



Monitoring Rowing Training

- a. Monitoring Performance
- b. Monitoring Training Load
- c. Monitoring Technique



Analysis Olympic Rowing



- » **Distance:** 2.000m
- » **Duration:** 5'30" - 8'00"
- » **Stroke Rate:** 34 - 40 strokes per minute
- » **Number strokes:** 220 - 250 strokes
- » **Stroke profile :** \pm isokinetic
- » **Power output:** 800 - 1000 N



Power Endurance Sport

70%-80% Aerobic

20%-30% Anaerobic



Limiting Factors

- Anthropometrics
- Physiological
- Psychological
- Technique
- Physical condition



Limiting Factors

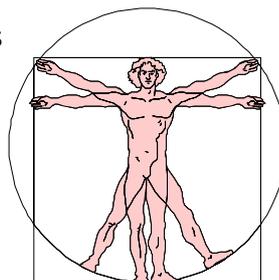
- Anthropometrics*
- Physiological*
- Psychological*
- Technique
- Physical condition

*determined by genetics



Anthropometrical

- A) Dimensions (height, weight, BMI,...)
- B) Form and proportions
- C) Body Composition
- D) Maturation age
- E) Functionality



Physiological

- A) Oxygen Consumption (VO_2 max.)
- B) Anaerobic Threshold
- C) Anaerobic Power.



Physical condition

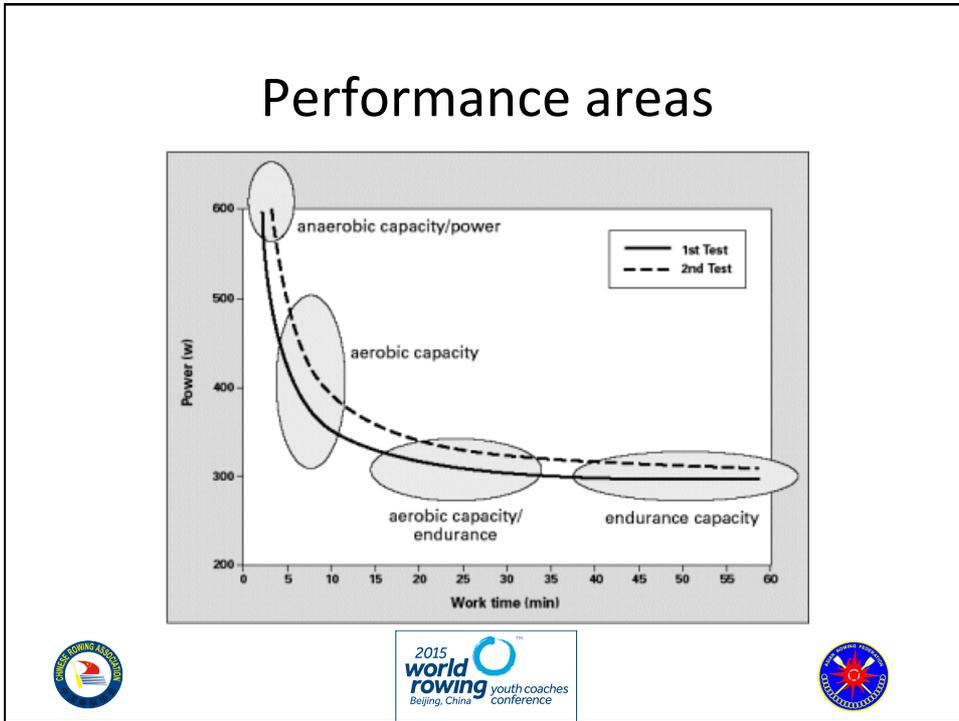
- A) General Strength condition
- B) Maximal Strength / Power
- C) General health condition



Monitoring Performance

- General performance Running Tests, Static bike Test, ...
- Semi-specific performance ergometer Tests: CII, RowPerfect,...
- Specific performance on water, competition,...





Performance Test

REPORT: Ergometer Power-Profile

Name: **Dani Fridman** Category: **Senior A Heavyweight Male**

Test Dates: 29/11/13 thru to 03/12/13

Current Test Data

| Date | Weight (kg) | Time | Test Distance (m) | Time (mm:ss.s) | Time (ss.s) | Av. Power Output (W) | Av Pace (m:ms.ss.s) | Av. Stroke Rate (spm) | Int. Standard (W) | International Standard |
|----------|-------------|------|-------------------|----------------|-------------|----------------------|---------------------|-----------------------|-------------------|------------------------|
| 03/12/13 | 92,50 | | 100 | 00:15,4 | 15,4 | 767 | 01:17,2 | 55 | 1020 | 75,1% |
| 03/12/13 | 92,50 | | 500 | 01:21,9 | 81,9 | 637 | 01:21,9 | 45 | 797 | 79,9% |
| 30/11/13 | 92,50 | | 2000 | 06:09,7 | 369,7 | 443 | 01:32,4 | 33 | 532 | 83,4% |
| 29/11/13 | 92,50 | | 6000 | 20:04,4 | 1204,4 | 346 | 01:40,4 | 27 | 414 | 83,7% |
| 03/12/13 | 92,50 | | 8392 | 30:00,0 | 1800,0 | 284 | 01:47,2 | 20 | 0 | |

