Continuous Fastener Galvanizing

The Continuous Fastener Galvanizing Process

The Products it can produce

The Markets it will service

The Economics of the process

The Investment required

The Future Potential

Summary

- CFG is a New Technology, world first
- True Hot Dip Galvanizing
- Specialized plant and equipment, fully automatic
- Lower production cost and better quality
- Range of market and product opportunities
  - Collated and hand driven nails
  - Building screws
  - Structural bolts

What is Continuous Fastener Galvanizing ?

Bryan Cathcart

Why is CFG different from normal fastener galvanizing?

The fundamental principles of galvanizing are well known

- Steel reacts with the molten zinc
  - The longer the immersion time, the thicker the coating
- Excess coating removed by application of energy
  - Surface Tension
  - Air wiped
  - Centrifugal Force

The key aspects of CFG are

- Shorter immersion time in the zinc
  - Achieved by small batch sizes
- More energy applied, faster
  - Engineered centrifuged system
- Automated process
  - High production rate
  - Lower labour cost

How do we achieve?

- Coating Thickness Control
- Uniform Coating Thickness
- Smooth Surface finish
- Fully Automatic Process
- Low application Cost

Coating Thickness Control

= IMMERSION TIME CONTROL

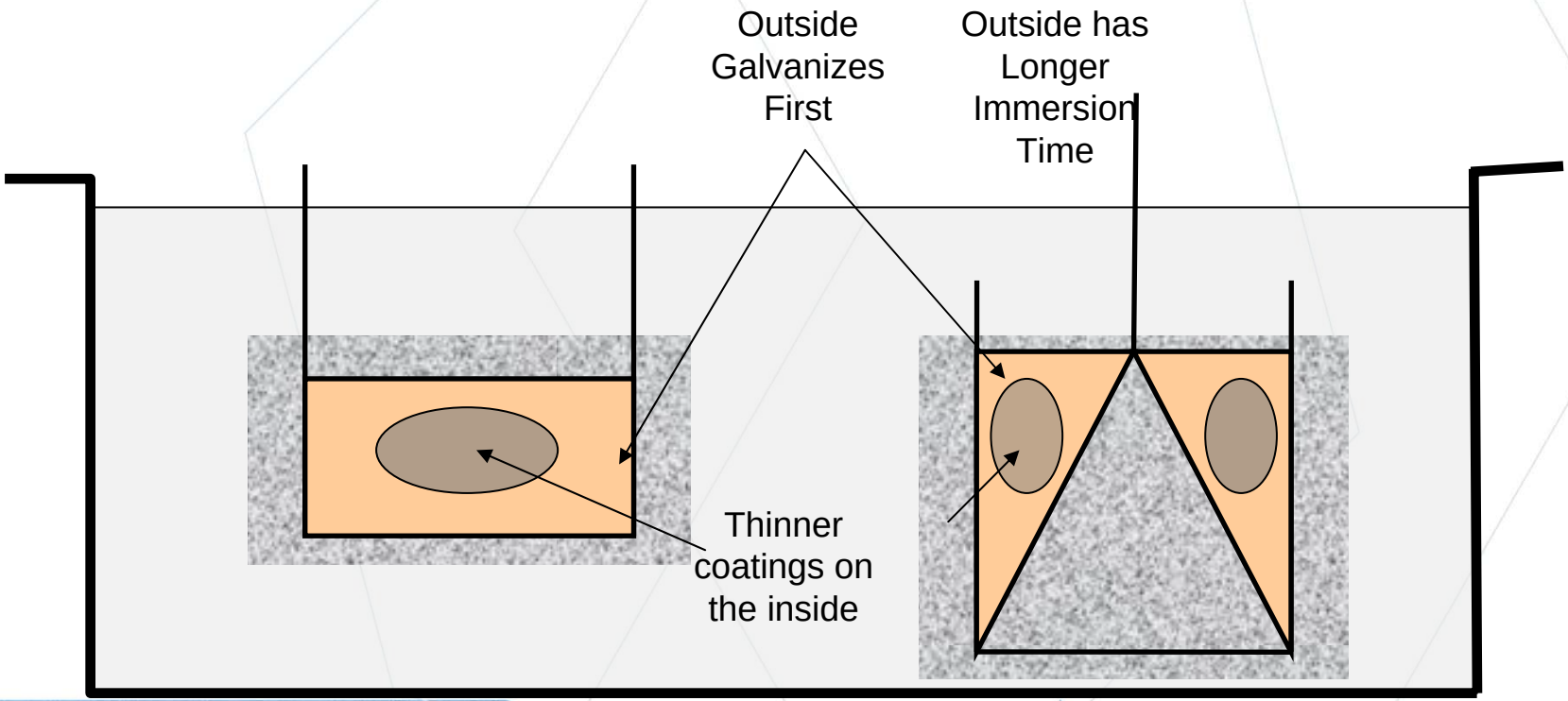
Zinc Coating Costs(US$2,000/t)

