Reality - 2006

- Baby boomers retiring.
  - Broad range of welding experience leaving the workplace.
- New grads show low interest in welding.
- Technology creating more uses for welding.

More Welding Information

American Welding Society, The Bureau of Export Administration.

Welding Related Expenditures, Investments, and Productivity Measurement in US Manufacturing, Construction and Mining Industries (May 2002)

- Welding expenditures represent a substantial contribution to the US economy ($325 for every household in the US)
- Labor represents the largest proportion of total welding expenditures. Labor represents over 70% of total welding-related expenditures ($22.0 Billion in 2000)
- Most firms have not studied, and have only minimal understanding of, the economics associated with the use of welding-related processes.
- Over 40% of Heavy Industrial Manufacturing firms indicated that a shortage of qualified welders impacts productivity either “moderately” or “extensively”. Approximately 30% of the firms in the Automotive and Construction industrial sectors indicated similar levels of impact.
- Almost 50% of companies studied reported their welding training needs not adequately met.

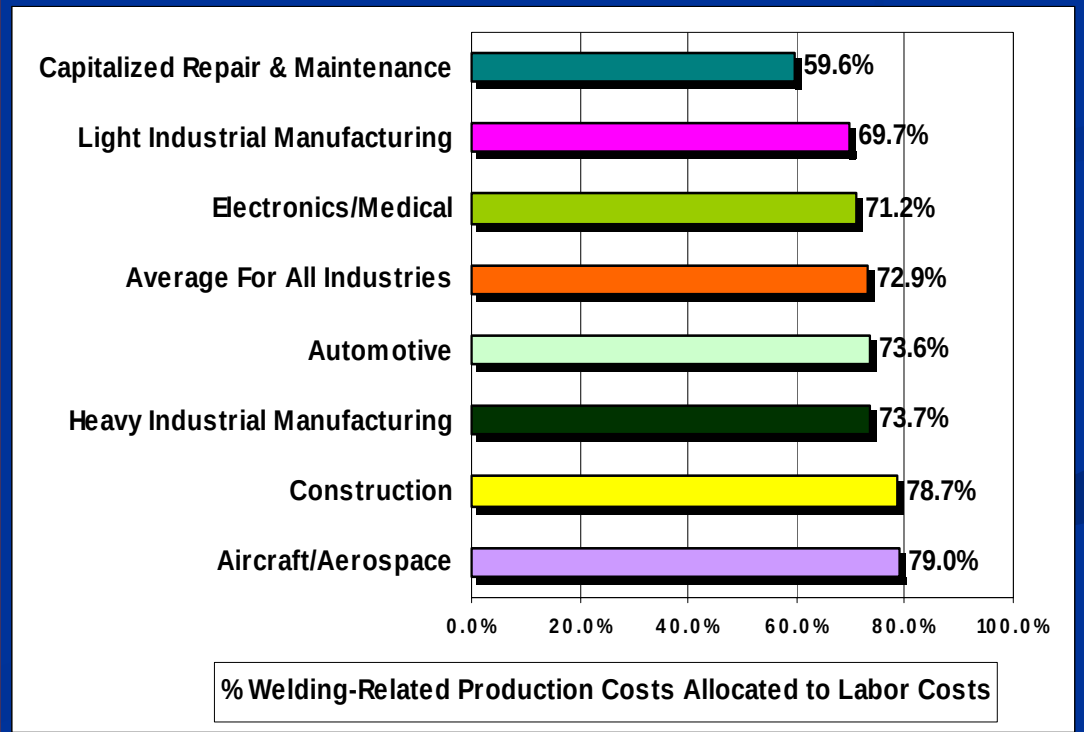
AWA Survey Findings

- Welding-related labor costs represented the largest portion of total welding-related costs in every industrial sector studied.
- Labor costs totaled over $24 Billion – An average of 4% of total labor costs in industries listed!

Industries Surveyed:

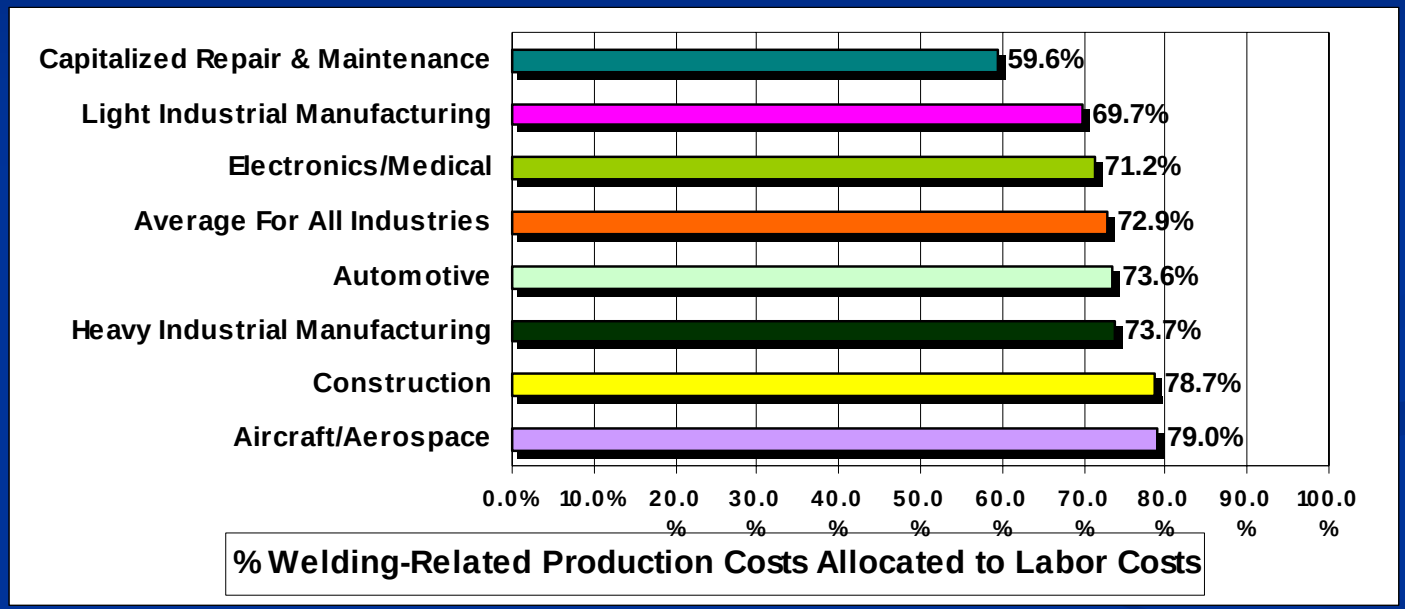
- Automotive
- Aircraft/Aerospace
- Electronics/Medical
- Light Industrial Manufacturing
- Heavy Industrial Manufacturing
- Construction
- Capitalized Repair and Maintenance

Welding-Related Percentage of Total Labor Costs



AWA Survey

Percentage of Total Welding Production Costs Allocated To Labor Costs



Labor accounts on average 73% of all welding costs - Wow!

Opportunities for Productivity Improvement in the Welding Industry

- Automation of welding processes
- Greater consideration of welding requirements during piping design
- Improved quality control in materials and components to be joined
- Use of lean manufacturing approaches
- Increased knowledge sharing of productive practices between and among industries
- Cooperative R&D programs

So What Does All This Mean????

- Less skilled welders available in the job market.
- Welding costs and productivity accounting are lacking in the marketplace. Minimal understanding of welding economics.
- Welding defect rates in most industries are high.

Bestweld Belled-End Pipe Fittings

Background

- Belled-end pipe fittings have tangent ends that are belled to form a socket.
- Standardized design MSS SP-119 – Belled end replaces cast socket weld, forged socket weld and butt weld fittings.

Benefits

- Equal in allowable internal burst pressures to ASME B16.9
- Fillet weld as opposed to butt weld
  - Faster
  - Easier
  - Accommodates most welder skill levels
- More robust weld
- Can easily be inspected

Bestweld Belled-End Pipe Fittings

Benefits (cont.)

- Unlike cast and forged socket weld fittings which are thicker and rigid, Belled end fittings are manufactured from starting stock with wall thicknesses very close to that of the pipe to which they will be joined. When joined this creates a “flex continuum” and moves inherent stresses away from the joint and into the sidewalls of the fittings. When tested and compared to cast and forged socket weld and butt welding fittings Belled end fittings were found to be “equal in burst and superior in fatigue” testing.

WELDING

FILLET	VS	BUTT
INSIGNIFICANT	PRE-WELD JOINT PREP	MODERATE
NEARLY ZERO	PRE-WELD FIT UP	SIGNIFICANT
LOW TO MODERATE	SKILL LEVEL	HIGH
HIGH	FORGIVENESS	LOW

FORGIVENESS ???? – ABILITY TO ACCOMMODATE A VARIETY OF POSSIBLE VARIANCES, I.E. SQUARENESS, OVALITY, WALL MISMATCH, MIS-ALIGNMENT

Bestweld Fittings Provide:

- Easier welding
  - Fillet welds as opposed to butt welds can be done in most cases (**4 to 7 x faster**)
  - Lower welding skill required
  - Lower labor costs – Increase in productivity
    - Less prep time
    - Reduced inspection time
- Reliable finished welds
  - Belled end eliminates problems with misalignment and wall thickness mismatch inherent in buttweld joints and internal deformities from “burn through”, i.e. “craters, fissures and icicles”

- High alloy products for stringent requirements

Belled End Fittings
Cost of Ownership Savings

- 75-80% Joint Preparation Time Savings
  - No pipe end or fitting end machining
- 20-30% Fitter + Welder Labor Rate Savings
  - Lower skills required
- 10-20% Welder Labor Time Savings
  - Reduced welding time

SAVINGS = $$$$$

Long Tangent Design for Flexibility

Flexibility is the major advantage of long tangent fittings. By using this type of fitting, in lieu of standard dimensioned B16.9 butt welding fittings, five methods of joining are possible: butt welding, socket welding, mechanical grooved joint coupling, flanging, and aligning connectors (pipe sleeves).