Previous Test Data

| Date | Weight (kg) | Time | Test Distance (m) | Time (mm:ss.s) | Time (ss.s) | Av. Power Output (W) | Av Pace (m:ms.ss.s) | Av. Stroke Rate (spm) | Int. Standard (W) | International Standard | Current data compared to this data |
|----------|-------------|------|-------------------|----------------|-------------|----------------------|---------------------|-----------------------|-------------------|------------------------|------------------------------------|
| 22/02/13 | 99,00 | | 100 | 00:15,7 | 15,7 | 724 | 01:18,5 | 61 | 1020 | 70,9% | 6% |
| 22/02/13 | 99,00 | | 500 | 01:23,1 | 83,1 | 610 | 01:23,1 | 47 | 797 | 76,5% | 4% |
| 14/02/13 | 99,00 | | 2000 | 06:13,3 | 373,30 | 431 | 01:33,3 | 34 | 532 | 81,0% | 3% |
| 12/02/13 | 99,00 | | 6000 | 19:47,9 | 1187,9 | 361 | 01:39,0 | 26 | 414 | 87,2% | -4% |
| 22/02/13 | 99,00 | | 8433 | 30:00,0 | 1800,0 | 288 | 01:46,7 | 20 | | #I/DIV/OI | -1% |

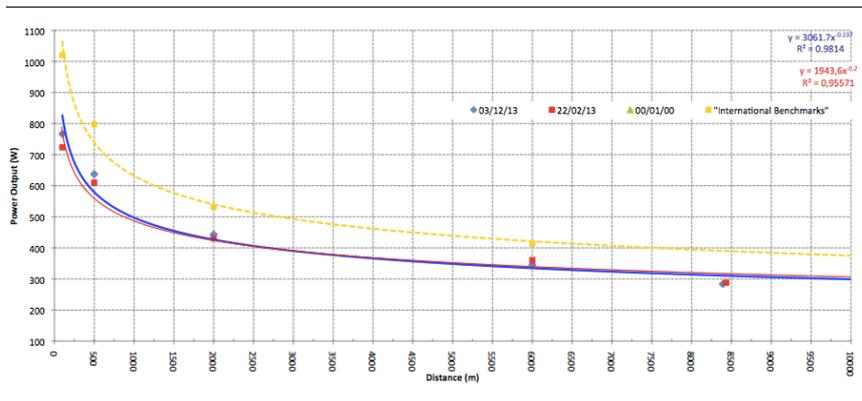




2015 world rowing youth coaches conference
Beijing, China



Performance Test



Step Test on CII ergometer for direct determination of VO_2 max



Step Test on CII ergometer for direct determination of VO_2 max



Schuttle Run by Leger & Lambert for indirect determination of VO_2 max in ml/kg./min.

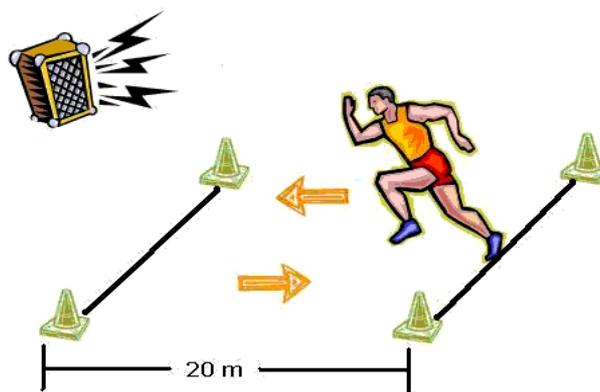


Fig.1 Test de Course Navette de Leger y Lambert



Specific Rowing Tests

- 6.000m Time Trial in short boats (1x/2-)
- Seat racing (500m / 1.000m) for crew building
- 2.000m Time Trial in best possible conditions.
- 2.000m race in competition format.



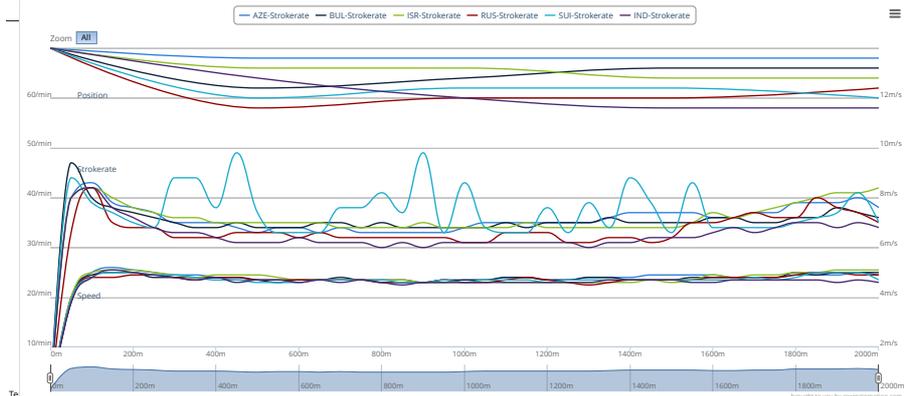
Horrible Analytics

2013 - World Rowing Championships

Powered by Rowing to Motion (http://horrible.com/share/action-click&publisher_id=31144&cta_id=23952&offer_id=253492&url=http%3A%2F%2Fwww.rowingmotion.com%2F%3Futm_source%3D%26utm_medium%3Dwebapp%26utm_campaign%3D%26event%3D%26)

Challenge

M1x Final B



Te (<http://www.rowingmotion.com/terms-of-service>) Privacy Policy
 Data provided by World Rowing Official Results (<http://www.worldrowing.com/results>)
 (<http://www.rowingmotion.com/privacy-policy>)
 brought to you by rowingmotion.com



Monitoring training load

Performance tests and medical check-ups are relevant and should be conducted regularly to track changes in performance.