Nail Diameter	Surface Area m² /t	CFG 25 µm	CFG 50 µm	Normal Spin Galvanizing 75 µm	Normal Spin Galvanizing 100 µm
3.0mm	175	3.0% $60/t	6.0% $120/t	9.0% $180/t	12.0% $240/t
2.8mm	200	3.5% $70/t	7.0% $140/t	10.5% $210/t	14.0% $280/t
2.0mm	283	5.0% $100/t	10.0% $200/t	15.0% $300/t	20.0% $400/t

CFG Coating Thickness Uniformity

- Batch Size
  - Zinc penetration time is minimised
- Basket Design
  - Minimal zinc cocoon
- All products in the basket get the same immersion times

NORMAL SPIN GALVANIZING



Process Capabilities

Micrometres	Minimum Coating Thickness	Controllable coating Range	Coating Thickness Variability
Ingalloy CFG	25	25-60	+or- 5
Automatic Galvanizing	60	60-80	+or- 10
Normal Spin Galvanizing	70-80	70-100	+or- 15

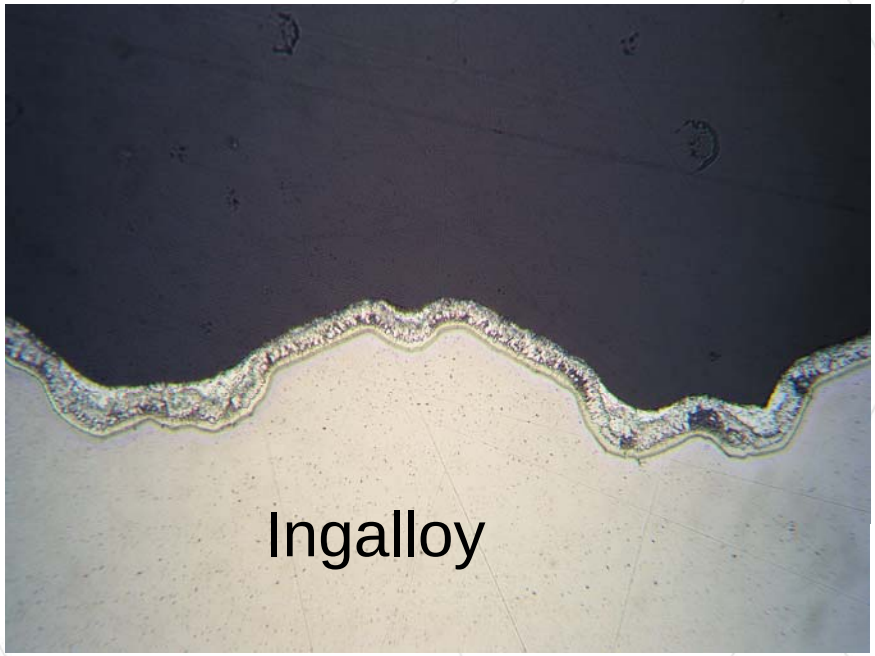
Why is Coating Uniformity Important?

