

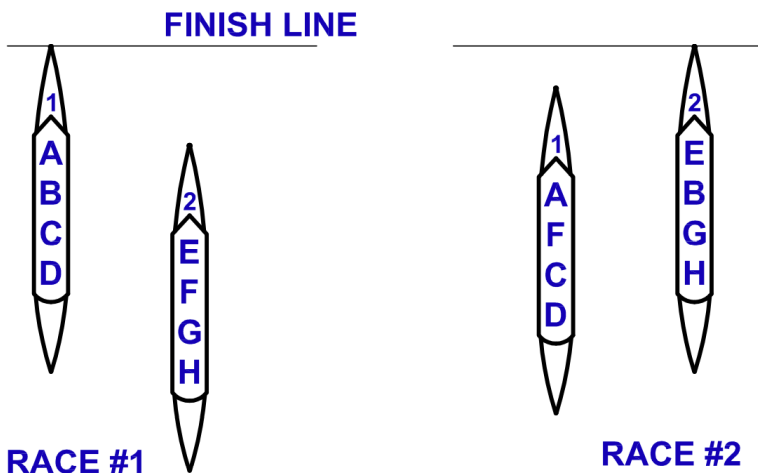
## 4.5 SEAT RACING *by: Mike Purcer*

Seat racing is a term used to describe evaluating athletes by racing them within inter-squad crews. Seat racing involves comparing athletes by switching crews and measuring the difference between the finish times of the races. The difference in the finish times reflects the athlete's boat-moving ability, as better athletes will contribute to faster times. Seat racing assumes that all athletes perform consistently throughout all races and that athletes with better boat-moving abilities will make crews faster. Seat racing is a highly acceptable method of evaluating the athletes' racing abilities.

A simple example of seat racing is shown in Figure 4.5a. In this example, in Race #1, Boat 1 finishes ahead of Boat 2 by 2.28 seconds and the difference is recorded. Following Race #1, athletes B and F switched boats. The second race is held over the same distance with the boats in the same lanes. In the second race, Boat 2 finished ahead of Boat 1 by 1.15 seconds.

Figure 4.5a

### Seat Racing



The results of the two races allow a comparison of athletes B and F. The first race set the initial comparison for the crews, with boat 1 being 2.28 seconds faster than boat 2. Following the first race, athletes B and F switched seats, and boat 2 was 1.15 seconds faster. The difference between the two boats over the two races reveals that Boat 2 went 3.43 seconds faster when athlete B was switched into the crew, as the only difference was the two athletes, B and F, switching crews. The seat race result is that athlete B is 3.43 seconds faster than athlete F. Seat racing when switching athletes, assumes that all other variables, including steering and the performance of other athletes in the boats, have been consistent between the two races.

There are numerous methods of switching athletes within boats to compare results. A more comprehensive form of seat racing involves multiple athletes changing crews over several races. The matrix of changes must ensure that athletes race with and against the other athletes they are being compared with an equal number of times. Again, this method offers objective and quantifiable total time values that measure the athletes' boat-moving ability.

#### **4.5.1 Seat Race Matrix**

A seat racing matrix is a complex method of switching multiple athletes between crews simultaneously over a set number of races. The switches must ensure that athletes being compared race with and against the other athletes an equal number of times. In sweep rowing, port and starboard athletes do not race against each other the same number of times and are not typically compared. The athletes should rotate between boats to minimize any inconsistencies affecting times. Athletes receive finish times for every race, and the sum of their finish times

allows a comparison to other athletes. The matrix system also allows different athlete combinations to be evaluated by comparing the finish times of the crews in all races, provided the conditions remain consistent.

#### 4.5.2 Equipment Setup

The equipment used for seat racing must be the same, with identical boats and oars. The boats must be rigged and checked prior to starting the seat racing. Oars should be set standard length and inboard. However, some consideration can be given to individual athletes with unique stroke lengths. Athletes with noticeably longer or shorter lengths can use a clip-on load adjustment mechanism (CLAM) or have an oar with inboard/outboard settings that they use throughout the racing. This allows athletes to match outboard stroke lengths with others in the crew and maximize performance.

