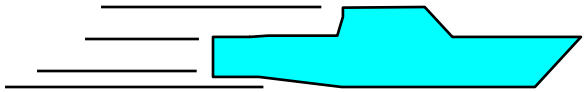
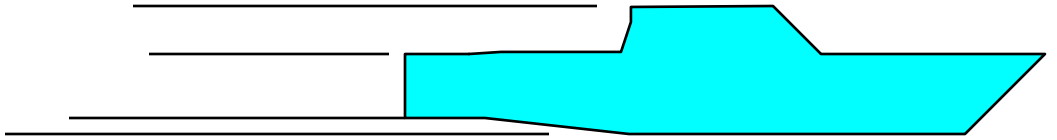


COMMERCIAL VIABILITY OF FAST TRANSATLANTIC FREIGHTERS



By Philippe GOUBAULT

for

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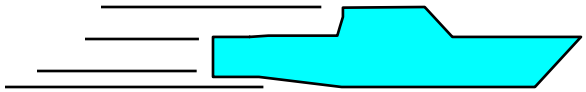
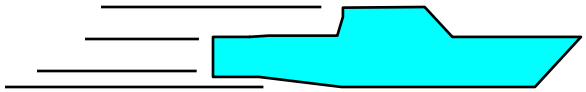


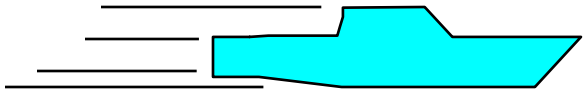
OBJECTIVES

- **Develop Conceptual designs of Fast Freighters for Transatlantic service, using various hullforms**
- **Optimize Speed/Payload for each hullform**
- **Assess Cost Effectiveness**



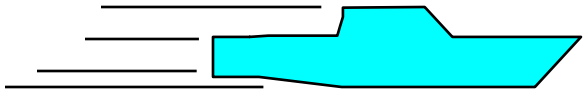
HULLFORMS CONSIDERED

- **Displacement Monohull**
- **Semi-Planing Monohull**
- **Semi-SWATH**
- **Surface Effect Ship**



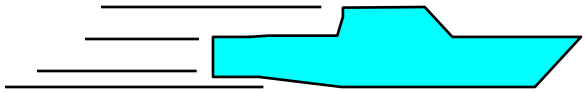
DESIGN REQUIREMENTS

- **PAYLOAD:**
  - **1500 ST / 50000 SFT Minimum**
  - **5000 ST / 200000 SFT Desired**
- **SPEED :**
  - **25 kt Minimum**
  - **50 kt Preferred**
- **RANGE:**
  - **3000 NM (+margin) Minimum**



GENERAL ASSUMPTIONS

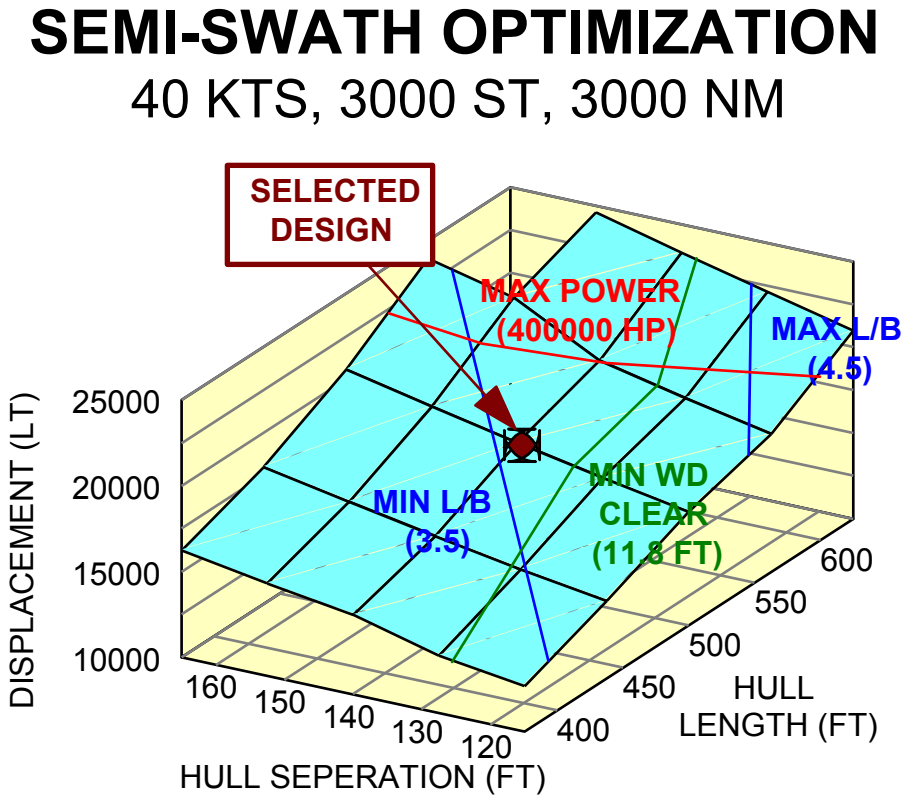
- **Technology projected to 3-5 years**
- **50,000 HP Marine Gas Turbine available**
- **Max propulsion power = 400,000 HP**
- **Large waterjets (e.g. up to 100,000 HP capability) available**
- **All designs to require equal time for loading / off-loading**