- Tolerances for Collating Machines
- Thread Clearances

CFG Smooth Coating

- High Energy
  - Engineered Centrifuge system
- Applied to product immediately on withdrawal
  - No freezing of zinc
  - Higher fluidity

Ring Shank Nails



What Differentiates CFG from the Competitive Coatings?

Comparison of Coating Systems

Normal Spin Galvanizing Ring Shank

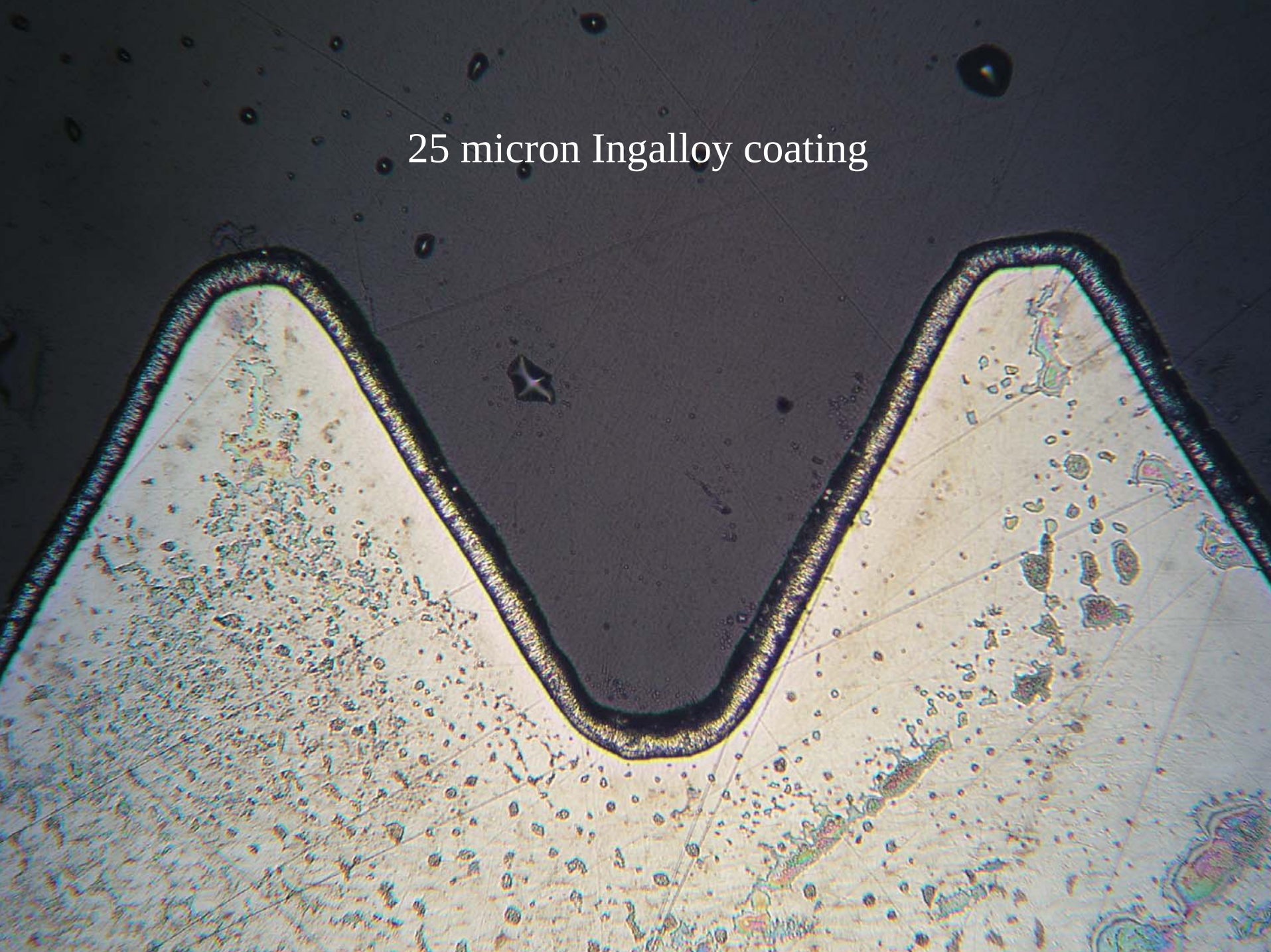
Ingalloy Ring Shank

Mech Plated Screw

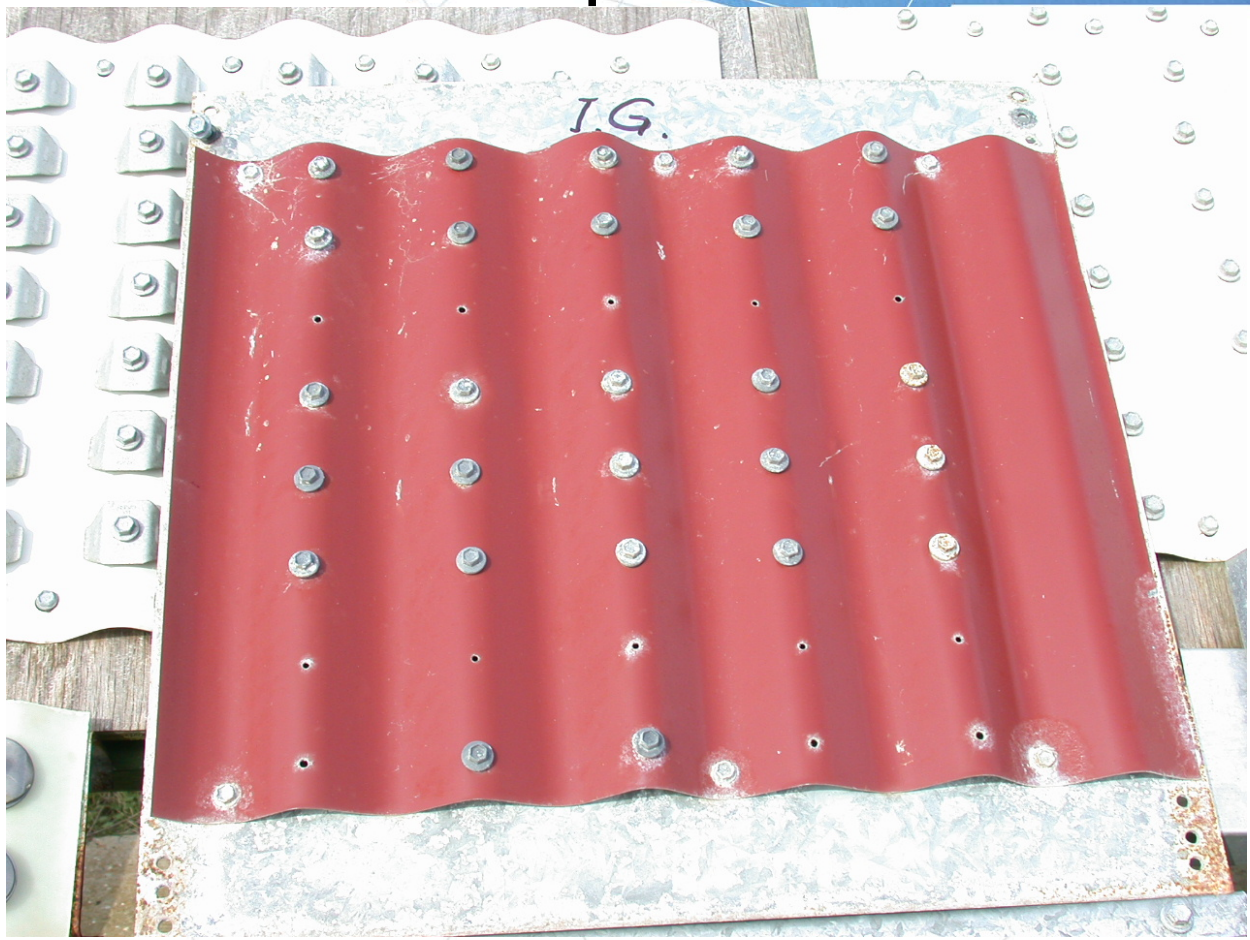
Pre Gal Wire Rolled Ring Shank

Electroplated

100 μm


25 micron Ingalloy coating

Outdoor Exposure Tests



Mechanical Plated Screws Failure

Figure 7.25: Vented attic framing at MCBH Coastal after 16 months.

