NORTH AMERICAN
PICKLE LINE MARKET STUDY

Survey 29

I. PLANT IDENTITY

A. Name of Company: **ABC Corp.**

B. Plant Location: **Anytown, USA**

C. Cold Mill Designation: **# 6 Pickler**

D. General Phone Number:

II. PROSPECT ANALYSIS

A. Is This Plant a Prospect for a Pickle Line Project?

1. Candidate: ___Hot, ___Good, ___Poor 2. Action: ___Present, ___Future

B. Best Application:

C. Comment:

This steel producer operates two older Wean pickle lines. It was indicated they are beginning to develop a plan for a major upgrade on # 6 pickle line. They have engaged a consultant to coordinate the evaluation and development of the project to develop scope and costs.

III. CONTACT

A. Name: **John Doe**	Date: **02/28/04**
Title: **General Supervisor Picklers**	Phone:
Address:	Fax:
City / State / Zip: **Anytown, USA**	Email:
B. Name: **Jim Doe**	Date: **02/29/04**
Title: **Manager Steel Finishing Maintenance**	Phone:
Address: **Same as above**	Fax:
City / State / Zip: **Same as above**	Email:
C. Name:	Date:
Title:	Phone:
D. Name:	Date:
Title:	Phone:
E. Name:	Date:
Title:	Phone:

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IV. CHARACTERIZING THE PICKLING PRODUCER

A. This Plant is an:

x Integrated Steel Producer	____ Minimill Steel Producer
____ Outside Processor	____ Specialty Steel Producer
____ Service Center	____ Tool Processor
____ Other, Specify:	

B. Describe Pickle Line Facilities at this Location Using the Following Tabl

Type of Facility	*Total Number of Lines*	*Coupled to Cold Mill*
Continuous Pickle Line	**2**	
Push - Pull		
Anneal - Pickle		
Cut-to-Length		**XXXXXXXXXXXXXXXXXX**
Slitting		**XXXXXXXXXXXXXXXXXX**
Coating		**XXXXXXXXXXXXXXXXXX**
Other Types, Specify:		

1. Comment:

C. Characterize this Pickle Line: Designation: **# 6 Pickler**

# of Tanks	*Length of Tanks (ft.)*	*Shallow / Non-Shallow (S/NS)*	*Acid Application Methodology**	*Total Length (ft.)*
4	**80**	**NS**	**O**	**500+**

* T - Turbulent Counter Flow; O - Other, Specify: **Cascading**

1. Is the Strip Shot Blasted Prior to Pickling? **No**
2. Is a Skin Pass Mill Installed Before the Pickling Tanks? **Yes**
3. Is a Scale Breaker / Tension Leveler Located Before Pickling Tanks **Yes**
4. Is the Skin Pass Mill or Scale Breaker WET or DRY? **Wet**
5. Does this Pickle Line have Strip Edge Trimming? **Yes**
   a. What Share of Line Capacity is Typically Edge Trimmed? **90** %
   b. What Width is Typically Trimmed Minimum: **18** Maximum: **48**
   c. Is the Strip Edge Trimming that is now In Place Adequate? **Yes**
6. Does this Pickle Line have Strip Oiling? **Yes**
   a. If YES, is it Adequate? **Yes**
7. Does this Pickle Line Utilize Tapered Tension? **No**
   a. If YES, is it Adequate? **N/A**

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IV. CHARACTERIZING THE PICKLING PRODUCER (Cont.)

8. For Push-Pull Pickle Lines (only), what kind of Tensioning Devices are there in the Line?

_____Tension Reels (recoilers); _____Other, Specify:

a. If there is a Tension Reel, is it a: _____One; _____Two; _____Turret Type

9. Does this Pickle Line have In-Line Slitting? **No**

10. Does this Pickle Line have Deep-Draw or other Coating Abilities? **No**

11. Comment:

John Doe said this line has a roll that helps with breaking scale but the temper mill does the majority of scale removal.

D. Production of this Pickling Mill:

1. Rated Capacity: **525** K tons / year
2. Production - 2003: **260** K tons / year
3. Project Production - 2004: **270** K tons / year
4. Operating Hours: **16** Hours / Day; **5** Days / Week; **50** Weeks / Year;
   80 Hours / Week; **10** Turns / Week;
5. Comment:

John said the normal schedule is Tuesday through Saturday with PM work done on Monday.

