Improved recovery of oil spills from water surfaces using tailored surfaces in oleophilic skimmers

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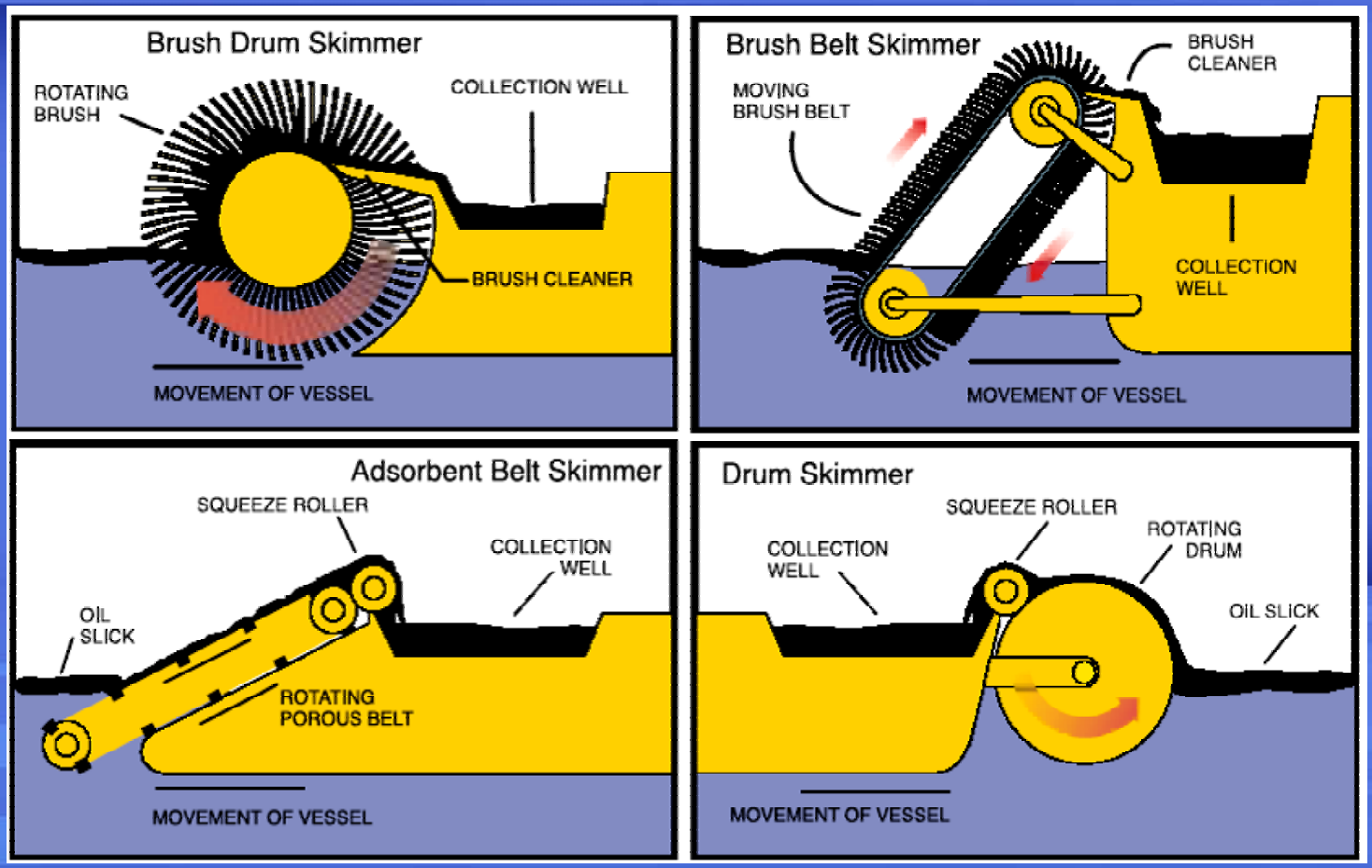
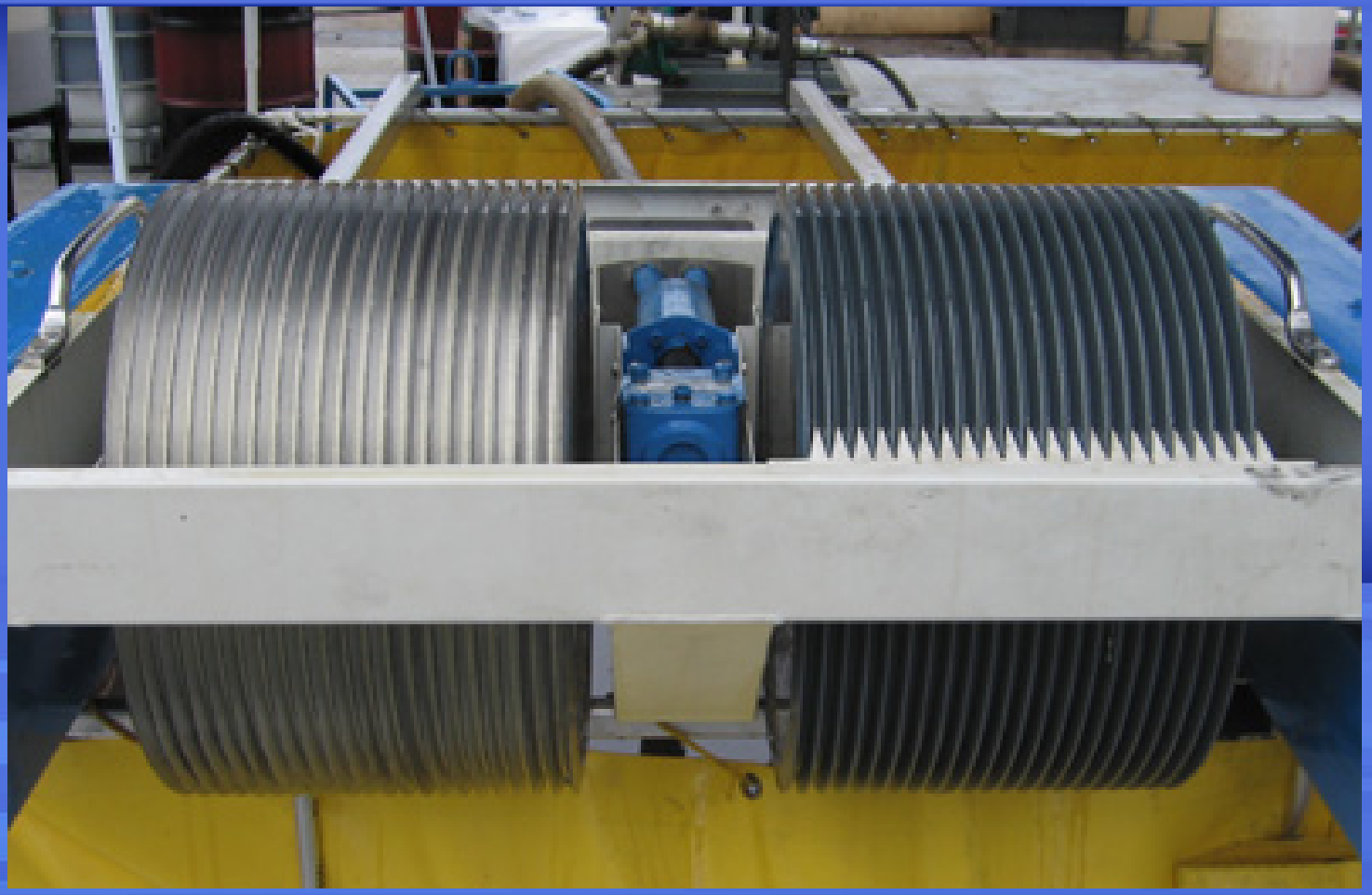
Mechanical recovery