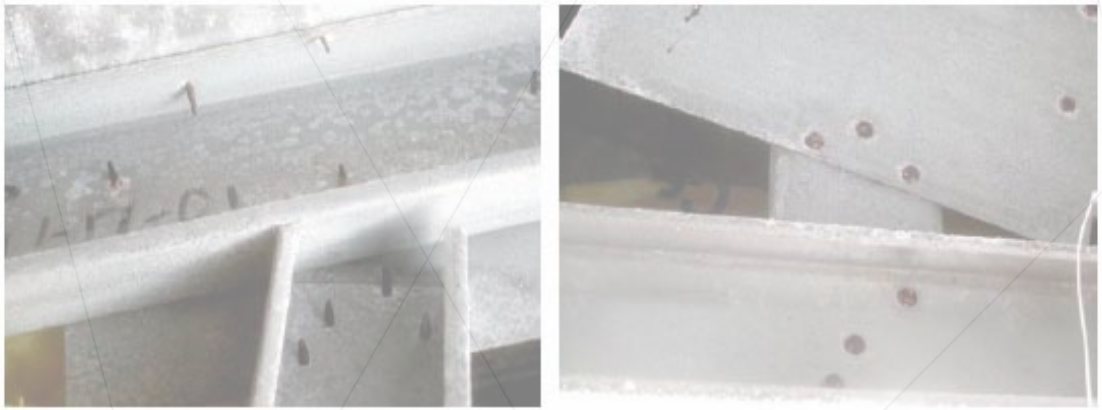


Figure 7.26: Vented attic framing at MCBH Coastal after 21 months.

The CFG Process

- Cleaning
- Fluxing
- Galvanizing
- Excess Zinc Removal
- Quenching

What are the target markets?

- Nails
  - Collated Nails
  - Hand Driven Nails
- Construction Fasteners
  - Building Screws
  - Structural Bolts
- Future
  - Machine Fasteners
  - Automotive Industry

Normal temperature galvanizing retains the drill speed of the self drilling screw

Electroplated nuts not tapped oversize fit on galvanized thread

What is driving Technology Change?

- Zinc Cost and Labour Cost Increases
- Changes to wood chemistry
- Standards and specifications
  - IBC Building code changed
  - Retailers (Home Depot policy)
  - Automotive life expectancy
- Major product manufacturers
  - Need for lower costs , higher quality
- Product Distributors
  - Reduced inventory and performance guarantee

US nails and fasteners market amounts to 10.7 bn US$, still growing 5% p.a, of which 25% are imported. Nails, screws and bolts represent 6.5 bn US$

Nails, screws and bolts represent 60% of the US market for fasteners

- Total market for nails and fasteners accounts to 10.7 bn US$
- It is growing 5% p.a.
- Imports account for 25% of the total market
- Nails, screws and bolts represent a total market of 6.5 bn US$ in the US

Imports account for a growing share of the US nails market and this tendency will remain unless new US regulation is voted

- The nails market has been increasing 4% p.a. in the last decade, but while imports have grown 10% p.a. from 200 mio US$ up to 430 mio US$ in 2001, US Shipments have remained flat at 500 mio US$
- US manufacturers have more and more difficulties to compete against Asian importers and some are already declining on the hand-drive nails business
- The future growth of US Shipments is directly correlated to the hypothetic introduction of a new US regulation which would protect them from additional imports