E. Grades / Product Characteristics:

1.Low Carbon (< .08 C) **70** %
2. Medium / High Carbon **15** %
3. HS Low Alloy Steels **15** %
4. Stainless / High Alloy _____ %
5. Pickling Time and Line Speed by Grades:

Steel Grades	*Specify Grades*	*Pickling Time (sec.)*	*Line Speed (feet / minute)*
Low (< .08 C) Carbon	**XXXXXXXXXXXXX**	**24**	**800**
Medium Carbon	**1010-1055**	**48**	**400**
HS / LA	**4130-4140**	**27.4**	**700**
Stainless			
Silicon			

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IV. CHARACTERIZING THE PICKLING PRODUCER (Cont.)

6. What Grade(s) of Steel is the Most Difficult to Pickle?

1. **1010-1055**
2.
3.

1a. Time to Pickle: **48** seconds, or 1b. Line Speed for these Grades **400**
2a. Time to Pickle: _____ seconds, or 2b. Line Speed for these Grades _____
3a. Time to Pickle: _____ seconds, or 3b. Line Speed for these Grades _____

F. Type of Acid Used: **x** HCI; ____ Sulfuric; ____ Nitric; ____ HFI

1. Are you using: ____ Raw; **x** Regenerated; or ____ Both types of Acid?
2. Do you Change Acid Concentrations Depending on the Grades Pickled? **No**

a. Comment:

John said the higher carbons are generally wide and thick which affects the pickling time more than just the carbon range.

G. What are Pickled Product Dimensions?

1. Strip Thickness (in.): a. Minimum: **.048** b. Maximum: **.187** c. Typical: **.100**
2. Strip Width (in.): a. Minimum: **18** b. Maximum: **48** c. Typical: **40**
3. PIW: a. Minimum: **N/A** b. Maximum: **N/A** c. Typical: **N/A**
4. Do you Vary Wet Section Speed as a Function of Coil Dimensional and Mass Parameters **Yes**
5. Do you Vary Wet Section Speed as a Function of Coil Steel Grades? **No**
6. Comment:

John said the strip cross section is the biggest reason to control speed.

H. End Product Destinations: **x** Outside; **x** Internal Use (only); ____ Both

1. If Outside, Indicate if for: **x** Cold Roll; ____ Galvanizing; **x** Other, Specify: **Rerollers**
2. If Both Outside and Internal Use, Indicate Percent Outside **20** %

I. Identify Major End-use Markets for Steel Pickled Produc

Rerollers, Warehouses

IV. CHARACTERIZING THE PICKLING PRODUCER (Cont.)

J. What "New" Products are Being Considered for Production of this Pickle Line?

None at this time.

K. Comment:

John said they do not pay attention to PIW, but rather to coil diameter which varies to some degree but not much. He said they try to weld the longest coils possible.

V. THE FUNDAMENTAL PRIORITY

A. What are the Current Fundamental Priorities of this Pickle Line Operation, or what Problem, Concern or Factor is having the Greatest Significant Impact on your Performance?

(Distribute 10 Points as an Indication of Priority Among the Following:)

____ Increase Productivity
4 Reduce Operating Costs
2 Increase Yield
____ Improve Equipment Reliability
____ Improve Quality (Surface, Shape, Flatness, Gauge Performanc
4 Other, Specify: **Increase Production**

B. What is the Relative Priority as Far as Investments in the Pickle Line?

(Distribute 10 Points Between these Two Alternatives) **3** Cost Reduction vs. **7** Increased Tonnage

C. Comment:

John said the two pickle lines are both old and the operation is becoming inefficient. He said investments will definitely increase production and have a marked effect on cost per ton. John said cost reduction is always on-going but he does not know if there is a benefit from investments in this area.

VI. ASSESSING THE ADEQUACY OF THE EXISTING MILL EQUIPMENT

A. Is the Pickle Line or the Pickling Facilities at this Plant Adequacy for your Needs? **No**

1. If NO, Indicate "PW" if your Response Applies to PW if Plant Wide:

a. What are the Major Problems, Limitations, or Concerns with the Adequacy of the Current Pickling Equipment?

The line is old and needs a major upgrade.

VI. ASSESSING THE ADEQUACY OF THE EXISTING MILL EQUIPMENT (Cont.)

b. How Could the Existing Pickling Equipment be Improved?

John said the most effective way is to replace both pickle lines with a new efficient line.

c. Specify what Area(s) will be Targeted:

John said they are considering a major upgrade on # 2 line and possibly a phase out of # 5 line.