- **Butt Welding** – always welding straight to straight
- **Socket Welding** – connect directly with socket weld flanges and unions and valves
- **Grooved** – roll grooved for mechanical couplings and joined without welding (can be cut grooved in Sch 40 and 80)
- **Flanging** – extra length allows for flanging without fouling
- **Aligning Connectors** – pipe sleeves slip over the O.D. and back weld

Standard Tangents in diameters ½” IPS through 8” IPS average 1” to 2” in length. Longer Tangents 4” to 5” on each end can also be supplied. Advantage? In tight and close piping, welds can be eliminated. In high integrity piping systems eliminating weld also eliminates testing of welds!!! Less welds equals less work equals less cost!

Bestweld Close Tolerance Pipe Fittings

Background

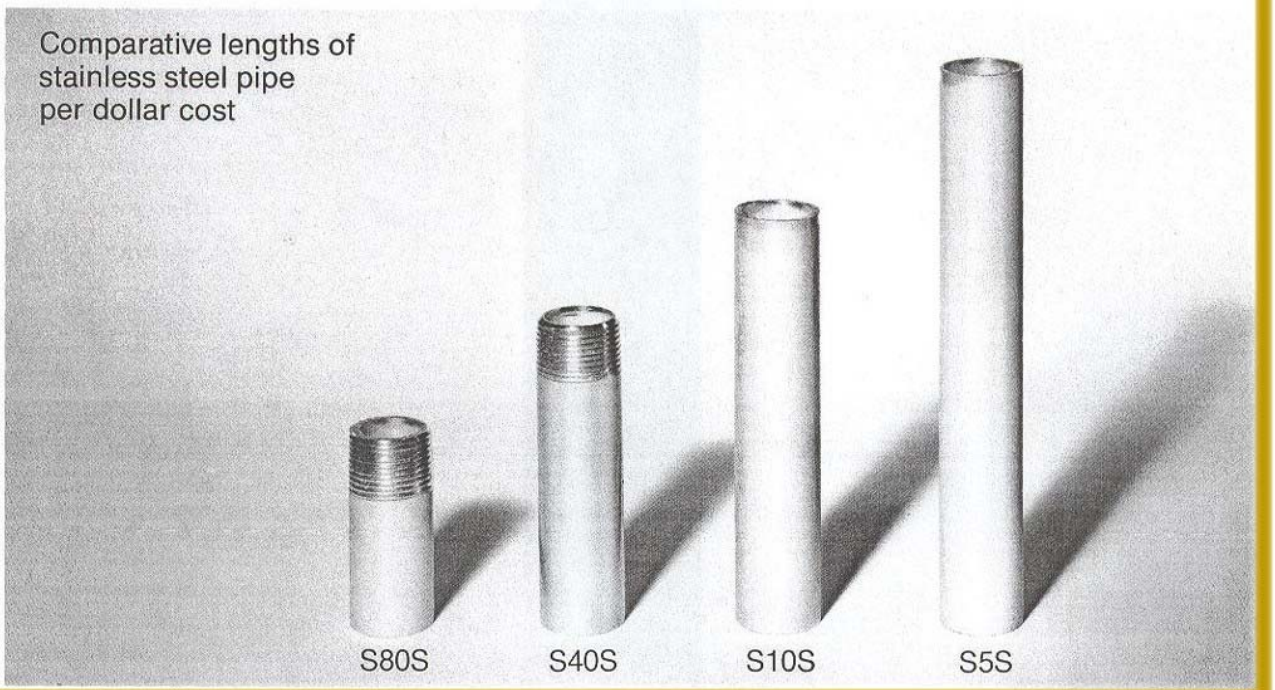
- High corrosion resistance applications
  - Internal surface roughness (RA or RMS units) is critical – Scratches/gouges potential contamination
- Bestweld pipe fittings have a high standard of controlling ovality, angularity, and wall thickness tolerances. Also, a variety of alloys offered.
  - Brewery and Pharmaceutical Quality Pipe Fittings.
- Can use automatic welding machines
  - Narrow wall thickness tolerance (50% of standard industrial tolerance and a tighter roundness tolerance eliminates mismatch issues.)