If seat racing in coxed boats, the coxswains must be the same weight to maximize the similarity of the shells, and lighter coxswains can carry weights as needed. Rigging and rowing the shells in workouts prior to the day of seat racing will provide the opportunity to ensure the boats are in good racing order.

#### 4.5.3 Racing Format

**By distance:** As in regular racing, seat racing can be completed with crews side-by-side or head-style racing. The races should be held on the course in the same lanes and must be over the same distance. The race distance can vary but is typically between 1000m to 1500m in length. The race distance depends on the number of races per day because athlete fitness should not affect the results.

Athletes who experience greater fatigue in the last few seat races may negatively affect the crew's finish time.

Others racing with fatigued athletes will be adversely affected and may receive unreliable times, reducing the accuracy of the comparison. Seat racing by distance provides a time comparison of the athlete's boat-moving ability.

**By time:** Another method of seat racing is by timed pieces. For example, the two crews will row beside each other. The crews will build to race rate, and the timer will start the watch when the bows are even. After a set time interval, such as four minutes, the timer will determine which crew is ahead and by how much. One crew may be ahead by a deck, a deck and a seat, half a length, half boat open or the best distance estimate. The crews stop, and two athletes switch boats. The boats begin again and row beside each other for a second piece. Similar to the first piece, the crews build the rate and when even race for the same amount of time as the first piece. At the end of the timed piece, the difference in one boat ahead is estimated and recorded. The difference in distance between the first piece and the second piece reflects the boat-moving ability of the two athletes who switched crews. It is important not to share which athletes are switching crews, and athletes must believe there is another scheduled race to keep them motivated, thinking that they might be switched next and their performance tested.

#### **4.5.4 Race Setup**

Before seat racing, if a matrix is used, designate athletes with numbers or letters or both if sweep rowing and record their name on the race sheet. Allowing athletes to select their own number or letter will show that the boat changes are not pre-determined and demonstrate that the coach is not biased and that the matrix is fair.

Seat racing with controlled stroke rates can limit athlete fatigue if many races are scheduled. However, open stroke rates are more common. Coaches have also allowed athletes to select the seating arrangement in the shell within an assigned crew. Typically, seat races start with running starts, and crews row through the start line at race rate and speed.

Before the first race, the warm-up must be thorough and include rowing at the race pace. The following is an example outline of the seat race format:

- 1) The coaches/timers assigned to the start and finish will start their watches together before racing begins.
- 2) The seat racing distance of 1500m, 1250m, or 1000m is common, depending on conditions and available time.
- 3) Crews can row through the start line together at race speed in assigned lanes and receive individual start times if the boats are not even. Or, the boats can race in time trial format, one after another 30 to 45 seconds apart and in the same lane.
- 4) Coxswains must only provide the stroke rate and not count or motivate the crew.
- 5) Any unordinary situations during the race must be recorded on the race sheets; athletes should communicate to the coaches after each race to voice their concerns.
- 6) Crews should dock near the finish line to make crew changes. This allows the new crew combination some time to row together before the next race.

The coach must ensure fairness in all races. Coaches must check all boatings are correct before launching for the next race.

### **4.5.5 Athlete Preparation**

Athlete preparation is critical to allow ideal performance, and athletes should be provided support in preparing for seat racing. Athletes must bring water and snacks if racing continues for extended periods. Seat racing can be highly stressful for athletes who feel their future in the crew depends on their performance.

Athletes should know days in advance of the scheduled seat racing as well as the format and the number of races. Prior to the seat races, coaches should hold a pre-brief with the group to outline the setup and answer questions. At the end of the day's racing, a debrief with the athletes will provide an opportunity for athlete feedback. The debrief is not a good time to speculate on future plans if the next steps depend on the results. Results should not be shared until they have been checked, and coaches may need to have individual meetings.

### **4.5.6 Race Record Sheets**

Coaches should use predesigned Race Record Sheets to record race-related times and notes. The times transcribed from the watch to the sheet must be legible and checked. Typically, the lead timer records the time on the sheet, and the backup timer checks the transcribed numbers against the backup watch.