2. If YES, what Type of Operating Improvements or Equipment Upgrades would Provide you with the Greatest Value on Each of these Lines?

N/A

B. Will Current Capacity be Sufficient for Future Needs **No**

C. What Characteristics of the Hot Band Make it Difficult to Pickle?

John said hot mill defects are a minor source of problems, mainly shape.

D. What are the Major Factors that Contribute to Poor Quality in the Pickling Operation

(Distribute 10 Points Among the Major Factors)

____Rolled In Scale ____Condition of Pickle Liquor ____Coiling Temperature at HSM

____Time in Contact with Acid ____Line Stops and Starts Due to Staining

__x__Other, Specify: **N/A**

E. Comment:

John said they do not have quality issues off both pickle lines. He said quality rejects are less than 1%. John said hot bands do not have heavy scale and the temper mill ahead of the line does an excellent job of removing scale.

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VII. FEEDSTOCK REQUIREMENTS

A. Do you Presently Buy Hot Band from Outside your Company? **No**

B. Do you Expect this to Change in the Next 3-5 Years? **D.K.**

C. What are your Key Markets (for Pickled Steel Products)?

Rerollers and Warehouses

D. What is your Biggest Concern for the Supply of Steel Feedstock for Pickling Over the Next 3-5 Years?

The serious uncertainty of the steel industry.

E. What Processing or Other Technology Investments do you Expect will be Required for you to Remain Cost/Quality Competitive in your Markets Served?

John said they need to improve efficiency and possibly operate one good cost effective line.

F. What is your Source of Feedstock for your Pickling Operations?

__**x**__ In-House

____ Open Market Purchase (____ US, ____ Imports, or ____ Both) or

____ Combination

G. Comment:

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VIII. ENVIRONMENTAL

A. Are there Any Environmental Issues with Regard to this Pickle Line Operation **No**

1. If YES, Indicate Environmental Issue:

___Waste Acid, ___Waste Water, ___Water Consumption, ___Air Quality,

_x_ Other, Specify: **N/A**

2. Comment:

John said they are in compliance, with room to spare, for the standards in both air and water.

B. Do you have your Own Acid Regeneration Plant **Yes**

1. If NO, is this Planned or Being Considered? **N/A**

C. Comment:

IX. MILL EQUIPMENT COMPETITIVE ANALYSI

A. Who are the Leading Firms you would Consider as Suppliers of Pickling Line Equipment Systems?

1. **VAI**
2. **Pro Eco**
3. **Mitsubishi**

B. How would you Rate these Suppliers?

Supplier Factor	*VAI*	*Pro Eco*	*Mitsubishi*
Supplier Track Record	**8**	**6**	**D.K.**
Price	**D.K.**	**D.K.**	**D.K.**
System Engineering	**8**	**6**	**D.K.**
Technical Support	**8**	**6**	**D.K.**

C. Comments:

John said he has seen a few VAI lines which were impressive operations. He said he has seen several Pro Eco lines and is not keen on these lines. He said it appears there expertise is in push-pull lines. John said he is only aware of Mitsubishi in pickle lines and cannot provide a rating. He said he understands the lines operating are satisfactory to those operations.

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X. PICKLE LINE AUTOMATION AND CONTROL

A. Is the Present Level of Pickle Line Automation Adequate for your Needs **No**

1. If it is Not Adequate, what Aspect or Problems are Related to Drives and Automation

____Insufficient Operational Visibility ____Not Integrated ____System Is Inflexible

____Reliability ____Maintenance ____Productivity

__x__Other, Specify: **Very Minimal and Outdated**

2. To what Extent will Addressing these Problems Involve New or Upgraded Drives and/or Automatio

The # 6 line needs a complete upgrade and it is expected that the systems will be evaluated and improved as needed.

B. Who are the Present Suppliers for Hardware and/or Engineering Services for your Pickle Line Drives and

1. **G.E.**
2.
3.

