

Mechanical Failure – the facts

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Question No. 1

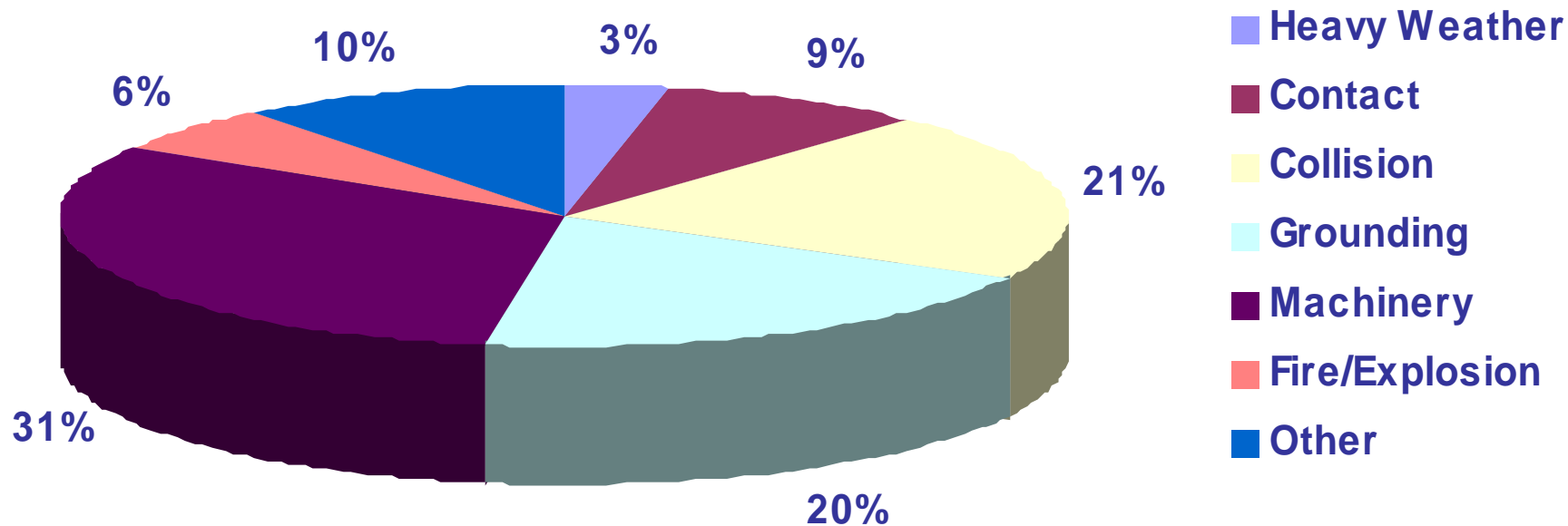
What claims category accounts for the highest aggregated claims cost?

A: Collisions

B: Groundings

C: Machinery

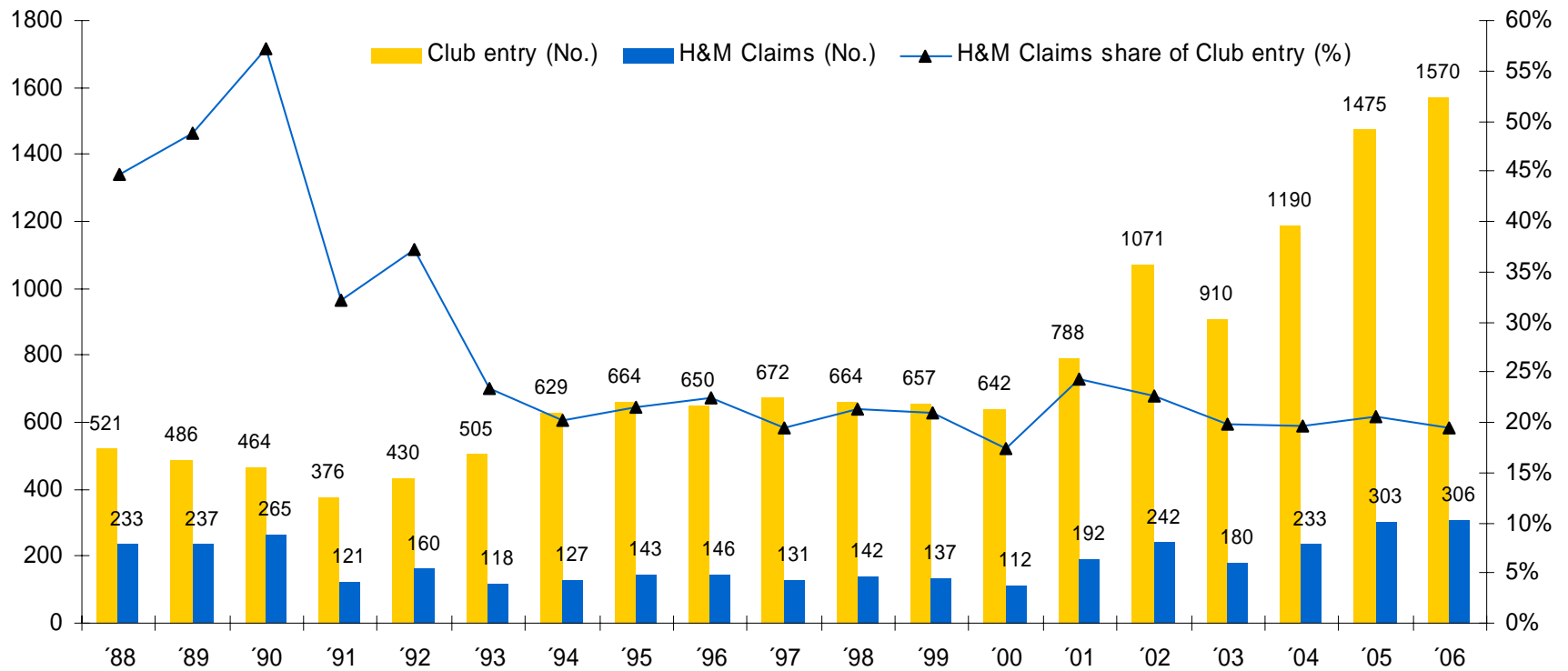
Hull & Machinery: Claims by cost 1998-2006