Fingas, 2002

Grooved drums



U.S. Provisional Patent Application (serial no. 60/673,043) by UCSB.

Objectives

The primary objectives of this research were:

- to perform a full-scale test of novel oleophilic drum recovery surfaces tailored for oil spill recovery;
- to determine the relation between the operational parameters and oil recovery efficiency.

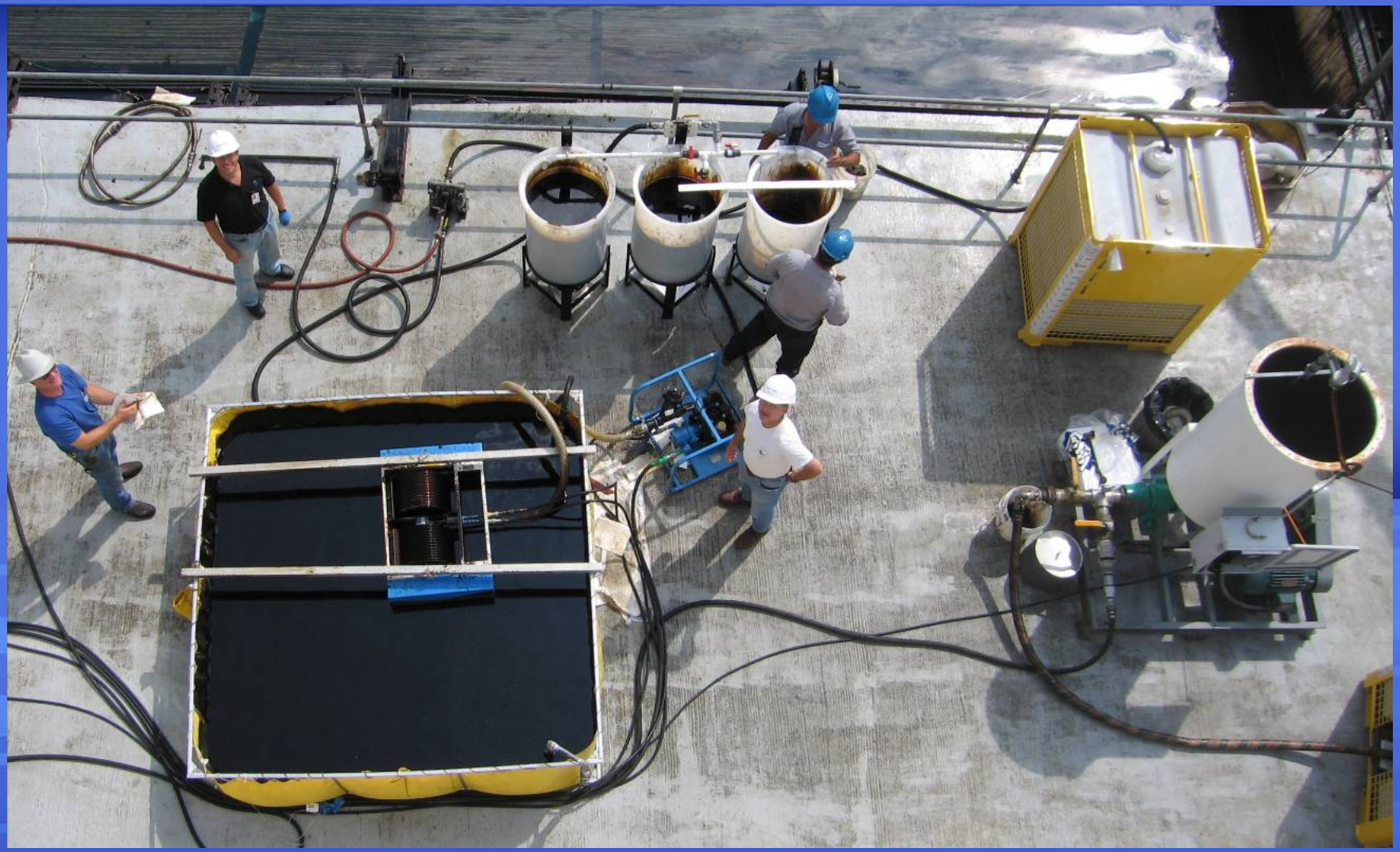
Test variables

- Ambient temperature
  ≈10ºC and ≈25ºC
- Oil type
  Diesel, Endicott, and HydroCal 300
- Oil film thickness
  10 mm, 25 mm and 50 mm
- Drum rotation speed
  30, 40 and 65 rpm
- Material of the drum surface
  Aluminum, Polyethylene, Polypropylene, Neoprene, Hypalon
- Drum surface pattern
  smooth and grooved

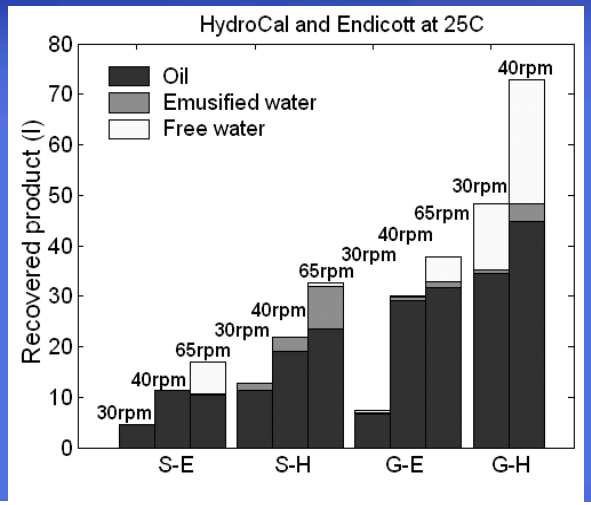
Oil properties

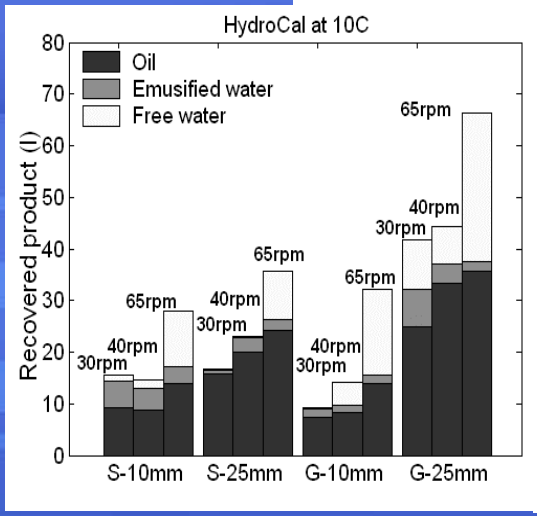
	Density (g/ml)		Viscosity (cP)		
Oil Type \ Temperature	**15°C**	**25°C**	**15°C**	**25°C**	Asphaltenes %
Diesel	0.833	0.823	6	2	0
Endicott	0.923	0.907	92	50	4
HydroCal 300	0.921	0.905	340	162	0