C. How would you Rate these Suppliers? (On a scale of 0-10)

Supplier Factor	*G.E.*		
Track Record	**7**		
Price	**D.K.**		
System Engineering	**7**		
Technical Support	**7**		

D. Are you Completely Satisfied with their Performance? **Yes**

1. If Not, Where do they Fall Short?

N/A

E. When (what year) was the Present System Commissioned (or last major upgrade)? **1999**

F. Are there Any Plans (P) or Considerations (C) to Replace, Install New, or Upgrade Any Drives, Control, or

Yes

*Type **	*New (N), or Upgrade*	*Scope ***	*Planned (P), or Considered (C)*	*Approx. Value*	*Is Money Allocated?*	*Year of Order*
CP	**N/U**	**Not Established**	**C**	**N/A**	**No**	**N/A**

* CP - Cont. Pickle Line; PP - Push-Pull; PA - Pickle Anneal; S - Slitting; CTL - Cut-to-Lenght; O - Other, Specify:

G. Comment:

John said they have been discussing several option plans for both # 5 and # 6 lines. He indicated that if the lines are not replaced they will try to get major upgrades on # 6 line which should include automation control systems.

XI. MILL MAINTENANCE

A. How would you Characterize your Current Maintenance Program?

____Very Good, __**x**__Good, ____Adequate, or ____Inadequate

B. Could your Pickle Line Maintenance Program be Improved? **Yes**

1. How?

Jim Doe said there is always a better way for maintaining equipment. He said it is important that they have a detailed PM list for the repair turn on Mondays.

C. What is the Availability of your Line Excluding Scheduled Outages, Roll Changes, and so on __**86**__%

1. What Area do you Think to Improve? __**x**__Mechanical __**x**__Electrical __**x**__Operational
2. Please Describe:

Jim said in most cases there are more operational delays and that area requires attention along with continued emphasis on mechanical and electrical issues.

3. Describe the Scheduled Pickle Line Outages:

Scheduled:	*Number of:*	
Weekly	**8-12**	Hours
Monthly		Days
Yearly		Days
Other, Specify:		

D. What is your Estimated Annual Maintenance Cost for the Pickle Line?

Indicate Any of the Following:

1. Total Annual Cost: $ **Prop.**
2. Total Annual Cost Range: ____$XXX; ____$XXX; ____$XXX; ____$XXX;
3. Cost Per Ton: $ **Prop.** per ton

E. Are you Having any Problems with your Rolls? **No**

1. If YES, ____Life; ____Sourcing; ____Other, Specify:

F. Is your Pickle Line (OEM) Supplier Involved in your Maintenance Program **No**

G. Distribute 10 Points Among the Leading Components of Pickle Line Maintenance Costs

____XXX; ____XXX; ____XXX; ____XXX; ____XXX; ____Other, Specify:

H. Comment:

Jim said the leading components of maintenance are labor and material. He said occasionally they have contractors involved with outages. Jim said the pickle lines are difficult to maintain. He said when you get the combination of acid, water, and scale. There are problems especially with bearings. He said they are in union negotiations and he preferred not to discuss actual costs.

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XII. ACID PUMPS

A. On a Scale of 1-5 Rate your Satisfaction with the Current Pickling Pumps: **N/A**

(1-Very Dissatisfied; 2-Somewhat Dissatisfied; 3-Neutral; 4-Somewhat Satisfied; 5-Very Satisfied)

B. How Many Pickling Pump, Including Spares, do you Have? **0**

C. Indicate Pump Brand / Manufacturer: **N/A**

1. What Type of Seal Arrangement do these Acid Pumps Have?

____Single; ____Double/Tandem; ____Sealless; **x** Other, Specify: **N/A**

2. Is a Seal Flush Used? **N/A**

D. List the Top Three Primary Causes of your Pickling Pump Failure:

1. **N/A**
   a.

2.
   a.

3.
   a.

E. Do you Use Caustic Soda (sodium hydroxide) Scrubbers for Fumes? **No**

1. If YES, Indicate Pump Brand/Manufacturer: **N/A**
2. What Type of Seal Arrangement do these Acid Pumps Have?

N/A

F. Have you Heard of Sealless Pickling Pumps? **Yes**

1. If YES, what Brand(s) are you Familiar with and what Are/Were your Impressions of these Pumps

Sealless Pump Brands	*Impressions or Opinions*
D.K.	

G. Who(m) Makes the Purchasing Decisions for Pickling Line Pump Replacement?

1. Name: **N/A** Title: Phone:

H. Comment:

Both respondents indicated pumps for acid are not used. The regenerated acid and the spent acid flow by gravity. They said they are aware of sealless pumps but without a specific need, this subject will never be investigated.