Unfortunately, most of the methods to assess performance are not always convenient for daily training, since they tend to be invasive, exhausting, expensive, and/or time-consuming.

Monitoring daily training load might be beneficial for an optimized athlete development, due to better training regulation and the possibility of detecting overtraining or injuries early on.



Monitoring training load

Table 1: Parameters for Monitoring Daily Training in the Literature

| Parameter | Number of Studies | Sports | Feasibility | Validity |
|-------------------------------|-------------------|--|-------------|----------|
| Duration and Kind of Activity | 16 | Triathlon, Running, Cycling, Track and Field, Swimming, Rowing | + | + |
| Heart Rate | 23 | Triathlon, Running, Cycling, Swimming | 0/+ | + |
| Heart Rate Variability | 8 | Triathlon, Running, Rowing | 0/+ | 0 |
| Blood Lactate Concentration | 9 | Triathlon, Cycling, Swimming, Rowing | - | + |
| Hormones in Blood and Saliva | 11 | Triathlon, Running, Cycling, Swimming, Rowing | B S 0/+ | + |
| Oxygen Consumption | 6 | Triathlon, Cycling | - | + |
| Rating of Perceived Exertion | 16 | Triathlon, Running, Cycling, Swimming | + | + |
| Questionnaires | 11 | Triathlon, Running, Cycling, Track and Field, Swimming, Rowing | 0 | + |

Roos L. et al.



Current Monitoring Practices

Current best practice methods for monitoring fatigue in high-performance sport were recently examined by Taylor*.

A total of 55 individuals working with high-performance programs across Australia and New Zealand completed an online survey, with 91 % indicating that they implemented some form of training monitoring and a majority (70 %) reporting equal focus on load quantification and monitoring fatigue and recovery within their system.

The most important reasons for monitoring were reported to be injury prevention (29%), monitoring the effectiveness of the training program (27%), maintaining performance (22%), and preventing overtraining (22%).

In terms of the importance of monitoring to the overall performance of the athletes, 38% of respondents rated it extremely valuable. Self-report questionnaires were the most common means of monitoring fatigue (84%), with the frequency of monitoring reported as daily (55%), multiple times per week (24%), weekly (18%), or monthly (2%)

Roos L. et al.

* Taylor K. *Fatigue in high performance sport: a survey of current trends. J Aus Strength Cond. 2012; 20:12-23*



Current Monitoring Practices

Actually, reviewing Literature, no study has clearly shown that laboratory testing is more reliable or valid than daily log for determination of fatigue and recovery processes despite the use of physiological measures:

HLa/Rpe, Catecholamine, Glutamine, IgA, 5-HT (Serotonine) receptors, etc...

Daily log (Training Diary) is a simple, cost effective and non invasive tool for monitoring training load and recovery.



Rating of Perceived Exertion

| Rating of Perceived Exertion (RPE) | |
|------------------------------------|--------------------|
| 6 | No exertion at all |
| 7 | |
| 8 | Extremely light |
| 9 | Very light |
| 10 | |
| 11 | Light |
| 12 | |
| 13 | Somewhat hard |
| 14 | |
| 15 | Hard (heavy) |
| 16 | |
| 17 | Very hard |
| 18 | |
| 19 | Extremely hard |
| 20 | Maximal exertion |

(Borg 1970)

