PLATE FREEZERS ABOARD FISHING VESSELS USING CO_2 AND AMMONIA

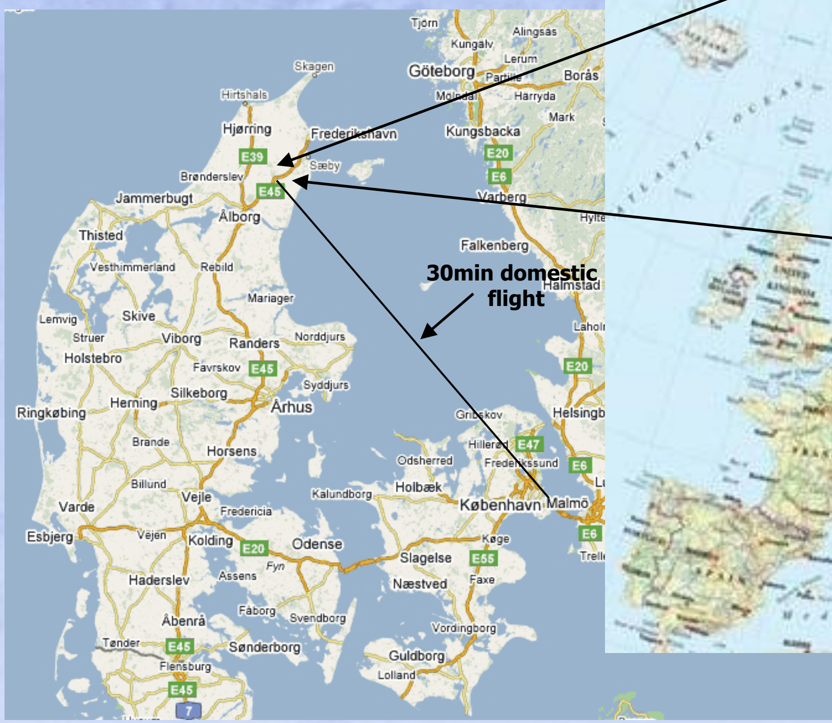
PLATE FREEZING

... Worldwide!