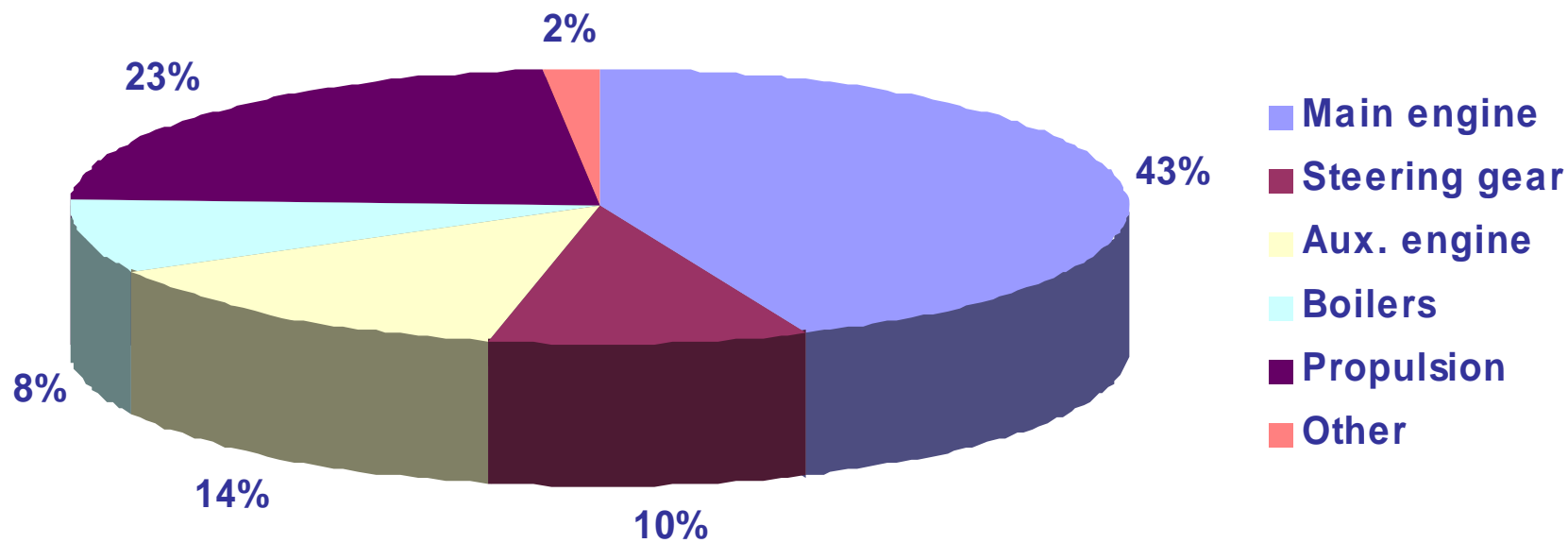
H&M Claims 1998-2006

Claims type	Number	Total Cost (USD)	Avg. Cost (USD)
Heavy Weather	101	27 310 050	270 397
Contact	261	72 871 936	279 203
Collision	214	176 987 490	827 044
Grounding	202	164 898 053	816 327
Machinery	867	263 390 668	303 795
Fire/Explosion	32	48 807 117	1 525 222
Other	190	88 348 286	464 991
Total	1867	842 613 599	451 320