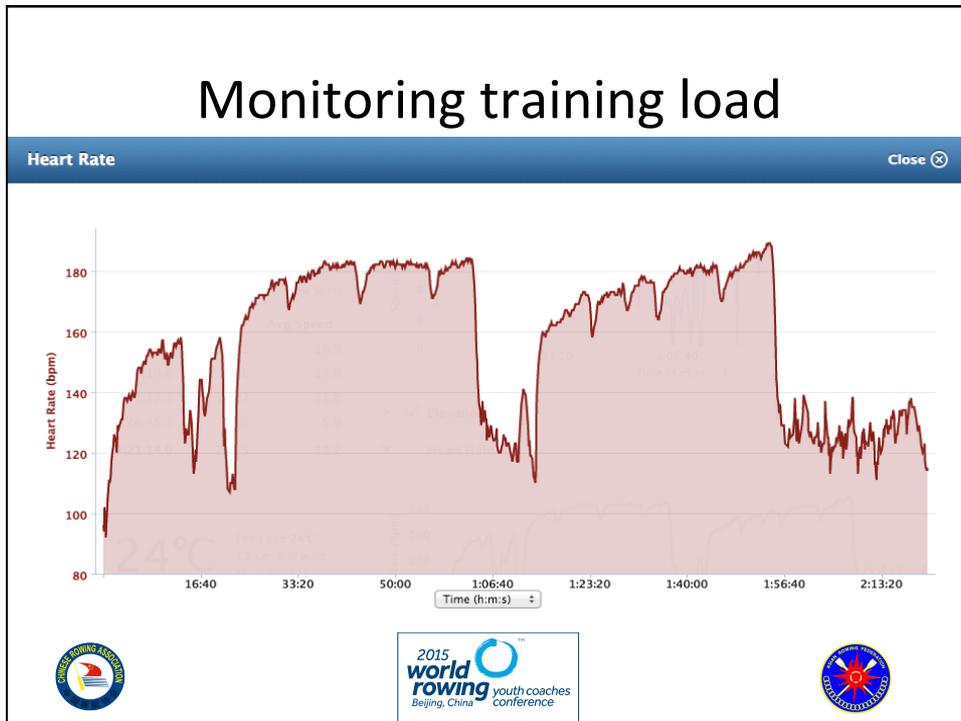


Rating of Perceived Exertion

| Rating | Descriptor |
|--------|-----------------|
| 0 | Rest |
| 1 | Very, Very Easy |
| 2 | Easy |
| 3 | Moderate |
| 4 | Somewhat Hard |
| 5 | Hard |
| 6 | |
| 7 | Very Hard |
| 8 | |
| 9 | |
| 10 | Maximal |

The modified rating of perceived exertion (RPE) scale used for athletes to classify their perceived intensity of each training session.





[Previous](#) [Next](#)

Gavirate Other

Wed, Jun 24, 2015 9:33 AM Central European Time By olegon
 Activity Type: **Other** | Event Type: **Uncategorized** | Course: ---
 Like - Comments (0)

Share
Export
Compare
Send to Device
Save as Course
Print
Details
Splits
Player

Summary

Distance: 16.41 km
 Time: 1:35:59
 Avg Speed: 10.3 km/h
 Elevation Gain: 24 m
 Calories: 1,303 C

Details

| Timing | Pace | Speed |
|-----------------------------|------|-------|
| Time: 1:35:59 | | |
| Moving Time: 1:27:55 | | |
| Stopped Time: 1:35:59 | | |
| Avg Speed: 10.3 km/h | | |
| Avg Moving Speed: 11.2 km/h | | |
| Max Speed: 19.0 km/h | | |

Elevation

Elevation Gain: 24 m
 Elevation Loss: 15 m
 Min Elevation: 234 m
 Max Elevation: 244 m

Heart Rate

Avg HR: 129 bpm
 Max HR: 171 bpm

Map

Charts

Average

Timing

Elevation

Heart Rate

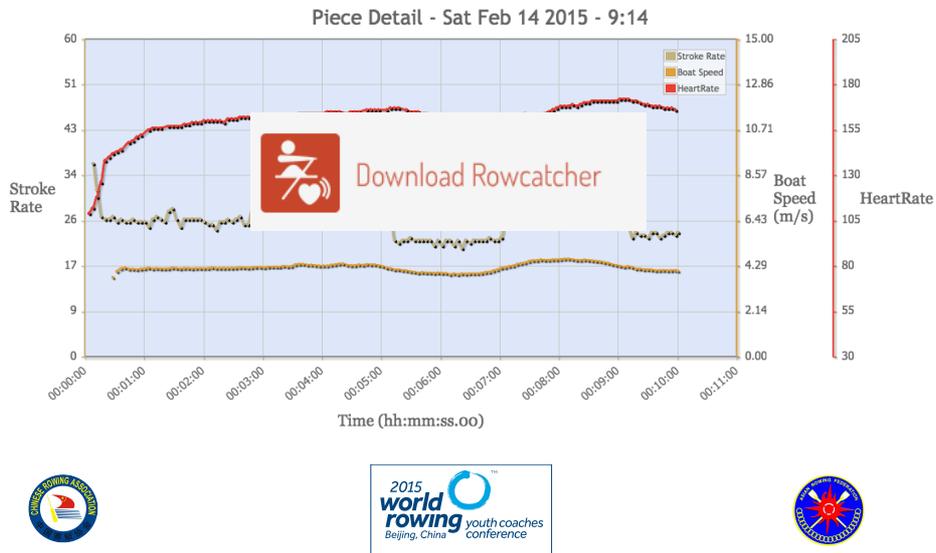
Laps

| Split | Time | Distance | Avg Speed |
|----------------|------------------|--------------|-------------|
| 1 | 31:44.8 | 4.83 | 9.1 |
| 2 | 15:57.8 | 3.56 | 13.4 |
| 3 | 12:04.5 | 1.38 | 6.9 |
| 4 | 15:39.0 | 2.36 | 12.9 |
| 5 | 20:32.1 | 3.29 | 9.6 |
| Summary | 1:35:58.6 | 16.41 | 10.3 |

RowCatcher App for mobile phone.

www.rowcatcher.com

Monitoring training load



Lactate samples



Monitoring training load



Monitoring training load



Power training
with free weights
(muscle contraction velocity)