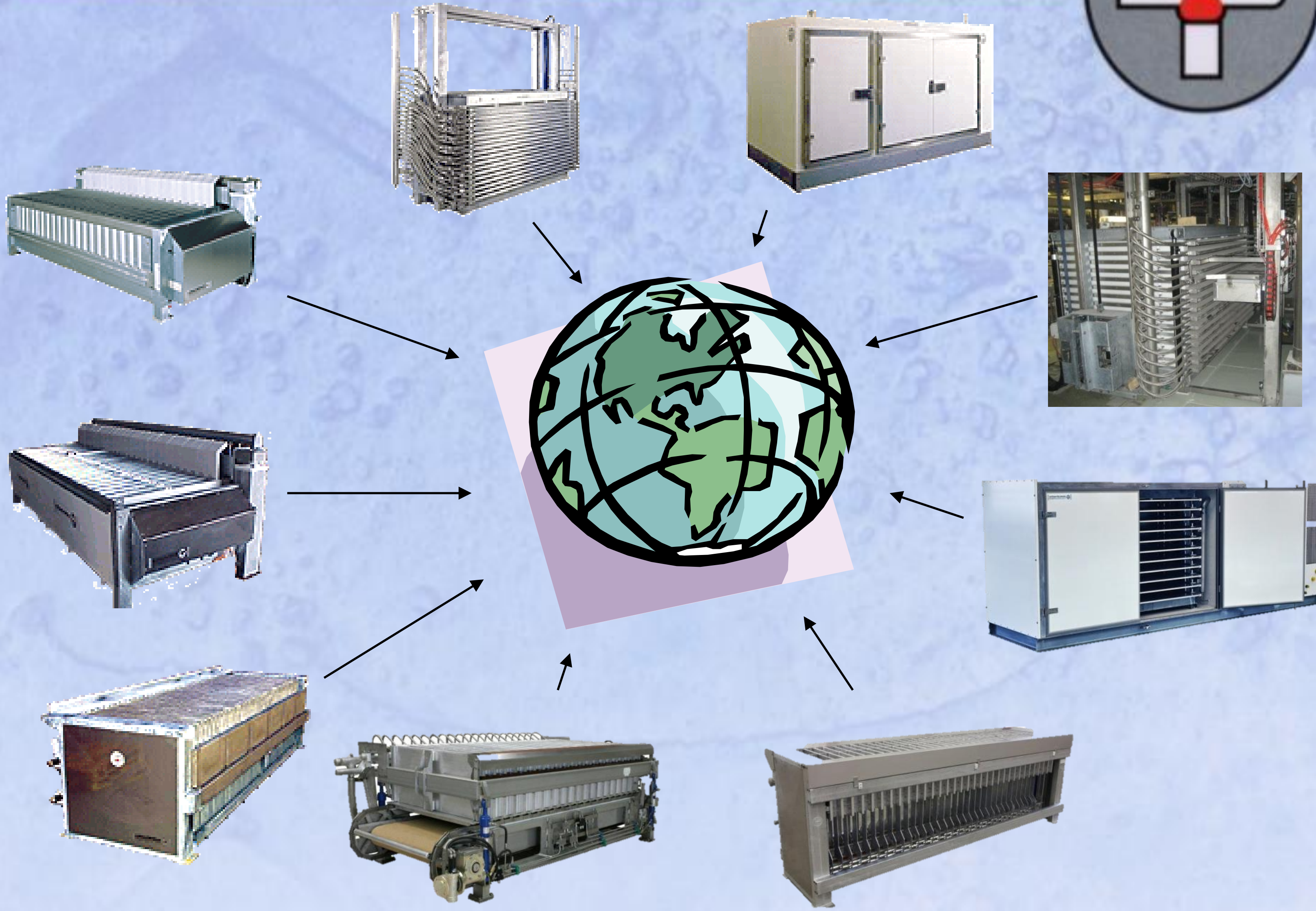
A/S Dybvad Stål Industri

Sales and production in the North of Denmark

European products!