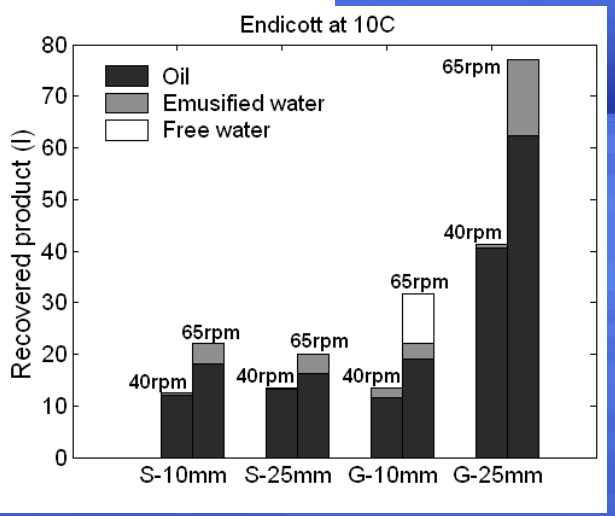
Ohmsett facility



Test results







Test results: HydroCal recovery

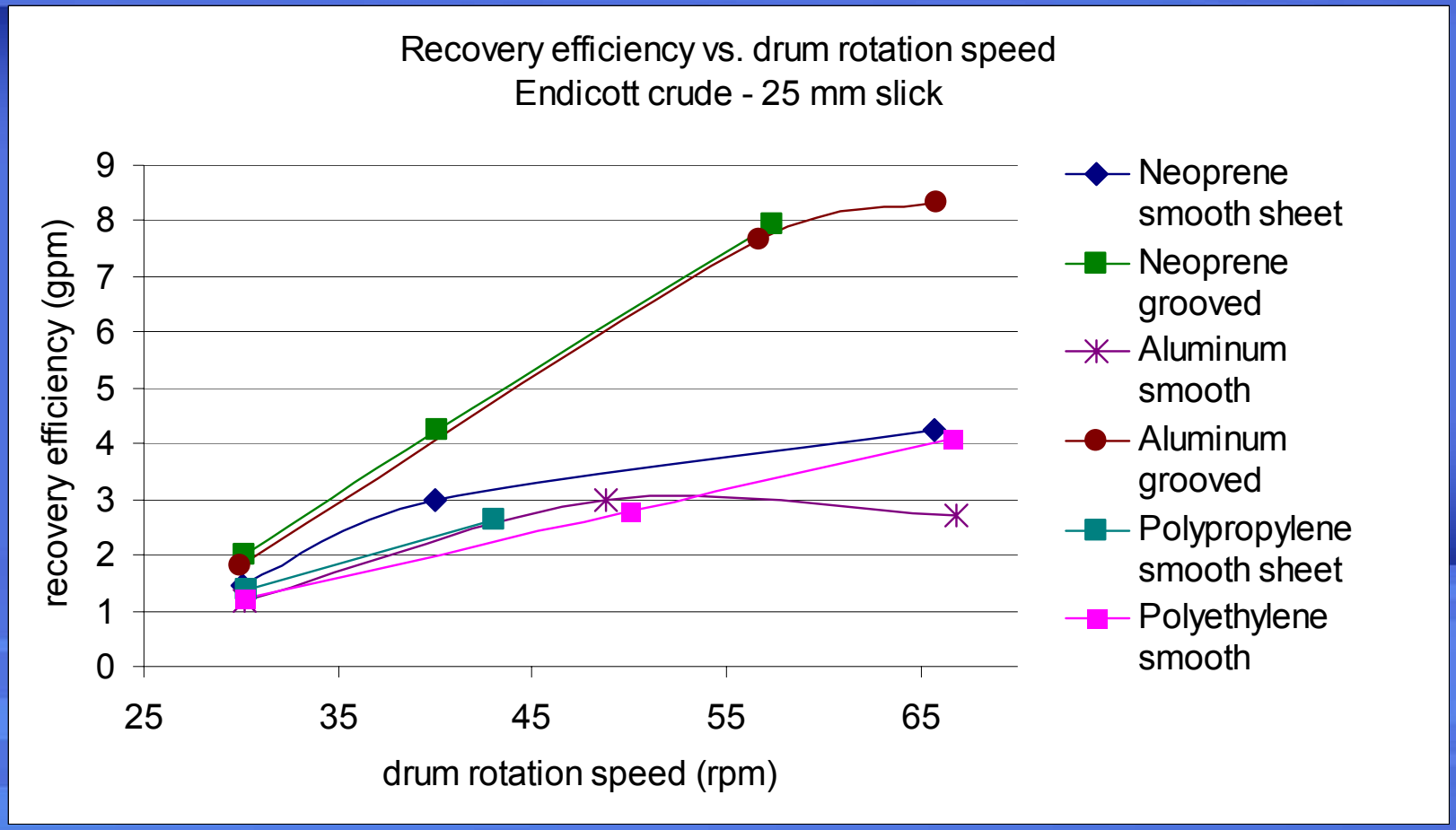