CHEN season 2010/2011 weeks: **36 + 2** [תן אופיר]



| Training Zones (Categories) | Training goals. | Intensity / Range | Stimulus (min, or reps) x sets | weekly summation registration (minutes/reps) | % | % |
|---|---|-------------------|--------------------------------|--|--------|------------|
| Ia | Anaerob. Alactic / Velocity (VEL) | <110% | < 30' x 6-12 | 9 min. | 0,04% | 0,09% |
| Ib | Anaerobic lactic Capacity (ANA-LAC) | >100% | 30'-90' x 1-6 | 18 min. | 0,05% | 0,09% |
| II | Aerobic-anaerobic capacity (Comp.) | 88-105% | 1' - 8' x 1-6 | 83 min. | 0,46% | 10,60% |
| III | Specific endurance (VO ₂ max) | 88-98% | 2' -10' x 4-8 | 871 min. | 4,24% | 72% |
| IV | Intensive Aerobic / mixt. (AT: 4-8 mmol) | 80-88% | 5' -45' x 1-8 | 1.228 min. | 5,96% | |
| V | Extensive Aerobic (2-5 mmol) | 70-80% | 30' -120' x 1-2 | 13.248 min. | 64,44% | |
| VI | Aerobic light (<2mmol) / Technique | 60-70% | 30' -150' | 5.112 min. | 24,87% | 89,31% |
| Max.S | Maximal Strength | 90-105% | 1-4 reps. x 2-4 sets | 535 reps 477 min | | |
| Pow.S. | Power Strength | 80-88% | 8-12 reps. X 2-4 | 5.554 reps 1.840 min | 14% | |
| AeroS. | Aerobic Strenghts (Circuits) | 60-75% | > 15 reps. | 8.550 reps 1.050 min | 56% | 12% |
| GET | or General Endurance Training | | 30' - 150' | 165 min. | | |
| GT | General Training (core stability, etc.) | | 30' - 60' | 4.540 min. | | 16% |
| Rowing | | | | 2.679 km. 138 km. 0 km. 317 km. | | 3.133 km. |
| 2- / 4- / 8+ | | | | 529 km. 0 km. 37 km. | | |
| Run | | | | 529 km. | | |
| Bike | | | | 0 km. | | |
| Others (sea-kayak/roller-skating, etc.) | | | | 37 km. | | |
| 348 | Total Trainingsessions / 36 weeks | 9,1 | Total min. | 28.668 min. | | |
| | Total training time / week | 13,3 | hrs/week | 478 hrs. | | |

11 sessions 16

18% 3.467 min.

38 sessions 55

58% 62 sessions

18 sessions 16

24%

Total Trainingsessions / year (48 weeks) **528**

Average Training Units / week **11**

Training Camp Amposta 294 km / 22 sessions Total water km: **3.110 km.**



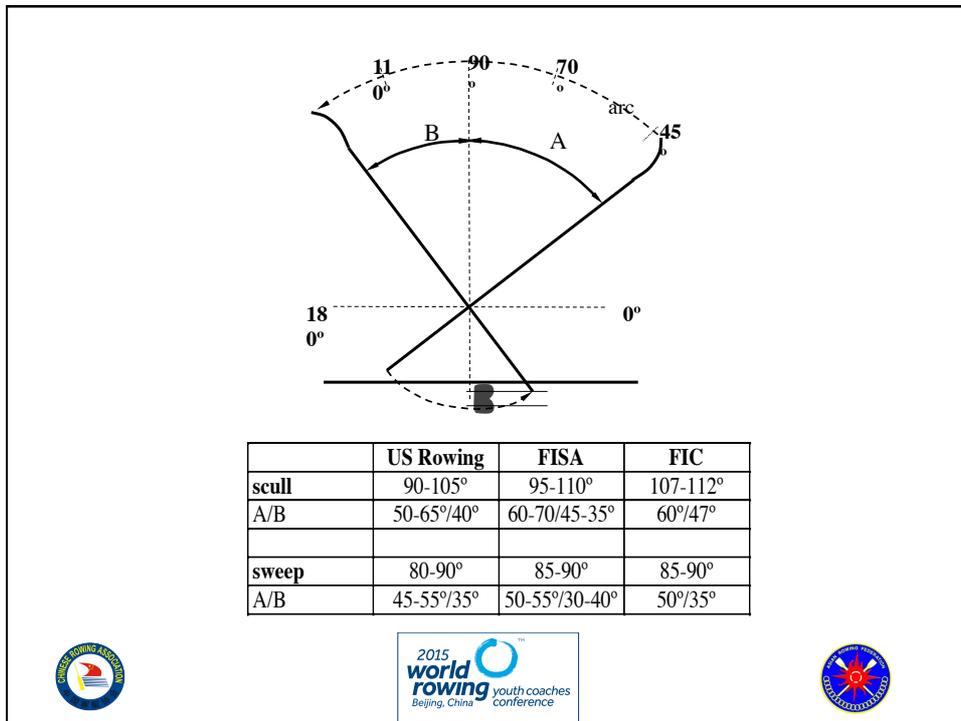


Monitoring Technique

- Correct Stroke length at all stroke rates
- Improve the dynamical structure in the drive phase
- Improve body and slide movement pattern in the recovery
- Improve boat speed and boat acceleration in entire stroke