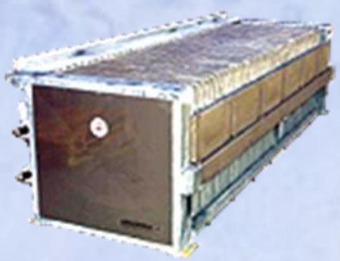


DSI Plate Freezers for the global market



First DSI CO_2 Plate Freezer Installation: MS Kvannøy

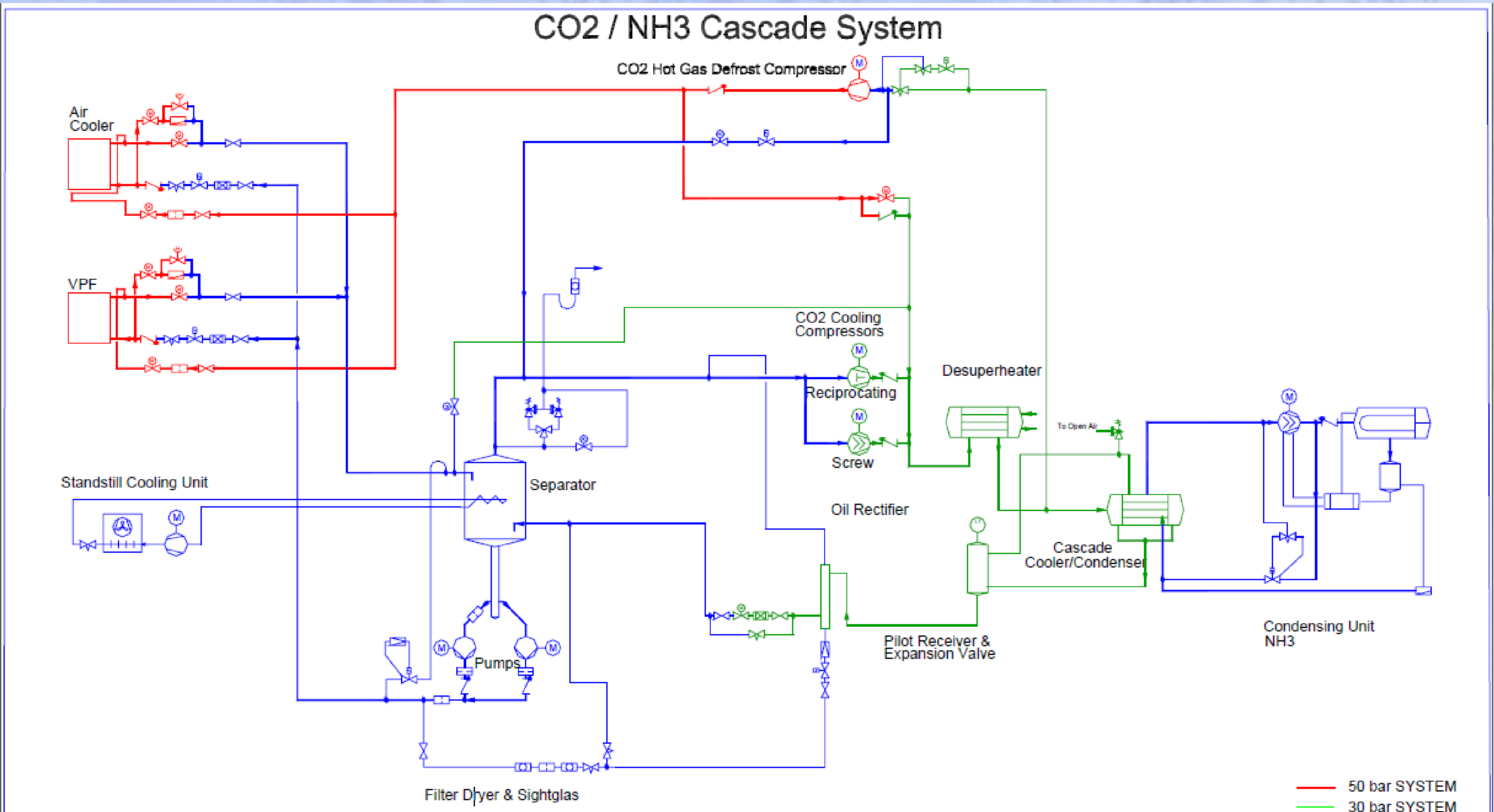
2002



11 pcs V20 38/75B

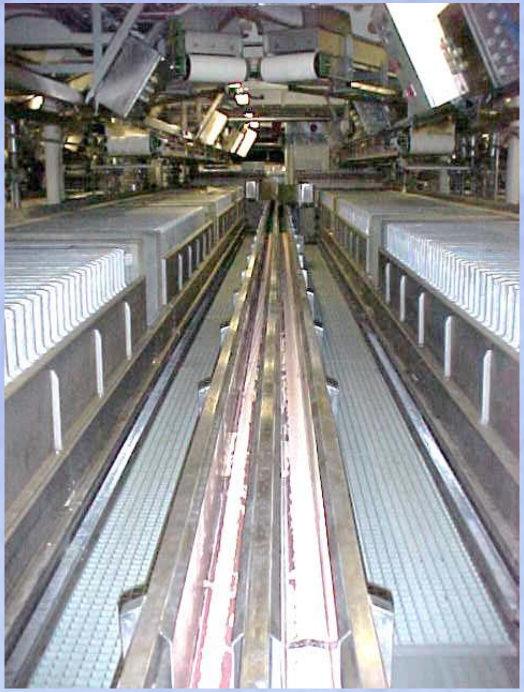
Source: http://www.coolingconsult.dk/pdf/CO2-NH3

Refrigeration system MS Kvannøy



Source: http://www.coolingconsult.dk/pdf/CO2-NH3

Freezers and Product



Special CO2 plate with reduced volume

Why Natural Refrigerants ? for plate freezers

- The technology is well proven we have produced ~5000 plate freezers
  - Since 2002 ~500 freezers for CO_2
  - Today ~ 80% with natural refrigerants CO_2+NH_3

- Drivers for choosing CO_2 or NH_3.
  - Legislation?
  - Profitability? *
  - Green Profile?

- Limitations choosing CO_2 or NH_3
  - Legislation?
  - Safety?
  - Price?