H&M claims and trends, 1988-2006



Machinery claims, by cost 1998-2004

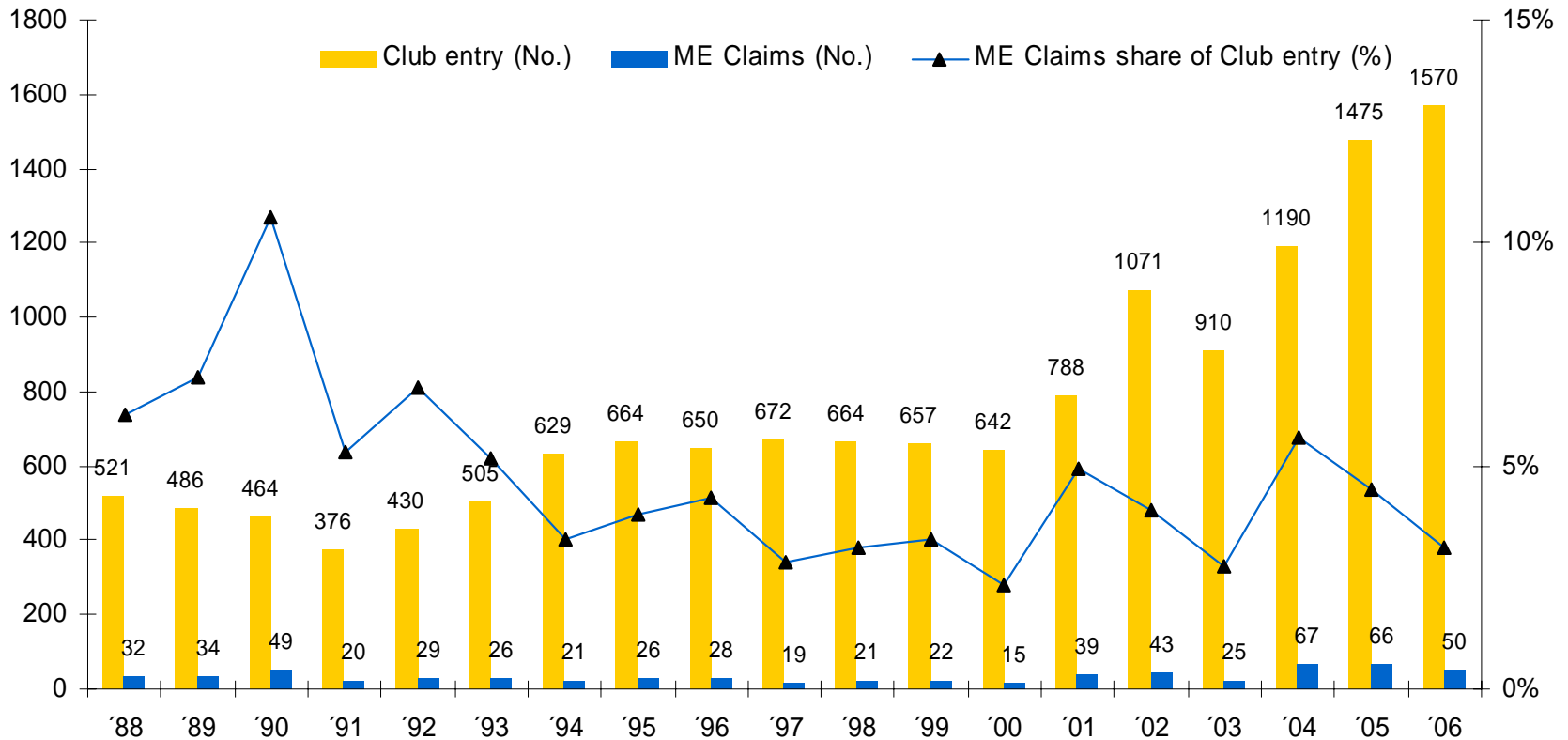


Machinery claims 1998-2006



Claims type	Number	Total cost (USD)	Avg. cost (USD)
Main engine	354	112 514 417	317 837
Steering gear	82	25 207 818	307 412
Aux. engine	166	35 854 708	215 992
Boilers	85	21 749 083	255 872
Propulsion	119	58 454 623	491 215
Other	19	4 047 198	213 010
Total	825	253 780 650	307 613