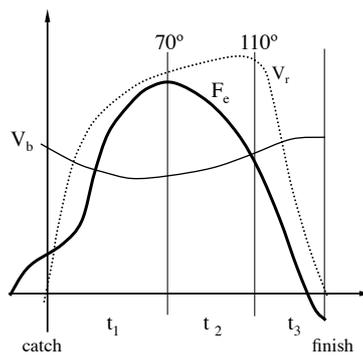






dynamical structure during drive phase

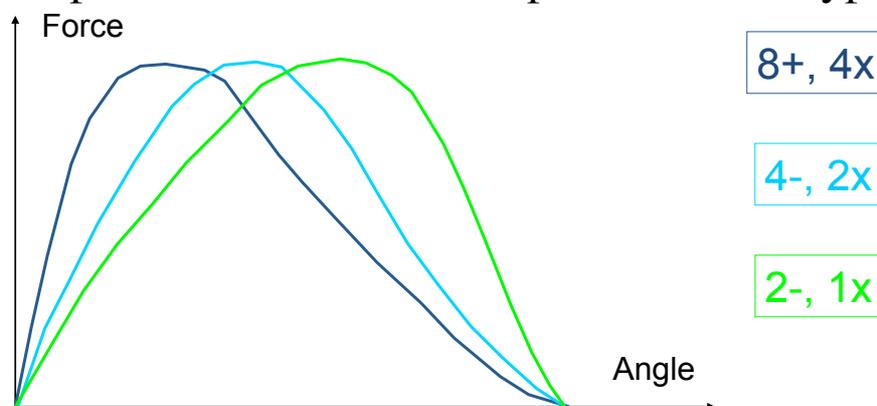
ideal model



Curves show relation between handle velocity (V_r), boat velocity (V_b) and force curve on pin (F_e) from Theo Körner.



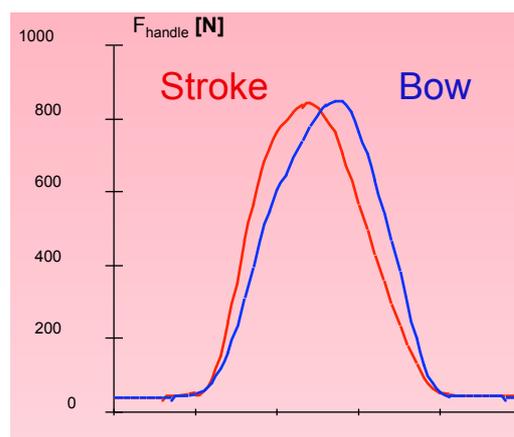
Shape of the force curve depends on boat type.



In big (faster) boats force peak occurs earlier;
In small (slower) boats force peak occurs later.

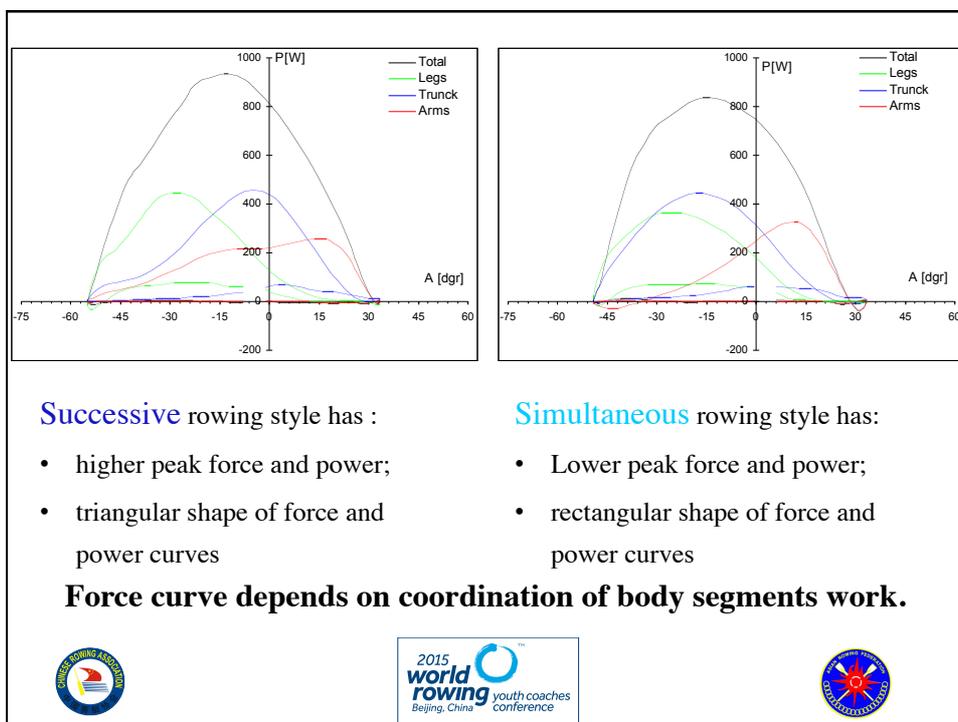


The shape of the force curve depends on the rower position into the boat.