Advantages for CO_2 aboard

<u>Gain comparing CO_2 with NH_3</u>

- **At the same evaluation temperature, -40°C,**
  The freezing capacity with CO_2 is increased 4-8%

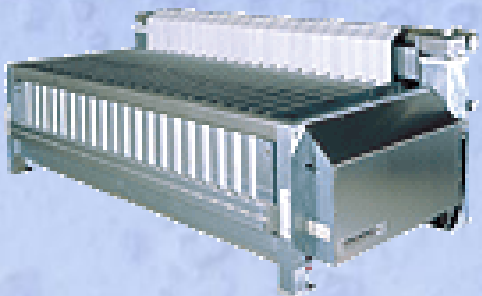
- **With CO_2 at -50°C the capacity increases 30-40 %**
  - **Better product quality due to the quicker freezing.**

In the same "limited space" you can produce 40% more.

- **Reduced fuel cost.**
- **Reduced production cost pr. Kg of fish landed.**

= Profitability

Recent installations aboard European Fishing Vessels



DSI Vertical
V3

DSI Horizontal

DSI Vertical
V16

Recent installations aboard European ships CO_2 + NH_3

2012	NORSK KULDE	MV FUGLEØYFJORD	2	V3 32/100B		SHIP	NORWAY
2012	Johnson Controls B.V.	MV ZEELAND	33	V8 26/100B	CO2	SHIP	HOLLAND
2012	FRYSTIKERFI Ehf.		2	V3 32/100B		SHIP	ICELAND
2012	Øyangen	MS HURLATRÅL	4	V3 26/100B		SHIP	NORWAY
2012	Teknotherm Marine	HAVBRYN	8	V3 32/100B		SHIP	NORWAY
2012	GEA refrigeration Netherlan	DESERT JEWEL	1	V4 32/75C+H		SHIP	HOLLAND
2012	Kælismidjan FROST Ehf.	HUGINN VE	1	V3 30/75B		SHIP	ICELAND
2012	RefComMurman KO		22	V4 32/65C+H		SHIP	RUSSIA
2012	KINARCA	OT 1570	3	V3 20/100B		SHIP	RUSSIA
2012	GEA refrigeration Netherlands		4	V3 26/100B, V3 32/100B		SHIP	RUSSIA
2012	MMC KULDE	BÅTBYGG	3	V3 20/100B		SHIP	NORWAY
2012	Nordischer Maschinenbau Rud. Baader GmbH	Nordischer Maschinenbau	5	V6 32/65 D, SPECIAL		SHIP	RUSSIA
2012	Teknotherm Marine	HAVSTRAND	8	V16 32/100B		SHIP	NORWAY
2012	Teknotherm Marine	AKER STX	9+1	V3 32/100B V3 22/150 B		SHIP	NORWAY
2012	Øyangen		1	V3 26/100B		SHIP	NORWAY
2012	PAM Refrigeration	FRØYANES SENIOR	3	V3 20/100B		SHIP	NORWAY
2012	RefComMurman KO	STRELETS	3	V3 29/100B		SHIP	RUSSIA
2012	MMC KULDE		8	V16 32/100B		SHIP	NORWAY
2012	Johnson Controls	POLAR NANOQ	4+1+1	V3 32/100B, V3 28/100B, V3 24/100B		SHIP	GREENLANI
2013	Karstensens Skibsværft		4	V16 30/100B		SHIP	NORWAY
2013	PAM Refrigeration	Vegsund Slip A/S, Norway	4	V3 20/100B		SHIP	NORWAY
2013	Highland Refrigeration		2	V3 26/100B		SHIP	USA
2013	Johnson controls Holland	SCH 72 Frank Bonefass	30	V826/100B	CO2	SHIP	HOLLAND
2013	Johnson controls Holland	SCH 72 Frank Bonefass	6	V8 26/100B	CO2	SHIP	HOLLAND
2013	Teknotherm Marine	ANDESFISK	6	V3 32/100B		SHIP	NORWAY
2013	Teknotherm A/S	KORALEN	3	V3 20/100B V3 16/100B		SHIP	NORWAY
2013	TEKNOTHERM AS	SOLHAUG	3	V3 26/100B		SHIP	NORWAY
2013	Johnson Controls Denmark	nyb. 1492 ULJANIK	12	V3 26/100B		SHIP	CROATIA
2013	Teknotherm Marine	AKER STX	9+1	V3 32/100B, V3 21/160B		SHIP	ROMANIA
2013	FRIO NORDICA AB	SOLUND VERFT	3	V3 20/100B		SHIP	NORWAY

+20 Horizontal freezers

www.dsi-as.com

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... Worldwide!