PARAMETRICS

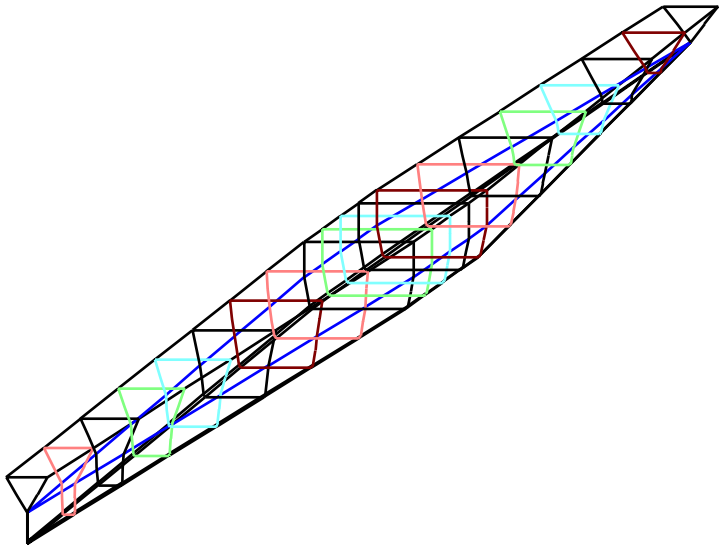
- **Varied Speed, Range and Payload**
- **Carried out parametric optimization for 40 designs:**
  - **7 Conventional Monohull designs**
  - **10 Semi-Planing Monohull designs**
  - **14 Semi-SWATH designs**
  - **9 Surface Effect Ship designs**
- **Each design was itself the result of parametric variations of their dimensions (25 variants per design approx. => nearly 1000 designs total)**

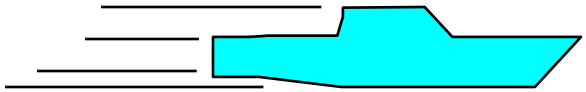
TYPICAL CARPET PLOT OPTIMIZATION



DISPLACEMENT MONOHULL

- **Design requirements selected:**
  - **5000 ST payload**
  - **9000 NM range**
  - **Max speed 39.5kt**
- **Propulsion:**
  - **Marine screws**
- **Hullform type :**
  - **SL7 derived (more slender)**