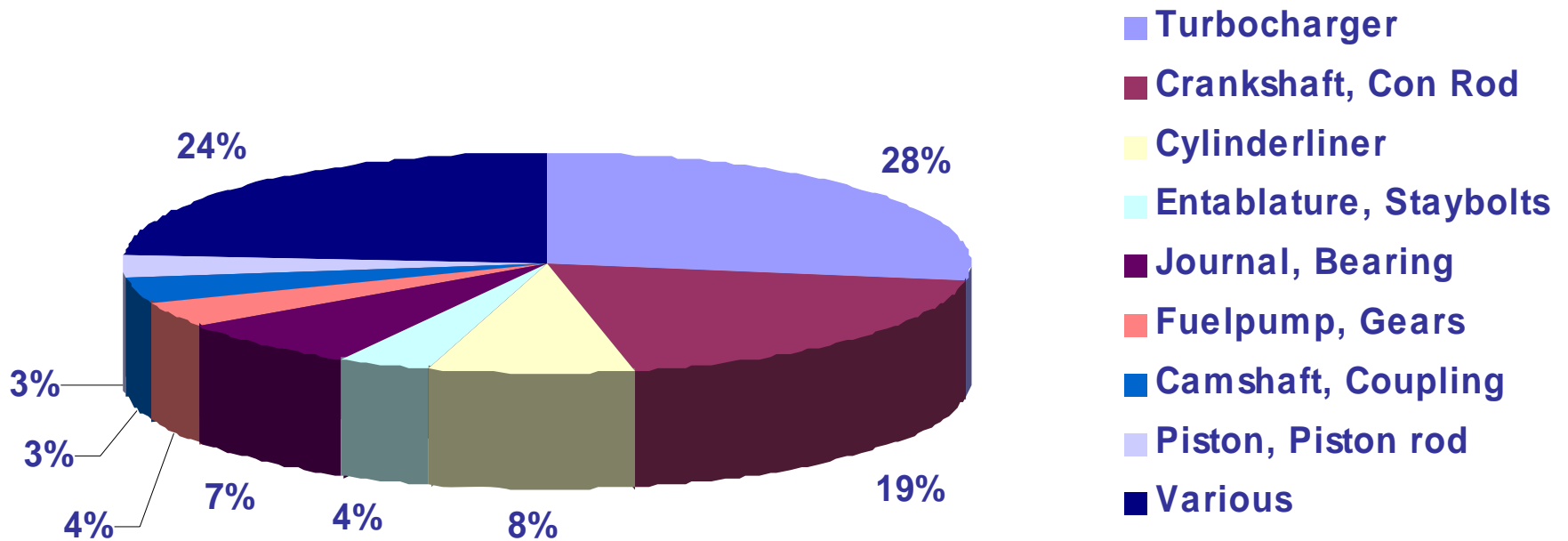
Main Engine claims and trends, 1988-2006



Investigation details

- **Period: 1998 – 2006**
- **Number of claims: 354**
- **Based on “our” fleet.**
- **NB! Deductible – avg. \$110 000**
- **Claims \geq \$10 000**

Main engine claims, by cost 1998-2006



Question No. 2

Of the Club's total cost for main engine claims which type of main engine accounts for the majority?

A: Low Speed

B: Medium Speed

C: Gas Turbines

Question No. 3

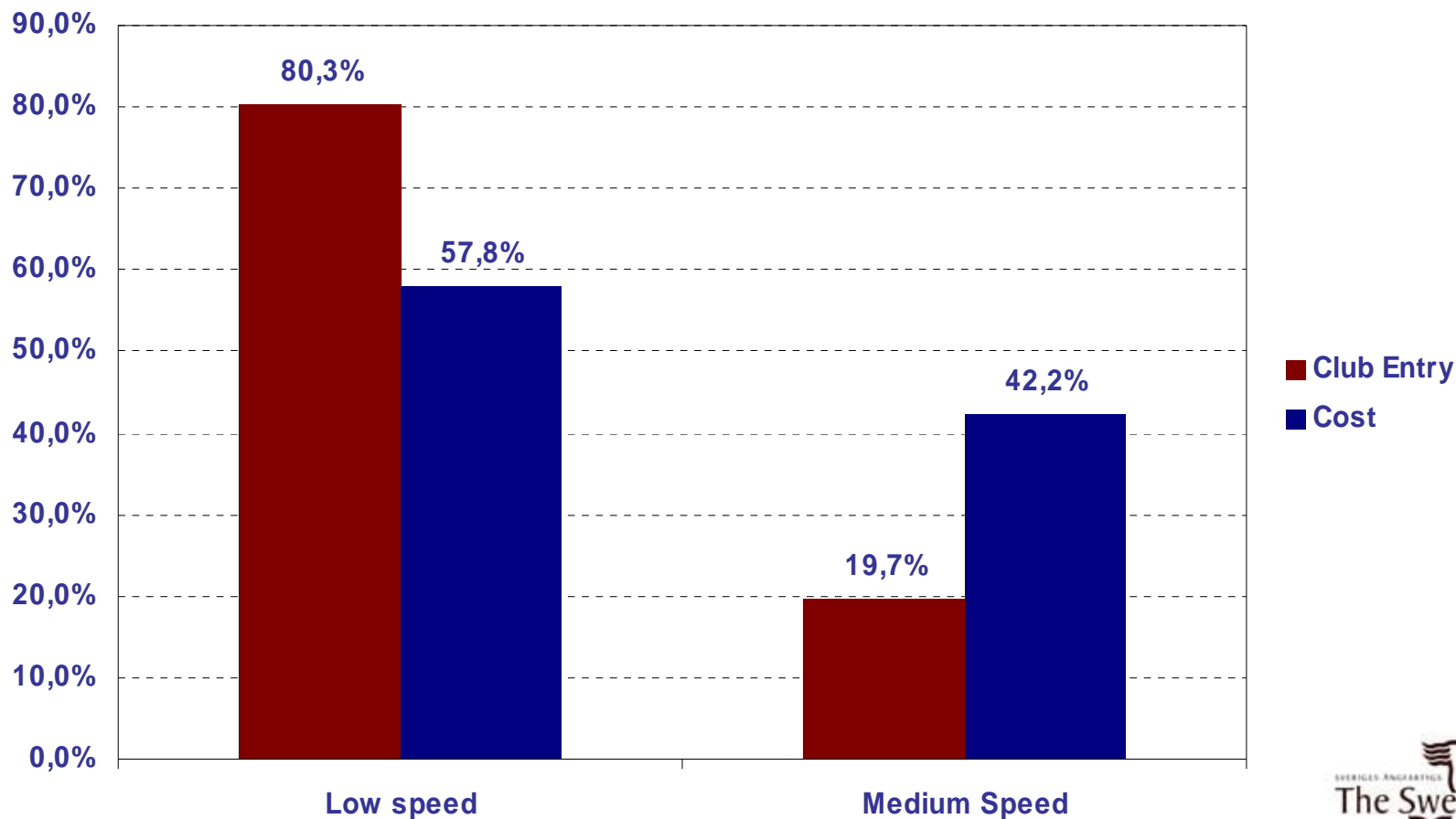
Of the Club's total number of entries for H&M, what is the proportion of Low Speed main engines respectively Medium Speed main engines?