Smooth drum

30 rpm **40 rpm** **65 rpm**

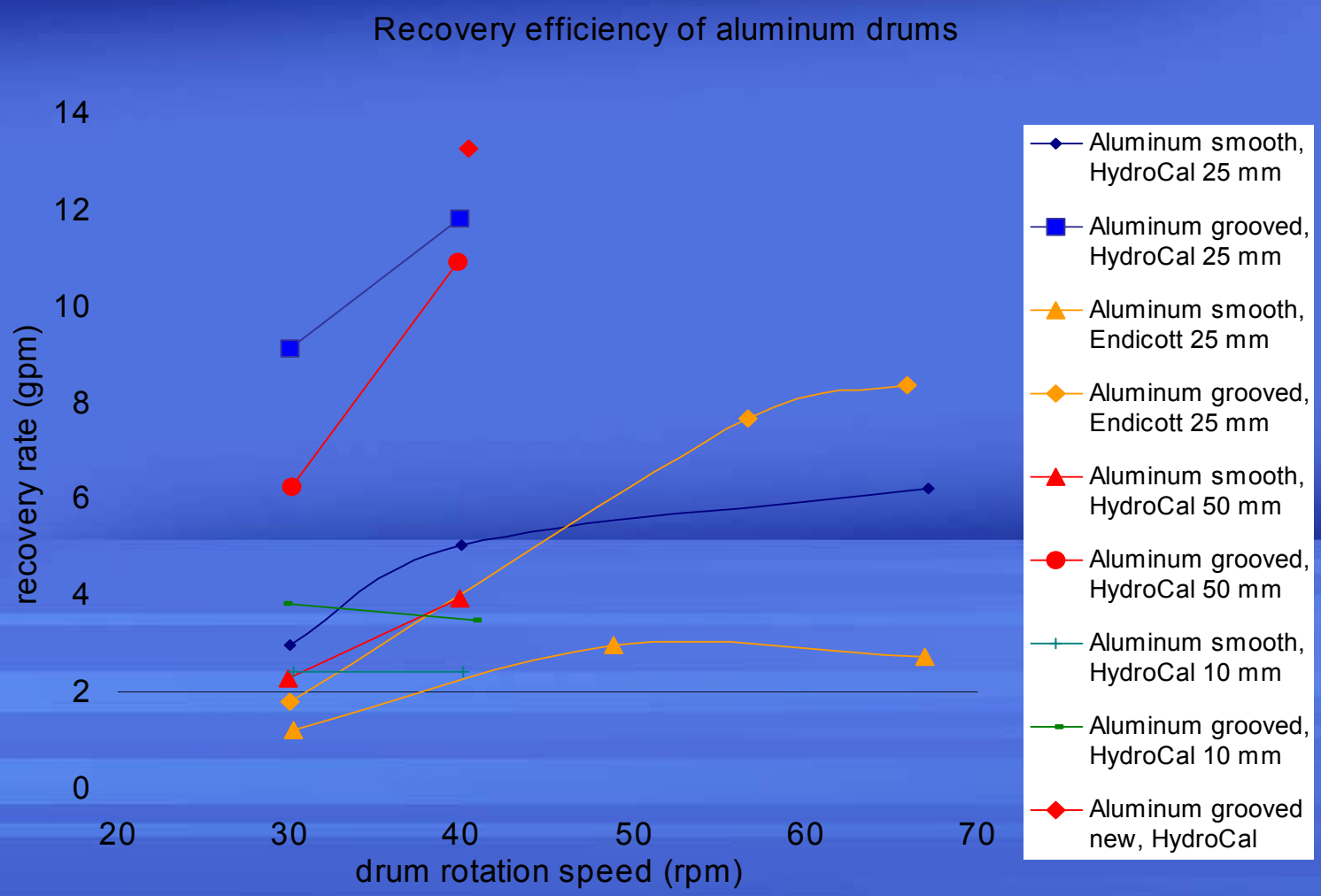
Grooved drum

65 rpm

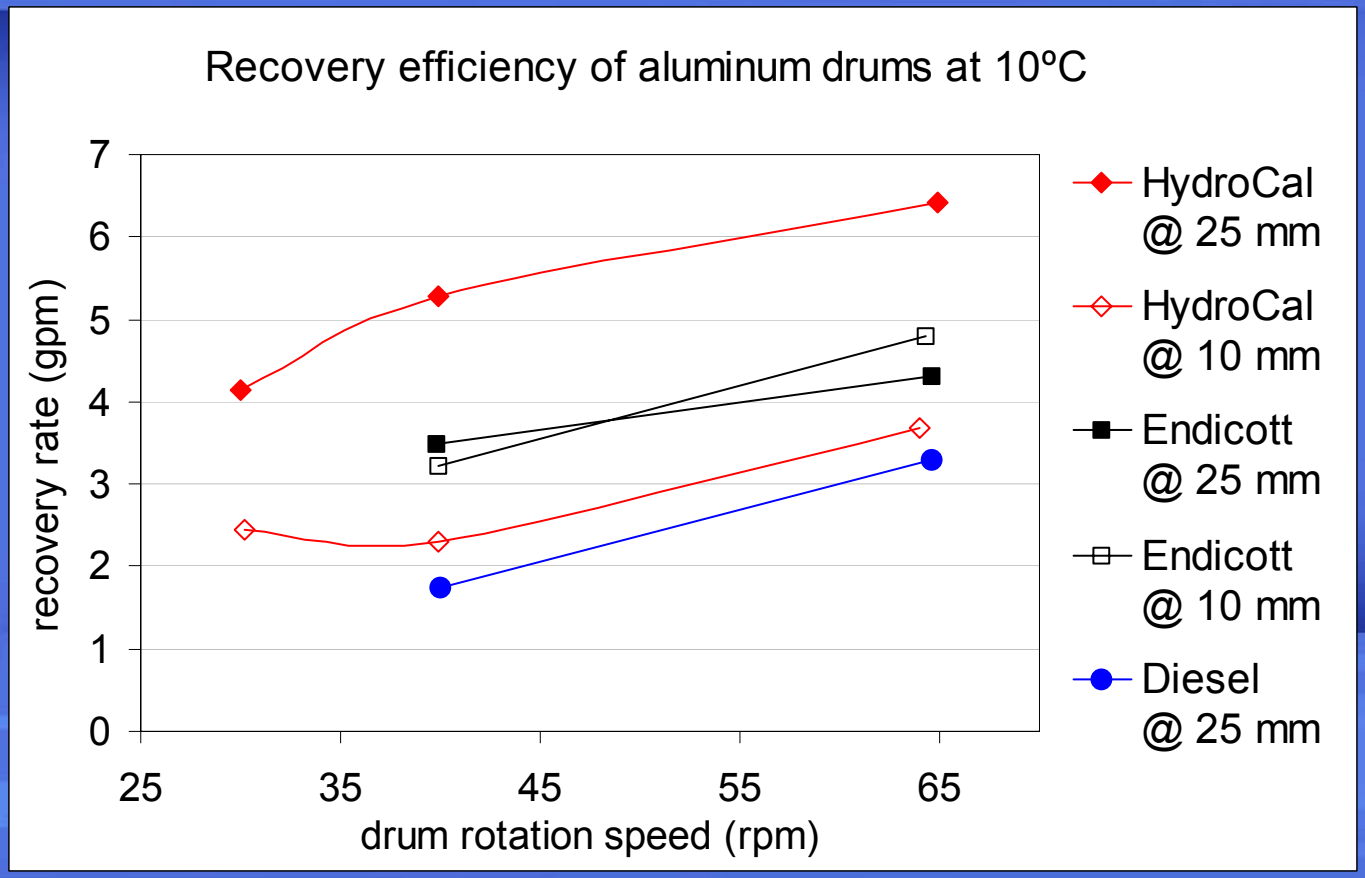