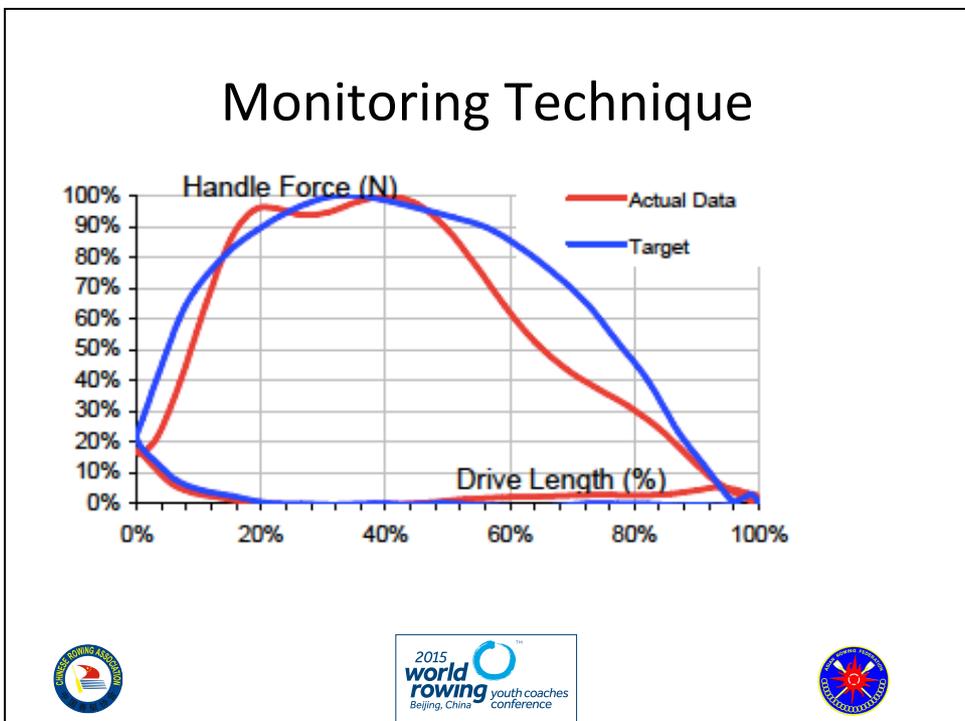
- Force in the stroke rower is higher at catch;
- Force in the bow rower is higher at finish;
- These features decrease boat rotation.

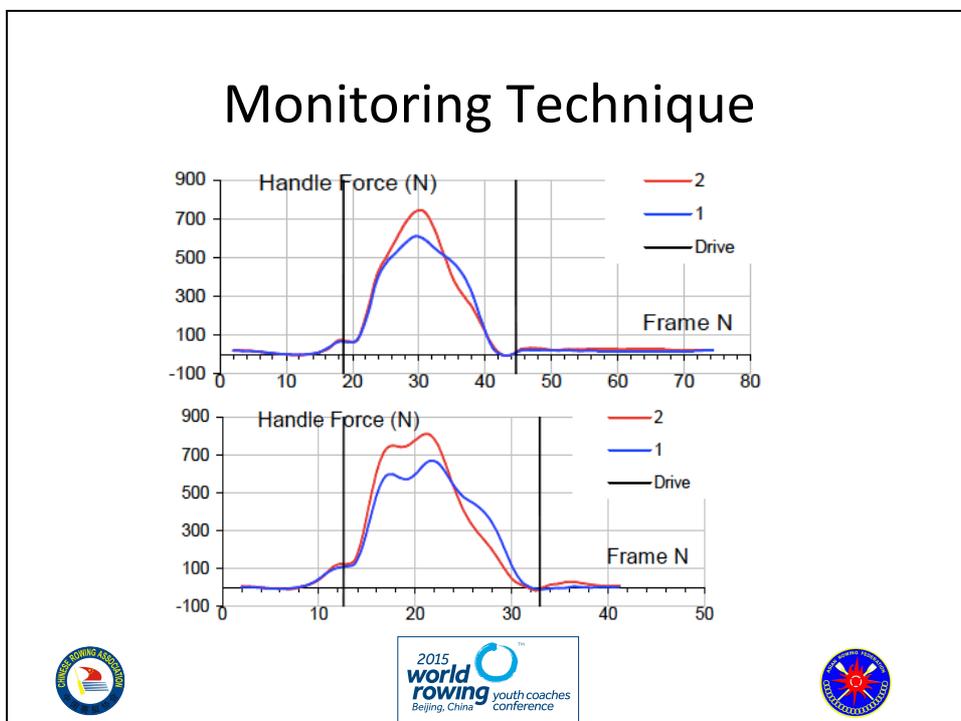
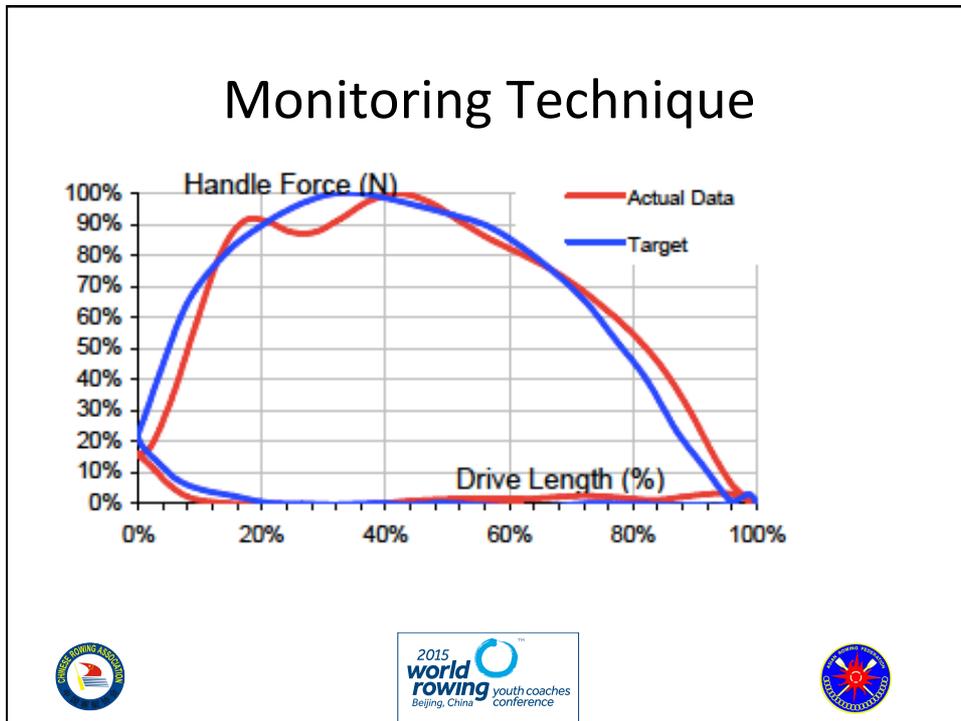