A: Low Speed 20% – Medium Speed 80%

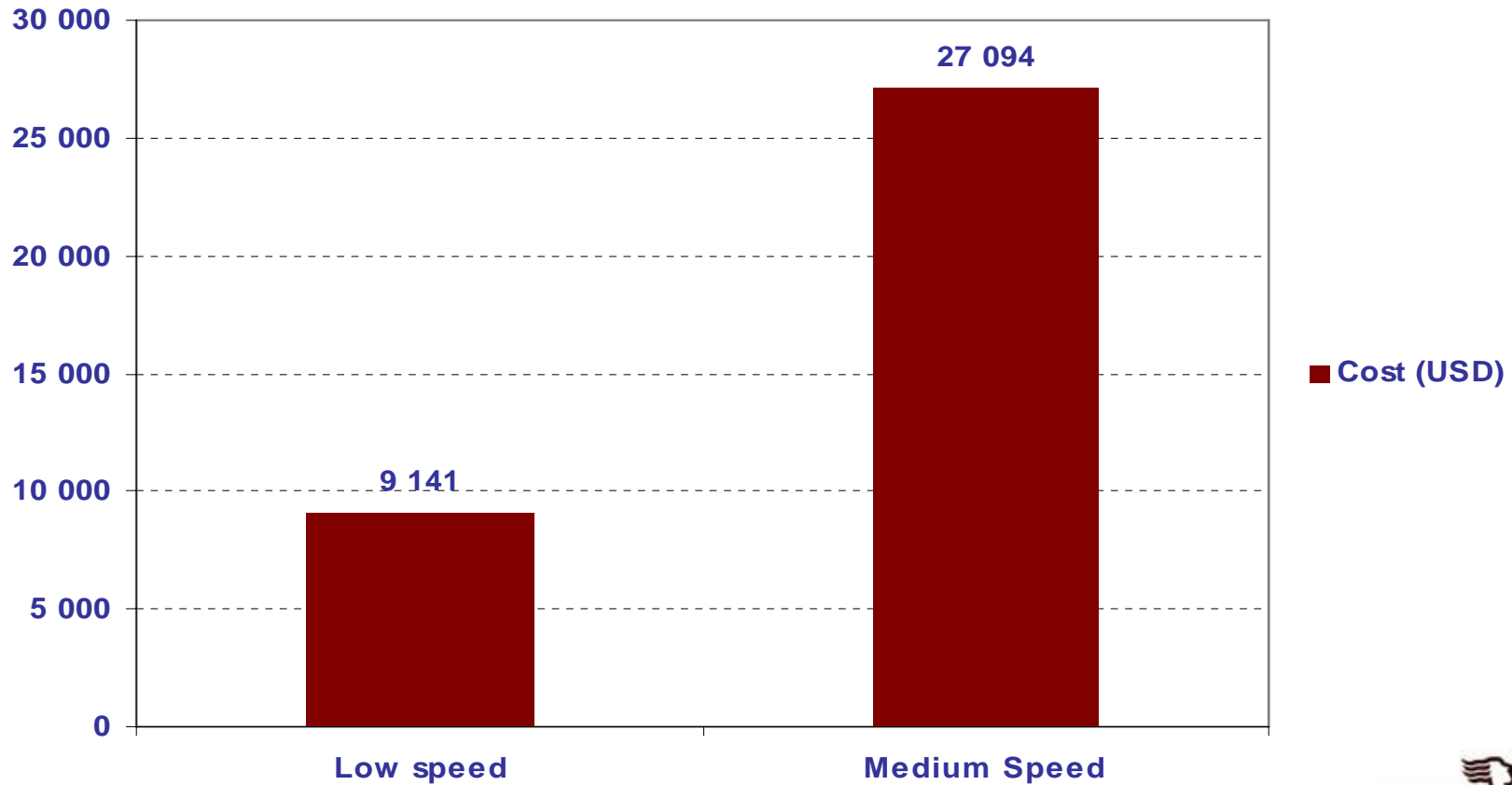
B: Low Speed 60% – Medium Speed 40%

C: Low Speed 80% – Medium Speed 20%

Percentage of Club entry and damage cost (1998 - 2006)



Cost per ship and year (USD) 1998 - 2006



Types of main engine claim: all



Claims type	Number	Total cost (USD)	Avg. Cost (USD)
Turbocharger	135	32 409 706	240 072
Crankshaft, Con Rod	30	22 655 684	755 189
Cylinderliner	31	9 126 286	294 396
Journal, Bearing	22	8 398 832	381 765
Entablature, Staybolts	19	4 130 803	217 411
Fuel pump, Gears	17	4 804 472	282 616
Camshaft, Coupling	12	4 100 955	341 746
Piston, Piston rod	14	3 971 266	283 662

- The eight most common main engine claims types.
- In terms of numbers and total cost, turbocharger damage remained the most common and costly claims category, accounting for 135 of the 354 claims and USD 32.4 million of the USD 117.7 million total cost.
- 104 of the 135 turbocharger claims involved low speed engines.
- Crankshaft & connecting rod failures was the second most common and expensive damage category. In terms of average cost, these failures produced the most expensive claims (USD 755,000/damage).

Types of main engine claim: low and medium speed 1998-2006



Slow speed

Avg. '05-'06

Claims type	Number	Total cost (USD)	Avg. Cost (USD)	
Turbocharger	104	27 869 016	267 971	336 877
Entablature, Staybolts	19	4 130 803	217 411	
Cylinderliner	28	8 291 734	296 133	
Journal, Bearing	13	3 906 343	300 488	
Piston, Piston rod	9	2 348 233	260 915	

Medium speed

Avg. '05-'06

Claims type	Number	Total cost (USD)	Avg. Cost (USD)	
Turbocharger	31	4 540 689	146 474	983 683
Crankshaft, Con Rod	27	19 496 058	722 076	
Camshaft, Coupling	8	3 451 850	431 481	
Journal, Bearing	9	4 492 490	499 166	
Fuelpump, Gears	7	1 023 196	146 171	

- The tables above show the five most common claims for low speed and medium speed engines.
- Turbocharger damage is the most common and expensive failure event for low speed engines.