Benefits

- Can be used with automatic welding machines
  - Faster
  - Easier
  - Less cost
- More reliable weld

save money!

Put your pipe dollars into length . . . not wall.



BESTWELD INC

Specify light wall Schedule 5S and 10S pipe as permitted by these codes:
ANSI B31.1 — (POWER PIPING)
ANSI B31.3 — (PETROLEUM REFINERY PIPING)

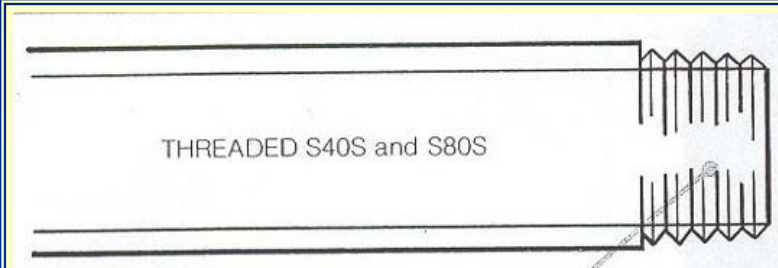
These codes broaden permissable use of Schedule 5S and 10S pipe. Yet heavier wall pipe and fittings are being used in thousands of applications where the code and safety factor does not require them. For example, the strictest limitations in the above codes allow 2″ S10S T304L pipe at 1033PSI to 100°F . . . or 1″ S5S T316L pipe at 1101PSI to 100°F.

The result of buying heavier wall pipe than is actually required is wasted money. As indicated in the photograph above, each length of pipe costs the same amount. With light wall Schedule 5S and 10S pipe you get more footage for your money.

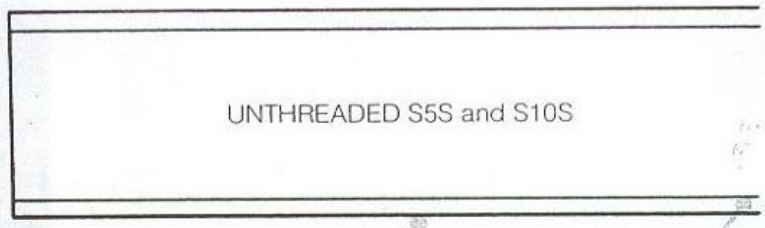
Schedule 5S and 10S light wall stainless steel pipe can be used in almost 90% of all process piping applications.

DON'T PAY FOR MORE THICKNESS THAN YOU NEED

Avoid Wasting Money With Threaded Fittings



Threads reduce wall
to ½ of original thickness.



Same outside diameter.

More inside diameter.

You get all these benefits with Schedule 5S and 10S pipe:

- ☐ Less metal to buy
- ☐ More inside diameter
- ☐ More flow
- ☐ Less pressure drop

BESTWELD light wall tangent and belled-end fittings simplify design and assembly, improve flow conditions, and reduce installation time and cost ….

Did you know…?

You can use:

2” Sch 10 304L A312 welded pipe and MSS SP119 Bestweld Belled-End fittings @ 1000 psi and 200F

***Based on calculations IAW ANSI B31.3

Maximum Allowance Design Internal Pressures For Welded Stainless Steel Pipe

(Minus 32° to plush 100° F)

ANSI Code for Pressure Piping, Section 3, (Petroleum Refining B31.3 - 1966)

Where: t = wall thickness (in.) Do = outside diameter

S = stress value (psi) y = 0.4

E = Longitudinal weld joint factor

$$P = \frac{2tSE}{Do - 2yt}$$

IPS, inc.	Schedule	Types 304, 316, 309, 310, 317, 321, 347, 348	Types 304L, 316L	IPS, inc.	Schedule	Types 304, 316, 309, 310, 317, 321, 347, 348	Types 304L, 316L
1/2	40	3730	3108		5	919	765
	10	2785	2320	2	40	1782	1485
	5	2144	1787		10	1240	1033
3/4	40	3052	2544		5	731	609
	10	2195	1830	2 1/2	40	1950	1624
	5	1696	1413		10	1129	940
1	40	287	2381		5	773	644
	10	2300	1924	3	40	1693	1410
	5	1342	1118		10	922	768
1 1/4	40	2353	1960		5	633	527
	10	1799	1499	4	40	1434	1195
	5	1055	879		10	713	594
1 1/2	40	2115	1762		5	490	408
	10	1562	1302				

Wall thicknesses used in computing these pressures are the minimum wall thickness resulting from applying 87 1/2% of the nominal pipe wall of each schedule to calculate the lightest wall of any pipe furnished to ASTM A-312.

As you are designing...

- Choose your fittings carefully.
- Analyze the design practicality.
- The savings in time and money can be truly significant.
- And the most cost effective choice is nearly always ***Bestweld Design !!!!***

Learn more about us and our products at www.bestweld.com!