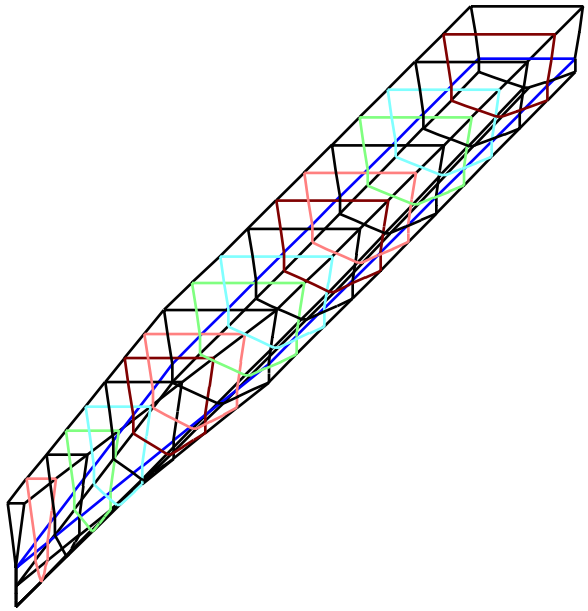


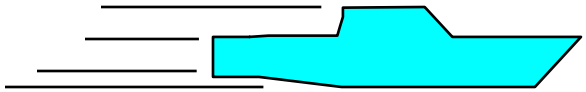
DISPLACEMENT MONOHULL

- **Overall Length : 921 ft**
- **Overall Beam : 104 ft**
- **Displacement : 47,100 LT**
- **Propulsion Power : 300,000 HP**
- **Cruise speed : 38.7 kt (85% MCP)**
- **Range : 9765 NM**
- **Payload : 5000 ST**

SEMI-PLANING MONOHULL

- **Design requirements selected:**
  - **5000 ST payload**
  - **5000 NM range**
  - **Max speed 43.5kt**
- **Propulsion:**
  - **Waterjets**
- **Hullform type :**
  - **Deep-V, rounded chine**



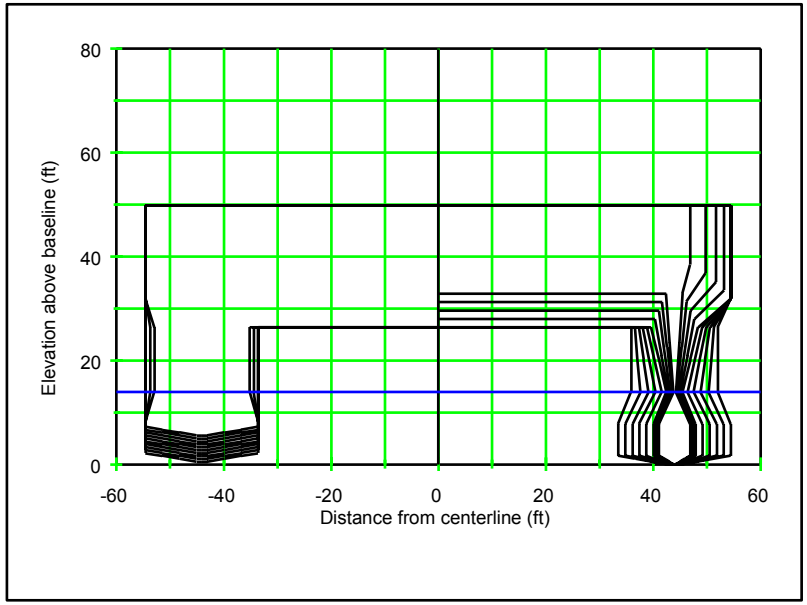


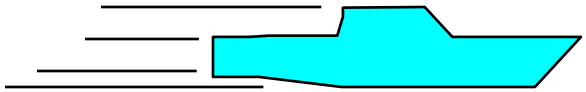
SEMI-PLANING MONOHULL

- **Overall Length : 736 ft**
- **Overall Beam : 122 ft**
- **Displacement : 29,354 LT**
- **Propulsion Power : 400,000 HP**
- **Cruise speed : 41.9 kt (85% MCP)**
- **Range : 4960 NM**
- **Payload : 5000 ST**

SEMI-SWATH

- **Design requirements selected:**
  - **3000 ST payload**
  - **3500 NM range**
  - **Max speed 45.0kt**
- **Propulsion:**
  - **Waterjets**
- **Hullform type :**
  - **Semi-SWATH catamaran**



