19 kg
Steel Cost ~ \$13.50
Blanking Cost ~ \$1
Total Cost ~ \$14.50/Veh

4-Pc LWB Option 1

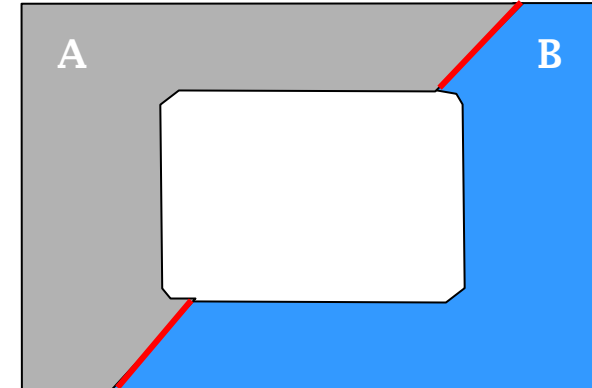


All Light Gage Bare

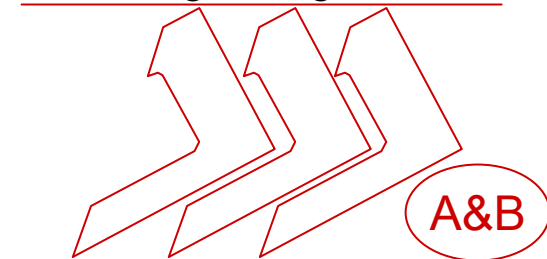
Laser Welded Blank Option 1

Steel Usage = 11 kg
Steel Cost ~ \$8
Blanking Cost ~ \$1.50
Laser Welding Cost ~ \$4.00
Total Cost ~ \$13.50/Veh

2-Pc LWB Option 2



All Light Gage Bare



Laser Welded Blank Option 2

Steel Usage = 13.5 kg
Steel Cost ~ \$9.50
Blanking Cost ~ \$1
Laser Welding Cost ~ \$2.50
Total Cost ~ \$13/Veh

Total Cost Savings = \$1.50 / Veh



TIMING CONSIDERATIONS

- Lead Time for New Blanking Dies: **8 – 12 wks**
- Lead Time for Material Dimension Change: **12 wks**
- Lead Time for Manufacturing Feasibility Trial: **2 wks**
 - Existing Blanks are cut and laser welded back together
 - Laser welded blanks are fed into current stamping die to determine if stamping tool modifications are required



OBSTACLES TO IMPLEMENTATION

- Exposed Weld Concerns for Body Side Outers
- Stamping Trial Concerns
- Crash Testing Assumptions
- Another Cost Reduction Trial in Progress
- Out-of-Date Process Sheets / Blank Data
- Tier 1 Components



Rules of Thumb for LWB Cost Reduction:

- Focus on the types of applications described in this presentation and others with >25% scrap rate.
- Heavier Gage and Coated = Greater Savings
- When nesting LWB's for improved material utilization, try to:
 - Minimize laser weld length
 - Arrange blanks so that coated blanks can be bare or CR to HR
 - Check to see if there are any areas that can be downgaged 15%
 - Keep coil widths over 40" to avoid steel cost extra
 - Minimize blanking costs (fewer pieces, 2 different blanks from 1 die)
- Consider laser blanking (\$2 blank cost hit may save \$4 mat'l + no blank die)
- See if plant offal can be laser welded together for free steel on different part