- Crankshaft and connecting rod damage is the most expensive medium speed engine failure category. There were 27 such claims in 1998-2006, costing USD 19.5 million.
- The table to the left also shows that, on an average cost basis, damage to the Journal or Bearings is the most expensive claims type (at USD 300,500).

Turbochargers – who or what is at fault?

- Total cost for damages 1998-2006: USD 32 400 000
- 135 damages – average cost USD 240 000
- 40% of claims not related to turbine – foreign objects.
- Medium speed engine over-represented in number
- Running hours – Strictly adhere to the maker's instruction
- ABB SEKO Concept (life time of rotating parts)



Crankshafts, Connecting rods – who or what is at fault?



- **Total cost for damage 1998-2006: USD 22 700 000**
- **30 cases – average cost USD 755 000**
- **Very expensive!**
- **Predominantly a Medium Speed Engine issue**
- **Lubrication failure – filters, purifiers, contamination**
- **Lube oil analysis to be made on a quarterly basis**
- **The Swedish Club recommends that partical counts are included in the above analysis**



Crankshafts, Connecting rods – who or what is at fault?



- Automatic lube oil filter counter readings to be logged daily
- Contamination of lube oil – condition of cylinders
- Crank shaft deflection readings to be carried out regularly, and compared with previous readings
- In connection with repairs or maintenance make sure to follow proper procedures (shipyard visits)
- Bring in the experts!

Cylinder liners - Who or what is at fault?

- Total cost for damage 1998-2006: USD 9 100 000
- 31 cases – average cost USD 295 000
- Cylinder lubrication – Regular inspections through the scavenge ports (as often as possible)
- Piston rings – quality and condition
- Fuel oil – The Swedish Club recommends that no fuel oil is used prior to the analyses of the bunker has been received
- Mingling of bunkers should be avoided if possible
- Performance monitoring – pressure measurement and power calculation
- Running in after overhaul – adhere to manufacturer's recommendations



Journals, Bearings – who or what is at fault?