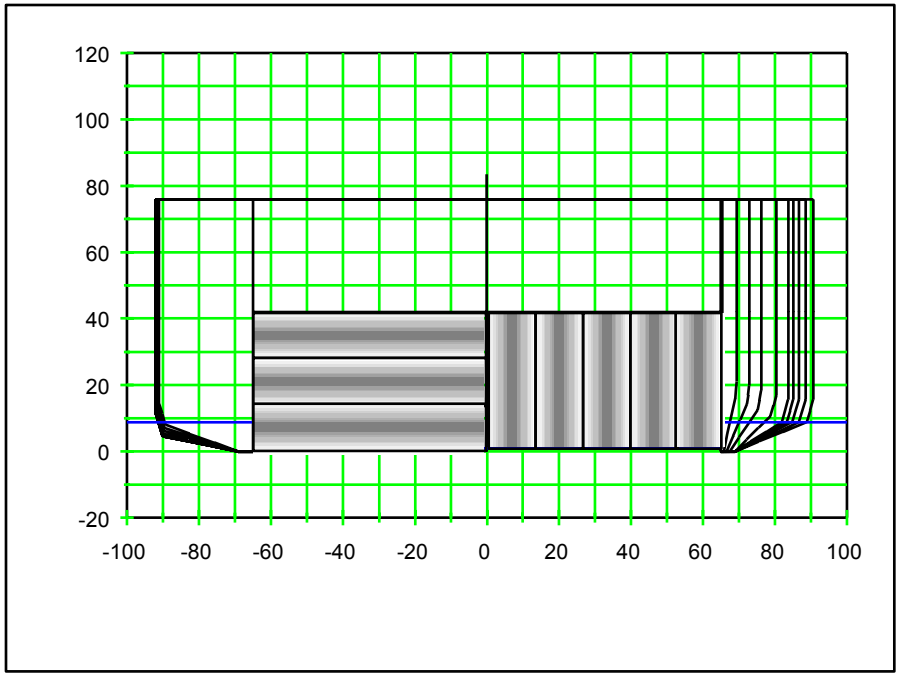


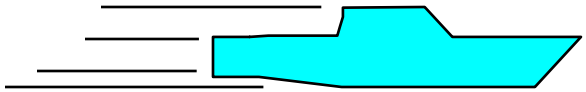
SEMI-SWATH

- **Overall Length : 557 ft**
- **Overall Beam : 184 ft**
- **Displacement : 18,350 LT**
- **Propulsion Power : 400,000 HP**
- **Cruise speed : 42.8 kt (85% MCP)**
- **Range : 3400 NM**
- **Payload : 3000 ST**

SURFACE EFFECT SHIP

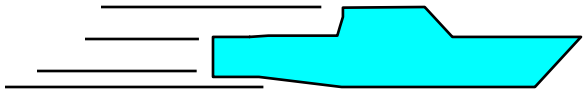
- **Design requirements selected:**
  - **5000 ST payload**
  - **3000 NM range**
  - **Max speed 53 kt**
- **Propulsion:**
  - **Waterjets**
- **Hullform type :**
  - **Surface Effect Ship**





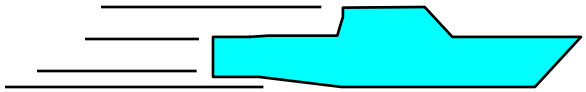
SURFACE EFFECT SHIP

- **Overall Length : 675 ft**
- **Overall Beam : 164 ft**
- **Displacement : 20,400 LT**
- **Propulsion Power : 520,000 HP**
- **Cruise speed : 51.5 kt (85% MCP)**
- **Range : 3000 NM**
- **Payload : 5000 ST**