Test results: drum material and pattern



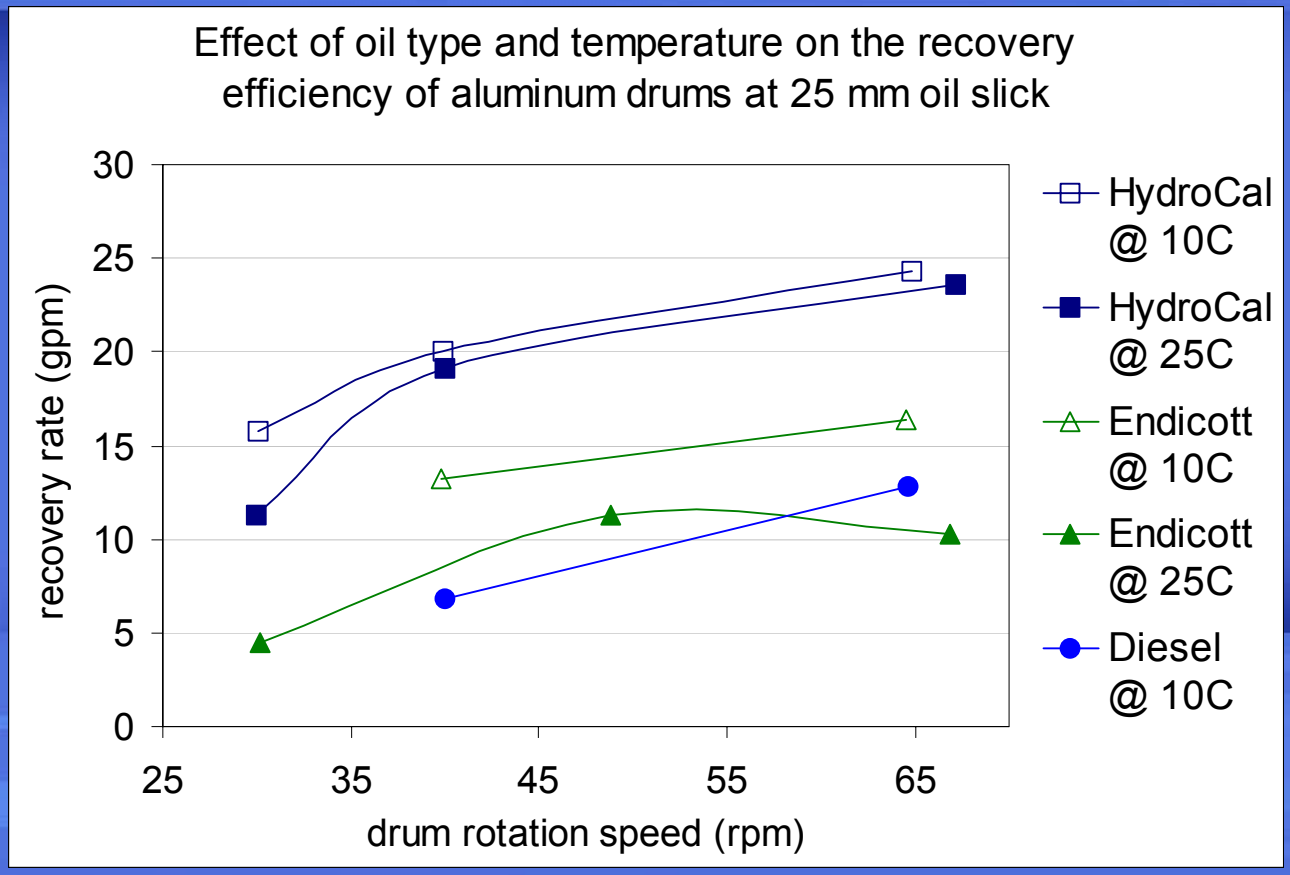
Test results: oil type, slick thickness and drum pattern at 25ºC