XIII. PICKLING ACID RECOVERY

A. How Many Pounds of Acid do you Use for this Line? **D.K.** Per Ton of Steel

B. Cost: $ **D.K.** Per Lb.

C. Strip Time in Acid: **24-48** Seconds

D. Do you Use a Scale Breaker? **Yes**

E. Pickling and Rinse Additives (inhibitors, accelerators, rinse aids) Used and Cost Per Ton of Steel Pickled

Type of Additive	*P or R **	*I, A, RA ***	*Cost ($/Ton)*
Crown	**P**	**I**	**D.K.**
Henkel	**R**	**RA**	**D.K.**

** General F'n: P-Pickling; R-Rinse ** Spec. Purpose: I-Inhibitor; A-Accelerator; RA-Rinse Acid*

F. Comment:

John said all the costs involved with the operation of the regeneration facility are lumped together in their accounting system. He said pickle lines that use raw acid account for their supplies differently.

XIV. HEATING IN PICKLING OPERATION

A. Heating Method: ____ Direct Steam Injection **x** Heat Exchangers

B. Is the Pickling Line Heating System Adequate? **Yes**

1. If Not Adequate, How Could it be Improved

N/A

C. If Heating Method is Heat Exchangers...

1. Where Are They Located? ____ Outside or **x** Inside
2. What Type of Heat Exchangers are there on this Line? **Tantalum**
3. Have you Ever had Acid Leaking through the Heater Seals? **Yes**

If YES,

a. What was the Consequence?

Acid Attack

b. Were Tubes Destroyed? **Yes**

c. Is this a Concern at Present? **No**

d. Comment:

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XIV. HEATING IN PICKLING OPERATION (Cont.)

D. If Heating Method is Direct Stream Injection...

1. What is Feed Water to Boiler Temperature? **N/A** Degrees F
2. What is Condensate Returned Water Temperature? **N/A** Degrees F

E. If you had a Capability to Preheat the Strip to Bath Temperature Prior to the Pickling Tank, what Benefit would you Foresee?

- **x** Surface Quality Improvement
- **x** Reduced Acid Consumption
- **x** Less Maintenance
- ____ Improved Environmental Issues
- ____ Other, Specify:

F. Pickle Tank Temperature: **190** Degrees F

G. Are you Experiencing or Anticipating an Increase in Natural Gas Price? **Yes**

1. If YES, **D.K.** % in 2004/05

H. Comment:

Jim said the heat exchangers only have steam passing through the coils versus systems that take the acid out of the tank and pass it through the heat exchangers and return it to the tank.

XV. PLANS TO ADD OR UPGRADE PICKLING EQUIPMENT

A. Are there Any Plans to Replace, Install New, or Upgrade Any Pickling or Related Lines at this Facility? **Yes**

1. If YES, Describe Plans in the Table Below:

*Type **	*N-New or U-Upgrade*	*Scope*	*Planned or Considered*	*Approx Value*	*Is Money Allocated?*	*Year of Order*
CP	**N**	**Welder**	**C**	**N/A**	**No**	**N/A**
CP	**N**	**Drives**	**C**	**N/A**	**No**	**N/A**
CP	**U**	**Wet Section**	**C**	**N/A**	**No**	**N/A**
CP	**U**	**Side Trimmer and Chopper**	**C**	**N/A**	**No**	**N/A**

** CP-Cont. Pickle Line; PP-Push Pull; PA-Pickle Anneal; S-Slitting; CTL-Cut-to-Length; O-Other, Specify:*

2. Is there Any Interest or Discussion About Coupling a Pickling Line with a Coating Process in this Plant? **No**
3. Are you Exploring Any New Pickling Technology? **No**

B. Comment:

The respondents said they have to address the age and condition of both pickle lines. They said they discussed upgrades of both lines, replacement of both lines with one bigger line, and now have settled on a major upgrade on # 6 line. It was indicated they have engaged Metals Strategies, a consultant, to coordinate the evaluation of this project.

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XVI. PICKLE LINE EQUIPMENT DECISION CRITERIA

A. Who are the Key Decision Makers that are Involved in the Specification and Selection of an Outside Supplier of Pickling Line Projects?

1. Name: **Operations, Maint., QA, Eng.** Title: **Managers**
2. Name: Title:

B. If Different Decision Makers are Involved for Automation and Process Control for Pickle Line Project Please Identify:

1. Name: Title:
2. Name: Title:

C. What are the Most Important Factors in Selection of a Mill or Process System Supplier for these Projects?
(Distribute 10 Points Among the Top 3)

4 Track Record	**2** Price
4 Engineering Design	____ Technical Support
____ Other, Specify:	

D. Comments:

The respondents said price is an important factor but the project will ultimately be evaluated on cost per ton.