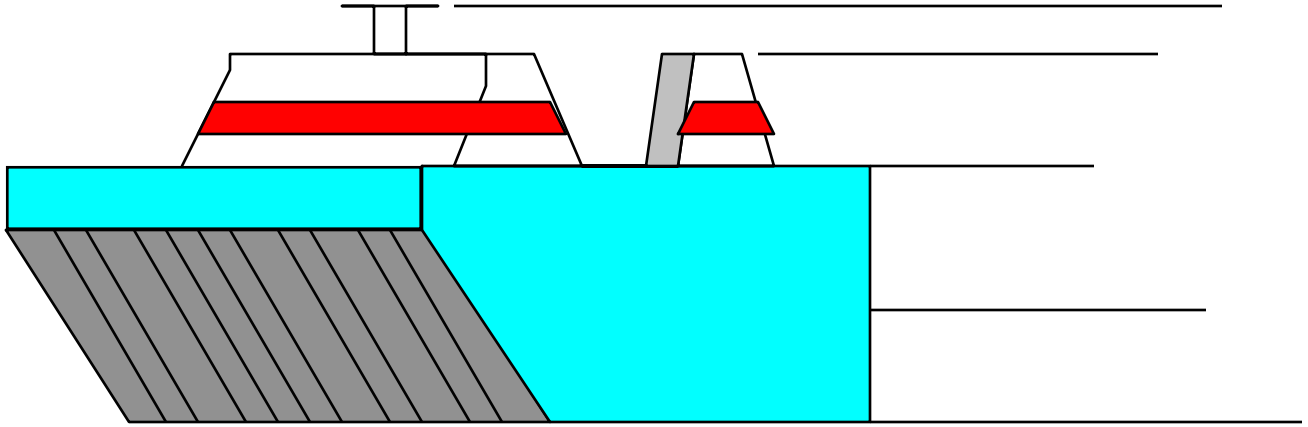


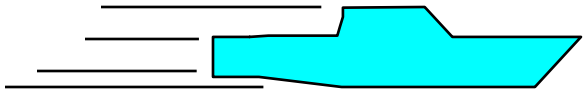
SUMMARY COMPARISON

	Displ Mono	S-P Mono	Semi-SWATH	SES
LOA (ft)	921	736	557	675
BOA (ft)	104	122	184	164
Draft (ft)	30	33	40	36/9
Displ (LT)	47100	29354	18350	20400
Power (HP)	300000	400000	400000	520000
Sust. Spd (kt)	38.7	41.9	42.8	51.5
Range (NM)	9765	4960	3408	3000
Payload (ST)	5000	5000	3000	5000



COST EFFECTIVENESS



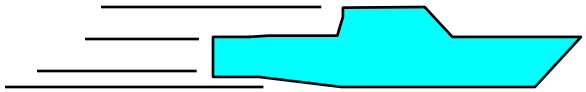


ASSUMPTIONS

- **Annual Freight = 850,000 ST**
- **Two departures / week (four for Semi-SWATH due to smaller capacity)**
- **Three vessels required (five for Semi-SWATH)**
- **20 year operation**
- **20 % operating profit**

OPERATING COST SUMMARY

	Displ Mono	S-P Mono	Semi-SWATH	SES
Construction ($M)	574	473	366	414
Annual O&S ($M)	142	142	141	169
Cost/Lb ($/lb)	0.449	0.429	0.669	0.480
Avg load factor (%)	85	85	71	85
Travel time (days)	3.12	2.89	2.82	2.34

