



Learning in Steel: Agents and Deficits

Peter Warrian & Celine Mulhern
University of Toronto

Changing Competitive Environment in Steel

★ Big 3 Integrations

- ★ Minimill Challenge 70s & 80s
- ★ Service Centres 90s
- ★ Imports: Quantity (40%) & Price \$375-210

★ New Steels for Auto

- ★ Metallurgy, process control, lasers
- ★ Decreasing returns, capital costs, limited R & D funds

★ 1998 Asian Crisis: Tipping Point ?

Themes: Agents & Deficits

- ★ Steel companies acquiring and implementing new technology
 - Traded knowledge: off the shelf tech
 - Decline of traditional in-house: Steltech
- ★ Dofasco as new Learning Steel company
 - Location matters: McMaster Steel Research Centre: People over Tech transfer
 - Public institutions play critical role in filling deficit

Steel in Learning Region: Themes

- ★ Steel companies embedded in a ***Network of Learning*** rather than a “Cluster”
- ★ Location matters:
 - ★ Management philosophy & strategy
 - ★ Accelerate pace of learning curve: Dofasco EAF, Process Control
 - ★ Alternatives to Turnkey projects

Algoma

- ★ DSPC: Most dramatic new steel process: liquid metal to coil 3/20
 - Most limited involvement in learning channels
 - Tried Complete Turnkey: over time, sub-optimal
 - Hand off to locals: Hydraulics, optimization
- ★ Location:
 - Logistics overcome \$11-15 per ton
 - DSPC technology threat to minimills

Stelco

★ Traditional Technology Leader:

- ★ Stelco Engineering, Steltech: Coil Box
- ★ Designed their own mills, 1200 engineers
- ★ Downsizing of late 1980s eliminated

★ Stelco in 90s: Traded Knowledge

- ★ Co-venture: Z-Line, Mitsubishi
- ★ Alliances: USLAB, AISI
- ★ Tech Leadership: Nippon Steel

Dofasco

★ New Tech Leaders

- ★ Vision: “*Solutions in Steel*”
- ★ Focus: Auto industry, Body-in-White
- ★ Downstream Processing: Powerlasers

★ Strategy: Local & Traded Knowledge

- ★ Co-ventures: DoSol Galva (Usinor), Extragal (Brazil), Dofasco de Mexico
- ★ Alliances: USLAB, AISI

Steel-Govt-Academic Links

☀ University research: Deep Metallurgy

☀ Research Chairs:

- McMaster: Steel Research Centre
- UBC: Centre for Metallurgical Process Engineering
- McMaster Advanced Control Consortium

☀ Bessemer Project: Thin Strip Casting

Channels of Steel Learning

- ★ Basic Research on innovative steel processes
- ★ Consultation resources for company specific problems
- ★ Facilitation of informal, firm-university learning networks
- ★ Forums for discussion on industry standards
- ★ Highly qualified personnel training & recruitment

Government Agencies: MMO

- ★ Metals research budget: 25% to Steel
 - ★ Seven projects: Material properties & processes
 - ★ Three consortia: Micro alloyed forging steel
 - ★ Technical consultation: Auto spring steels
 - ★ Workshops:
 - New Steel
 - Hard Coatings
 - ★ Writing Specs: SAE technical standards

CSTEC: Training and Skills

- ★ Algoma: CSTEC training and recycling skills
- ★ Dofasco: Largest user of CSTEC curriculum
- ★ CSTEC Recruiting: 300 technician, technologist, engineering (HRDC)
- ★ Accelerated apprenticeship schedule to replace retiring tradesmen

Steel Questions & Themes

- ✦ NAFTA Steel Industry?
- ✦ International Clusters? Usinor, Nippon
- ✦ Algoma: Stranded Asset? Location?
- ✦ Virtuous/Vicious Circles of Investment and Innovation
- ✦ Maksteel: Too much too soon?

Conclusions

- ★ Location matters: technological transfer and human resources
- ★ Dofasco: the leading indigenous innovator
- ★ The challenge of innovating in capital intensive industries
- ★ Interdependence of location and business models
- ★ Public institutions matter – but how much?
Canada/EU distinction