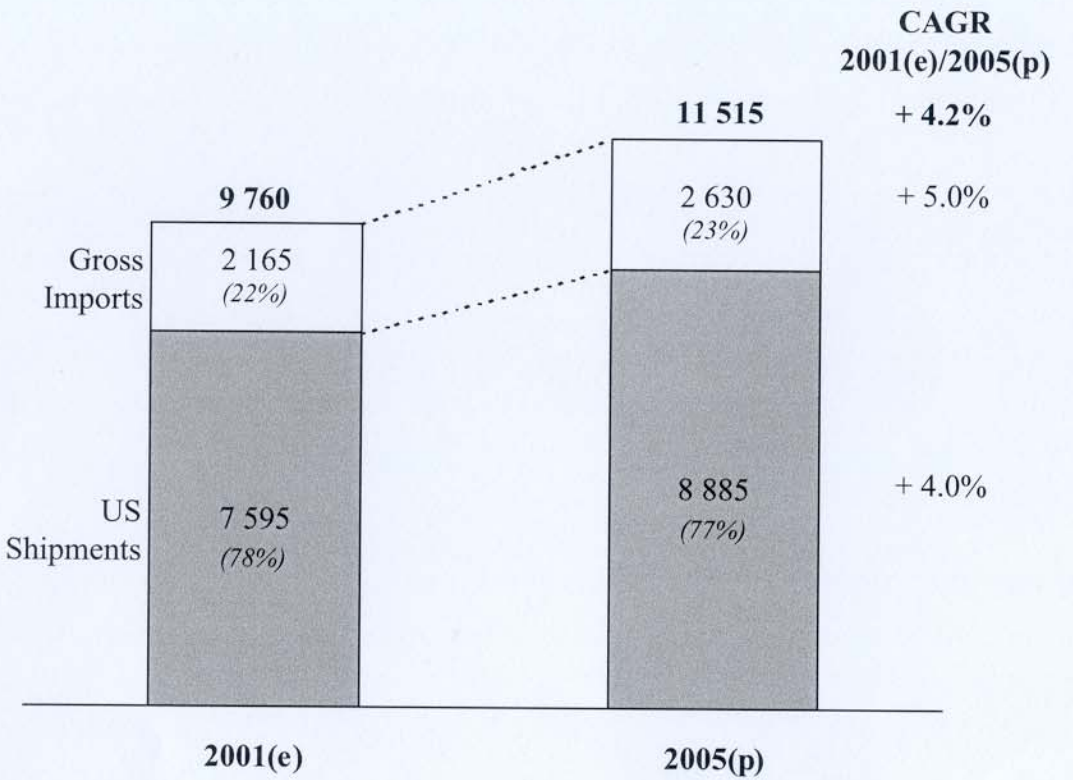
The Fastener Quality Act has protected the screws and bolts business from importations since the beginning of the 90's

- A law introduced in the beginning of the 90's, the Fastener Quality Act, has protected US production of screws and bolts against imports by imposing quality standards that a significant share of the import manufacturers could not fulfill
- It has allowed the US production to grow 5% p.a. since 1993
- However, imports are being more and more reliable and are expected to weight more in the US market in the future

Imports are however expected to weight more in the US market in the future, as their quality improves and US manufacturers go offshore

US fasteners market(1) projected evolution

- 2001/2005, US$ mio -



Rationale

- In the next 4 years, imports are due to grow more than US Shipments
  - Quality hit by imports has sensibly risen in the recent past
  - US manufacturers have started to add capacity overseas at the expense of the US Shipments