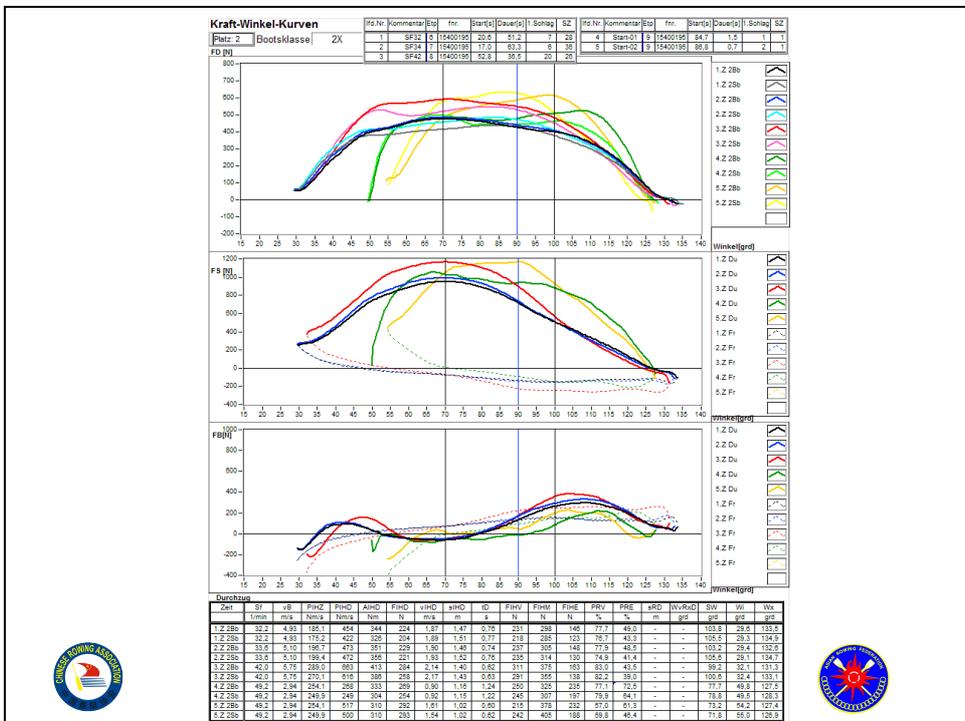


Monitoring Technique

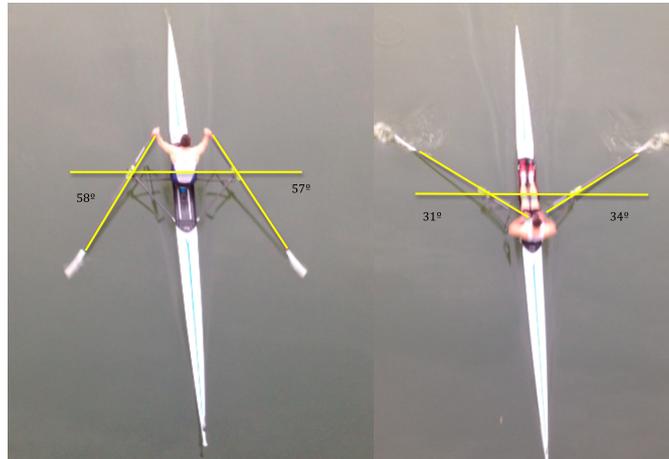




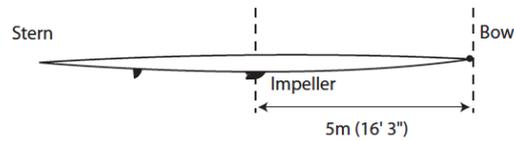




Monitoring Technique



SpeedCoach®



Monitoring Technique



Monitoring Rowing Training

Thank you for your attention !!