- Total cost for damage 1998 - 2006: USD 8 400 000
- 22 cases – average cost \$380 000
- Lube oil, lube oil, lube oil...
- Measurement of ovality
- Con rod bolts – life time expectancy, error in repairs/overhaul
- Con rod – ovality
- Proper tools and procedure
- Bring in the experts!

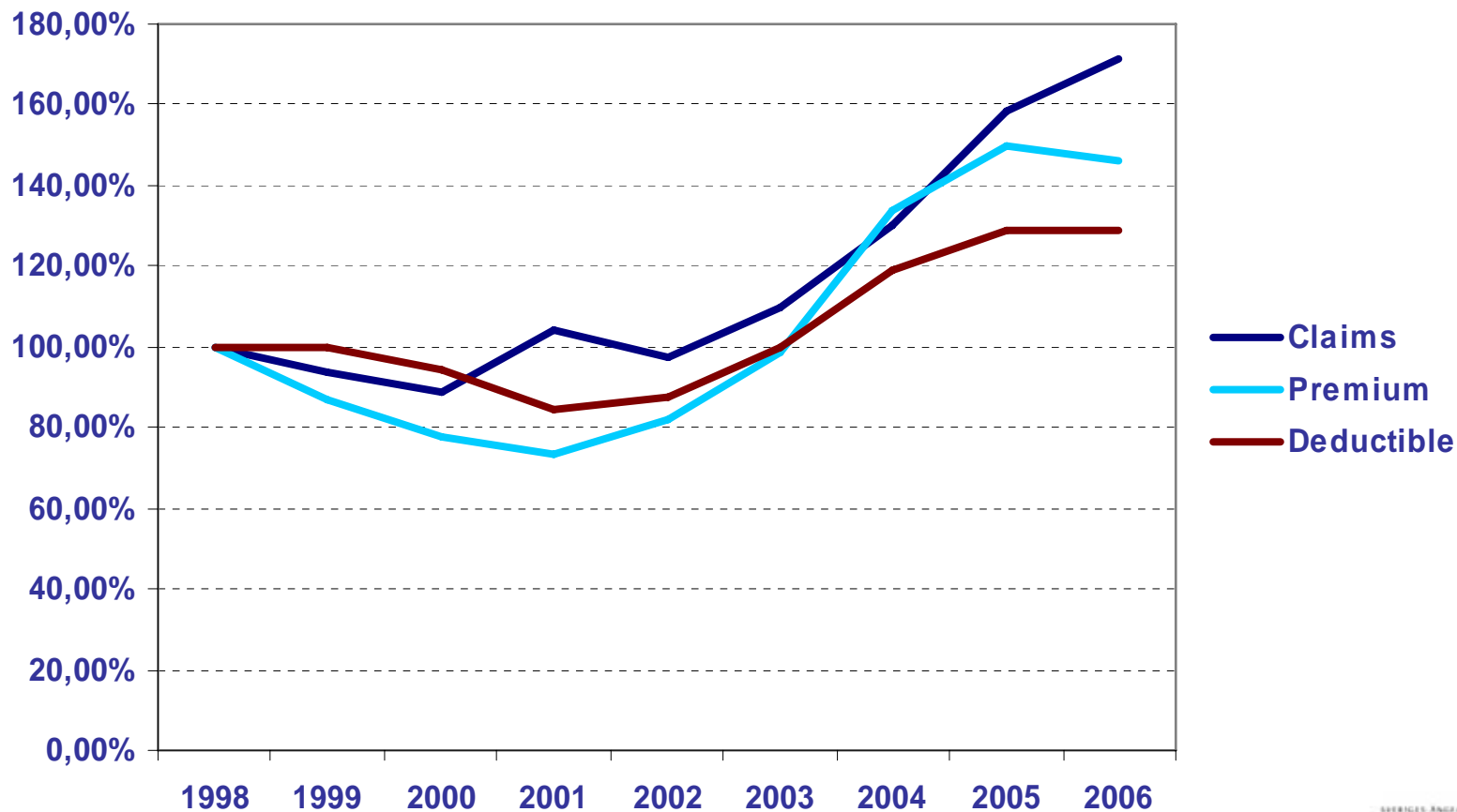


Inflation Exposure H&M

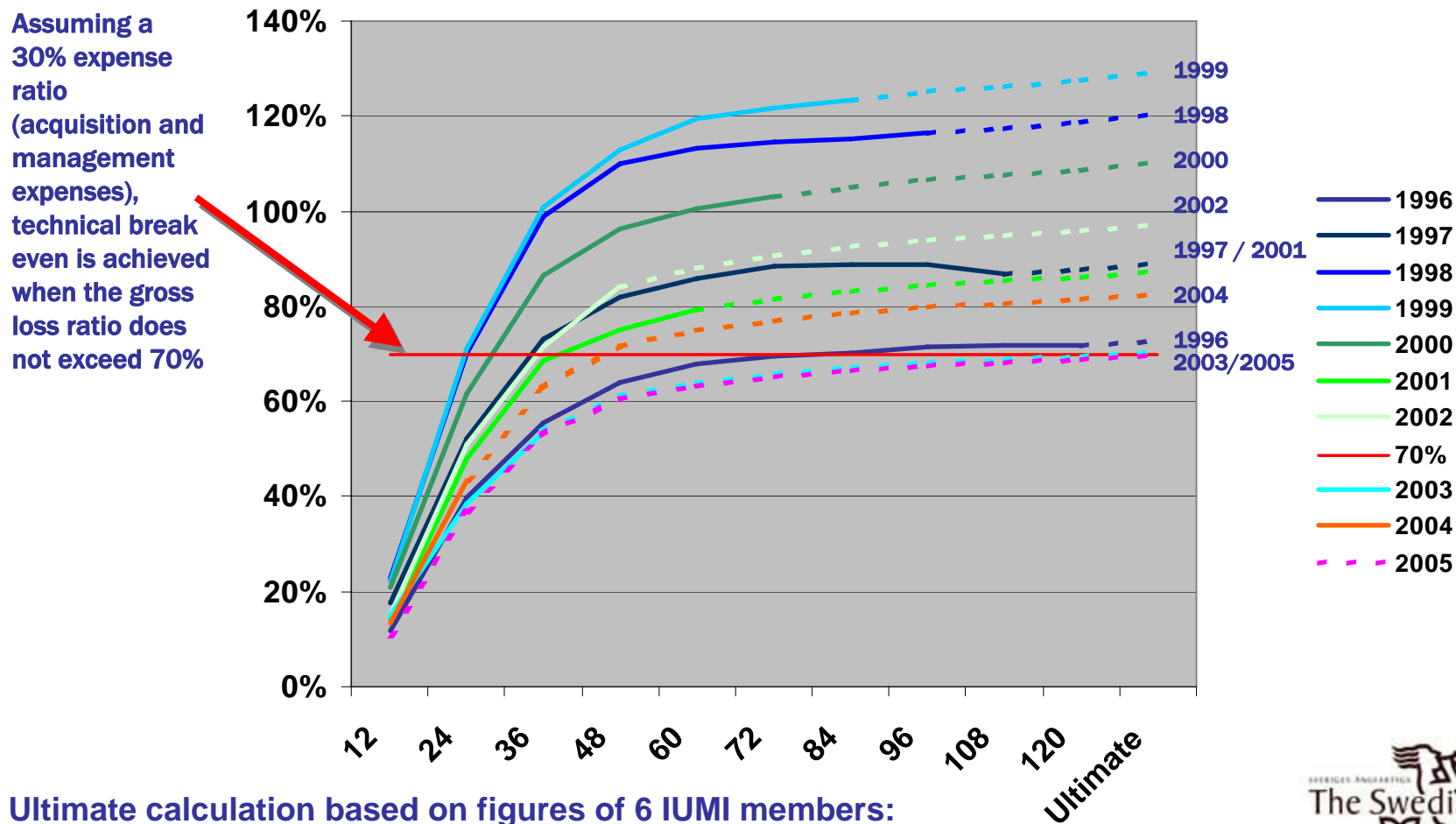


- Crew's experience/competence is decreasing
- Lack of dry-dock space and availability
- Larger vessels > require bigger dry docks
- In case of emergency dockings of large vessels there are substantial additional costs
- Larger main engine > more parts, larger parts, more expensive parts, for example: liners, bearings, pistons, cylinder heads
- Innovation and new design > untested technology
- Larger vessels contains additional auxiliary engines and T/C
- Steel price is increasing
- Delivery time for spares is extended

Hull & Machinery: claims cost and premium/deductible trends



Marine Hull – Evolution of Gross Loss Ratio, actual and estimated towards ultimate U/W Year 1996 to 2005



Ultimate calculation based on figures of 6 IUMI members:
 France, Germany, Italy, Norway, UK Lloyds, UK IUA (5 for 1996 – no Germany)



Question No. 4

And the winner is?

A: Underwriters

B: Owners

C: No one

Why insure such failures? How to insure such failures?

If one is to insure these failures, consider the following:

- Underwriting is a cyclical and painful exercise that requires discipline over time
- There will most certainly be a market reaction given claims development and current rates
- There is no alternative to Exposure Rating
- If you are not able to rate exposure commensurate to the risk assumed – don't assume the risk
- Active and focused loss prevention will assist you – but only to a certain extent

Minor engine problem off Dutch Harbour, Alaska, 2004



Current reserve: USD 167 000 000



Minor engine problem off La Rochelle, France

Current reserve: USD 83 000 000



2006.10.27

Leaning towards an increase in premium



2006.10.26

Where it all started