Note: (1) Fasteners market = Total US Shipments + Gross Imports

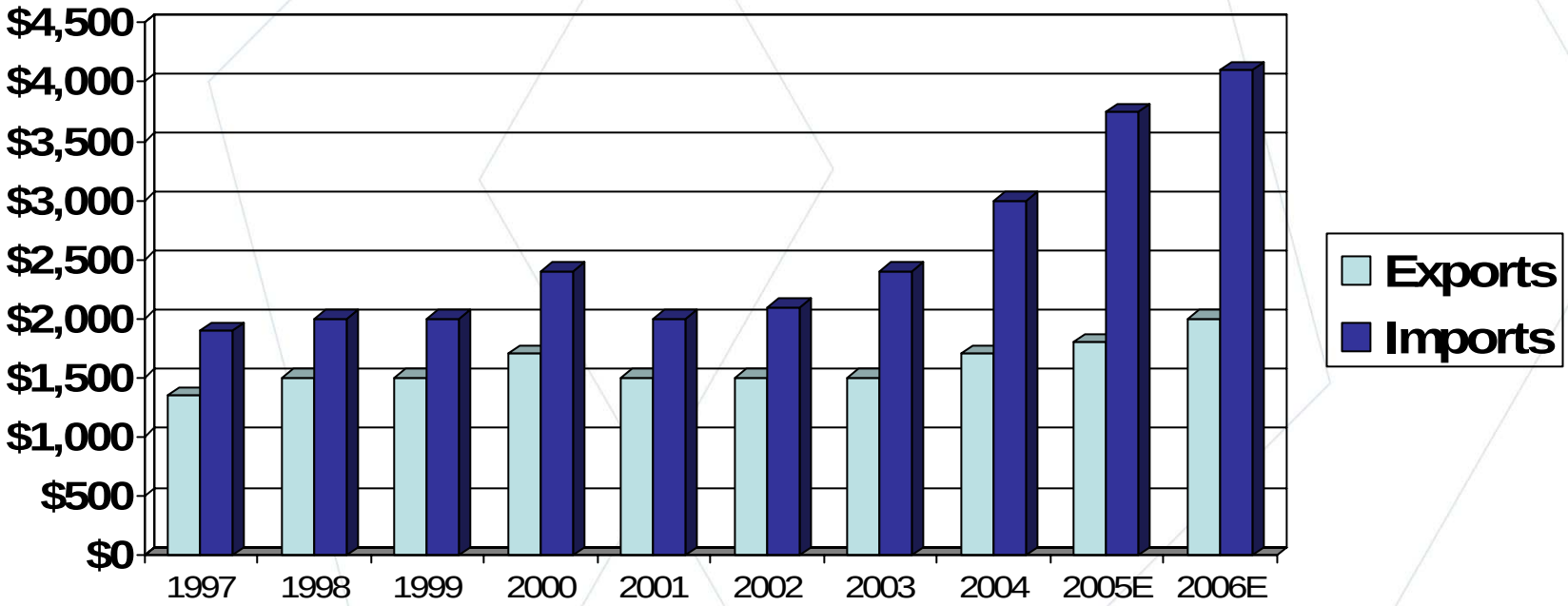
Sources: US Census, International Trade Agency, Interviews, A.T. Kearney analysis

AT Kearney says in the USA

- Nails , Screws and Bolts are US$6.5B
  or 6 million tons
- 40% of nails are imported to the USA
- Fastener consumption growing at 5% pa
- US domestic production has been flat

US Trade in Fasteners US$ m

Fastener Technology International Feb 06 BTA Hinde Liep



2006 Statistics

- USA Imports risen 10.4%pa
- Taiwan has 48% of Volume and 38% of value
- Taiwan now actively promoting higher value Automotive Fasteners in USA
- China is making significant gains in market share
- Chinese Domestic Market increasing, with infrastructure and manufacturing

Our Market Research has shown

- US Fastener industry is demanding greater corrosion resistant coatings to meet customer demands
  - Collated nail manufacturers need to change now
- Building Codes and standards are changing to recognize true HDG
  - Ingalloy represents true HDG
- Manufacturers need in-line processing to stay competitive
  - CFG automation will make US producers competitive with imported coatings
- CFG is cost competitive with lower performing coatings
- US Fastener industry is still growing
  - Building screw and structural bolt market segments are immediate growth opportunities

Single-user Technology Fee

- Detailed Engineering Construction drawings
- Operations Manual
- Process control and maintenance manual
- Operator Training (at cost)
- Commissioning assistance (at cost)
- License of the Ingalloy Brand

Equipment Purchase Includes

- Design
- Construction
- Commissioning
- Operator Training
- Technical Advice
- License of the Ingalloy Brand

Conclusion

- New CFG technology now available
- Reduces costs and improves quality
- Scaleable to suit capacity requirements
- Suits in-line manufacturing application
- Wide product range, with quick change capability
- Allows manufacturers to compete with lesser coatings
- Consumers and specifications driving change
- Commercial options to access the technology