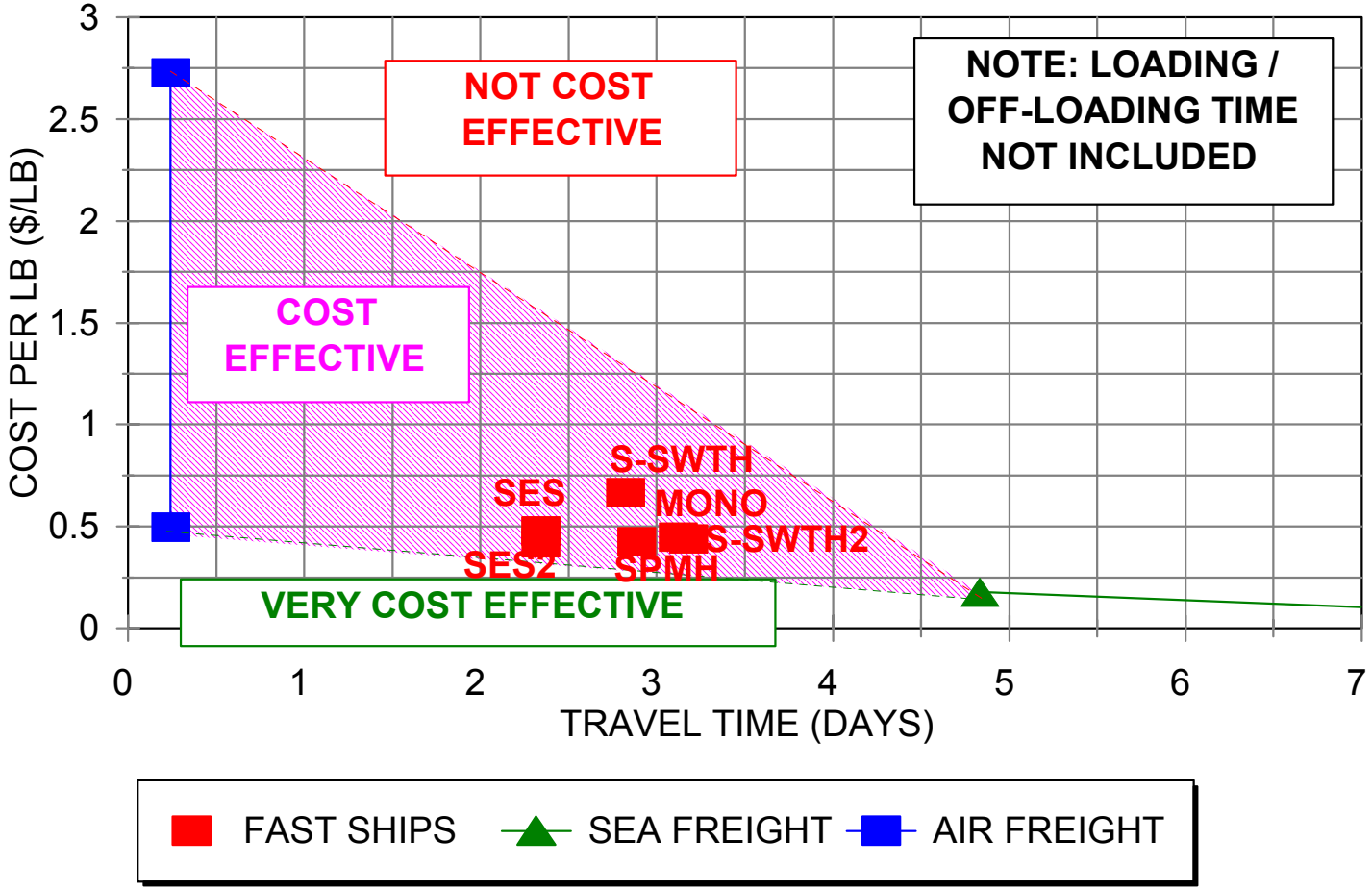


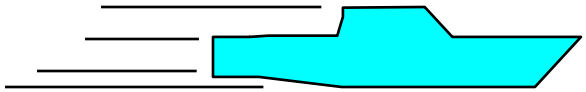
ALTERNATIVES CONSIDERED

	S-SWATH 2 (3 larger vessels)	SES 2 (2 vessels only)
Displ (LT)	24800	20441
Speed (kt)	38	51.5
Constr. Cost ($M)	440	414
O&S Cost ($M)	151	235
Cost / Lb	0.442	0.422
Load Factor (%)	85	85
Travel time (days)	3.18	2.34

COST EFFECTIVENESS ASSESSMENT

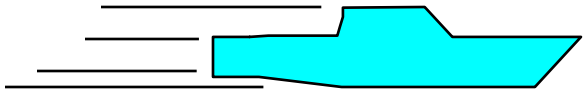
TRANS-ATLANTIC ROUTE





CONCLUSIONS

- **All Fast Ships fall in "Cost effective" zone**
- **Semi-SWATH least cost-effective due to smaller capacity**
- **All concepts show good potential**
- **SES has greatest potential but at higher risk (Technical & Operational)**



CONCLUSIONS

- **All designs assessed are feasible, but will require technological developments**
- **The 'Middle Market' appears viable**
- **All concepts are cost effective**