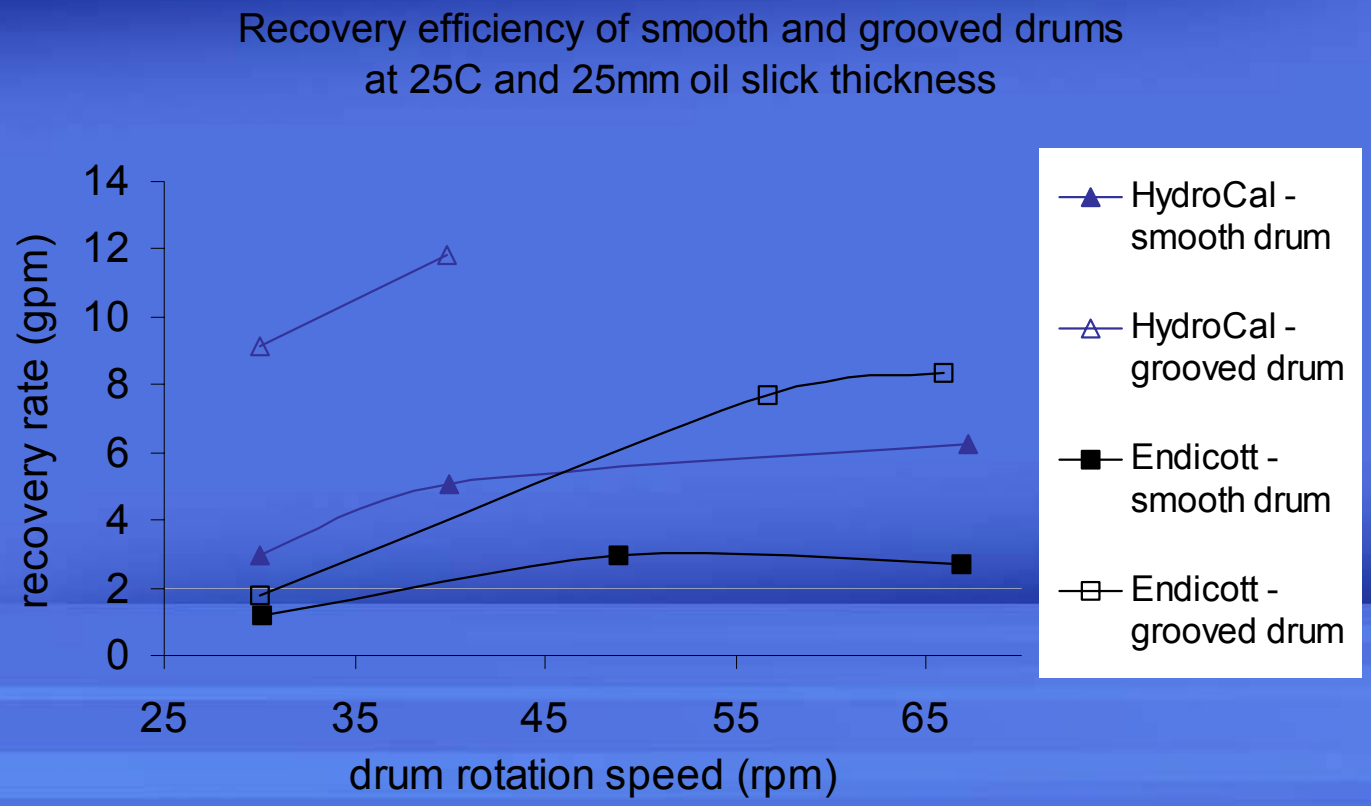
Test results: oil type and slick thickness at 10ºC. Smooth drums.



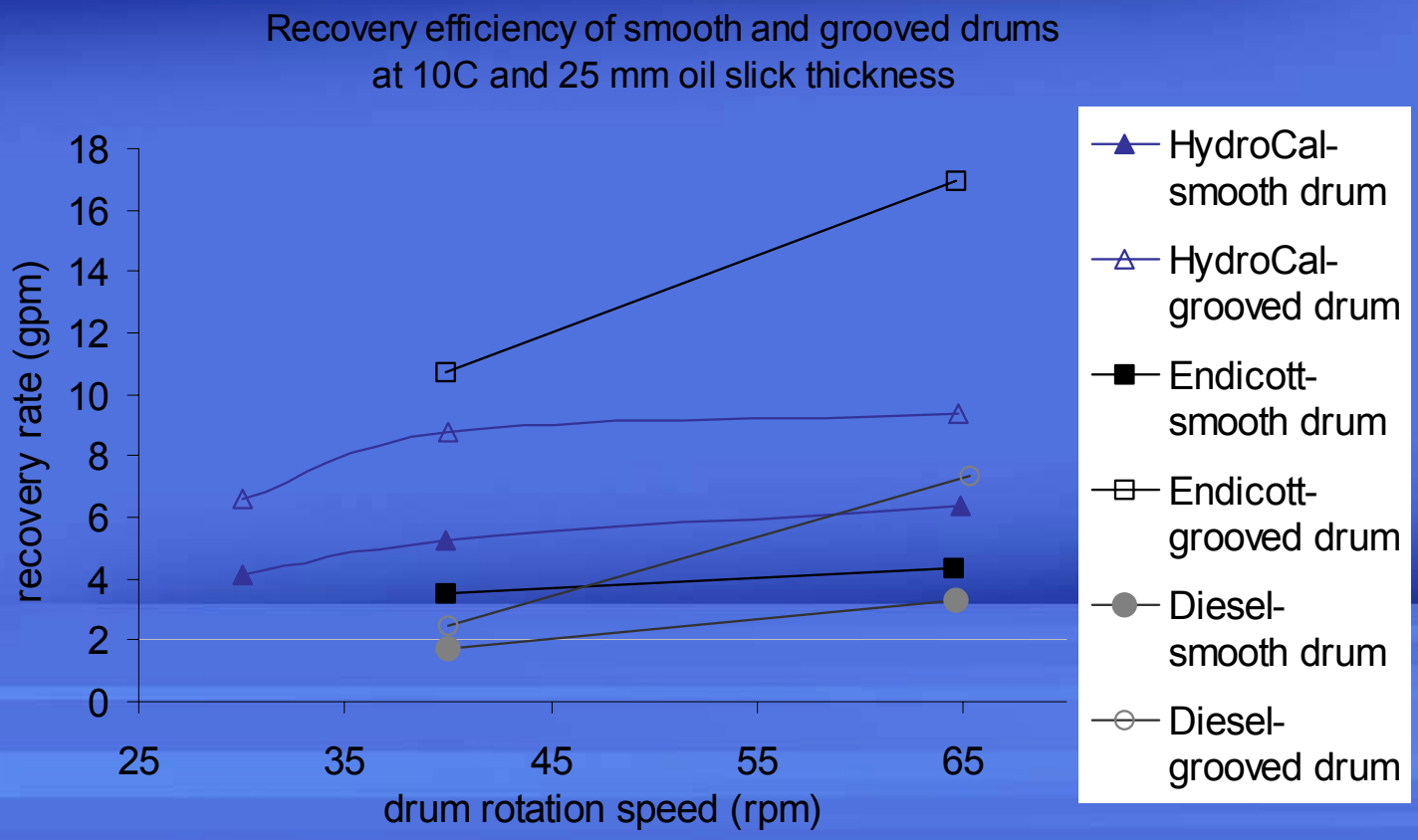
Test results: oil type and temperature. Smooth drums.



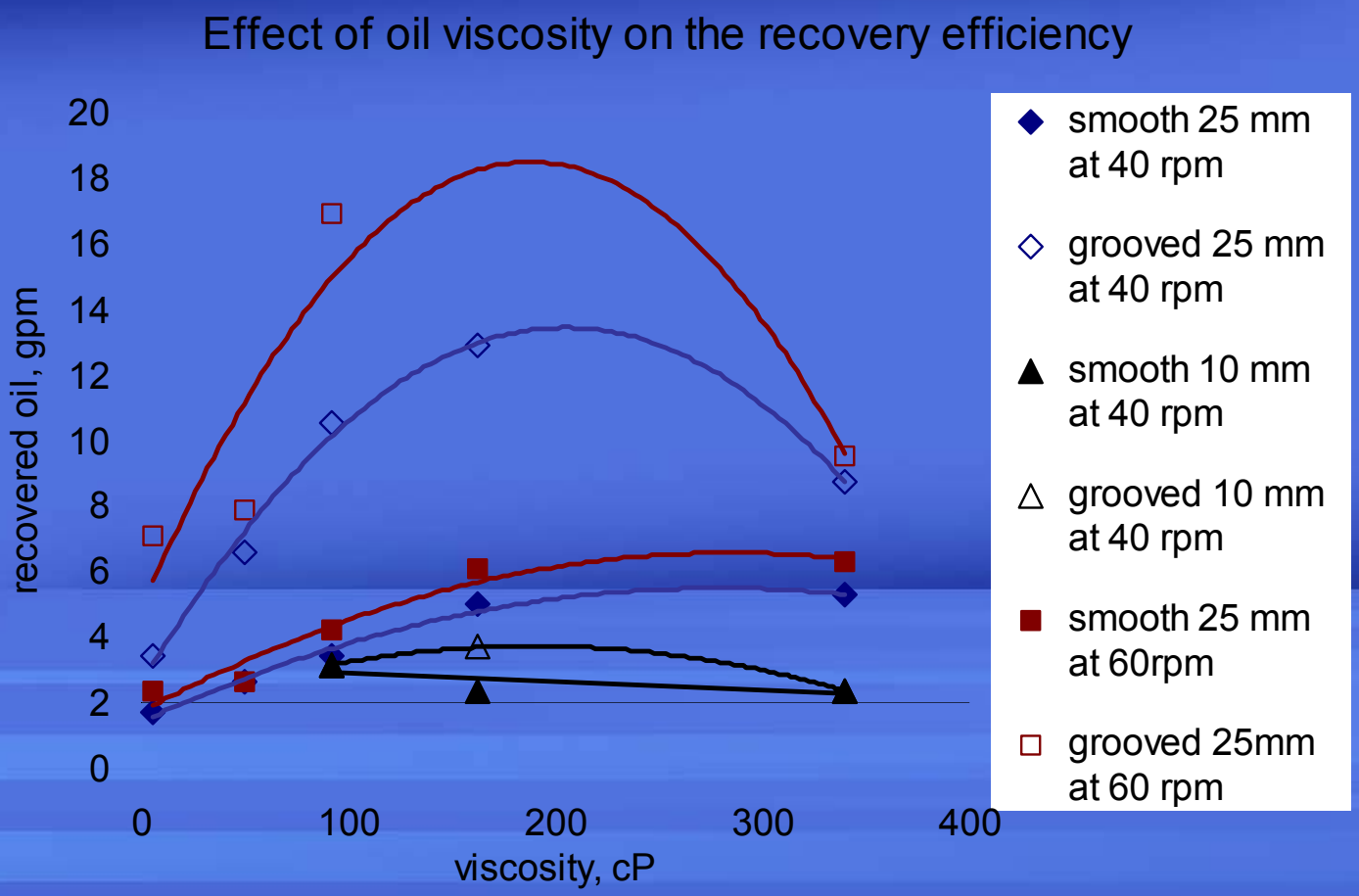
Test results: oil type and drum pattern at 25ºC



Test results: oil type and drum pattern at 10ºC



Test results: oil viscosity and drum pattern



Conclusions

- **Proposed grooved pattern can increase recovery efficiency by 100-200%.**
- **Recovery surface material can increase recovery efficiency by 20%.**
- **We determined the effect of oil viscosity, oil slick thickness, and drum rotation speed on the recovery efficiency.**

Future work

- **Tailoring recovery surface to oil viscosity.**
- **Oil spill recovery in cold and ice-infested waters.**
- **Graduation and new job!**

Acknowledgements

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Questions ?


OASIS SE
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