The race record sheets must indicate shell names and the athlete seat assigned in the boat, start and finish times, overall times, and any events that may have affected the race times should be noted. The weather and water conditions should be recorded for all races.

The legibility of the race records is critical and the sheets must be kept for future reference and in case of appeals. A photo of the sheets can be used as a backup of the document. Also, smartphone video of the watch as

times are recalled can serve as a permanent record of the start and finish times.

### **4.5.7 Analysis**

Seat racing is typically measured by time, and the athletes with the faster (lower) times have shown their boat-moving ability. The difference in time for two or more athletes is the measurable racing ability. A slight difference in the total measured time of less than 0.3% might be considered negligible and may not be conclusive when selecting between two athletes. A minimum of 0.5% is suggested, and a full 1% would be considered a conclusive difference. Following a complete matrix, the total of the times for all races provides a comparison of the athletes' abilities.

A spreadsheet that allows inputs for start and finish times for each crew and race will reduce the possibility of calculation errors. The spreadsheet calculates the time for each race and should calculate the total overall time for each athlete. The athletes' overall times provide the comparison, and lower times reflect a faster boat-moving ability as more highly skilled athletes will contribute to faster boats and lower overall finish times.

A seat racing matrix provides a number of crew combinations. Reviewing the finish time for each crew may show the fastest athlete combination, provided the conditions remain the same for all races. The fastest time from all races may be deceiving as the seat racing may have taken over a few hours, and the conditions may have changed. Additionally, fatigue from race to race may have affected results. Seat racing in a matrix may provide the following results:

- a) Athletes with the lowest overall time for all races combined.
- b) The fastest time for the crew related to all races.

c) Largest time difference between the two crews.

The seat racing data can provide additional in-depth analysis using athlete times, crew combinations, and assigned boats. The overall time for each athlete divided by the number of races will provide their individual average time. Combining the average times of the individuals in the crew offers a theoretical projected finish time for that combination of athletes. Comparing two crews' projected finish times to their actual race times will reflect the consistency of the athletes' performances.

Consistency of performance is critical for valid seat racing. The coach must review significant differences between finish times and projected times to monitor the consistency. The coach should check the race sheet for condition changes, comments or other factors influencing the race. The coach should review the times and check that the race did not cause a shift in athlete ranking. The projected to actual race time comparison should be integrated into the spreadsheet. Section 4.5.10 Seat Racing Spreadsheet reviews many of the calculations used in the analysis of seat racing performances.

The similarity of the shells used in seat racing is often a concern, and the data related to projected times and actual times can be used for review. Shell times that are consistently faster or slower than projected times should be analyzed to determine if one shell has an advantage over the other. For this reason, it is important the athletes race in all boats the same number of times.

#### **4.5.8 Athlete Debrief**

Selection is a highly stressful time for athletes who are very concerned about seat racing results. Coaches de-selecting athletes based on seat racing results may wish to meet with the athlete individually before the team debrief. Results can be shared with individuals by



removing the names and identifying the individual's time and ranking. Review Section 4.4 Selection for related information.

### **4.5.9.1 Traditional Seat Racing**

A traditional seat racing example was shared at the beginning of this section, which involved racing two crews together and switching two athletes between boats before the next race. The athletes that are switched are judged based on the finish time of the race in comparison to the previous race. Following each race, two athletes will switch crews to continue the comparisons.

It is important that athletes do not know who will be switched or if there will be further racing to keep them motivated to perform at their maximum. Seat racing using this method can be done with any boat class (eights, fours, doubles).

### **4.5.9.2 Fours Matrix**

The Fours Matrix rotates eight athletes through the two shells over six races, as shown in Figure 4.5.9.2a. Through the rotation, starboard and port side athletes race with other athletes an equal number of times. Every athlete races twice, with athletes rowing on the same side of the boat and three times with athletes on the opposite side of the boat. Figure 4.5.9.2a details the matrix rotation of athletes through the seat races.

The Seat Race Matrix outlined in Figure 4.5.9.2a designates each athlete as a letter or number. Reading the table down from bow to stroke shows athletes A, B, C and D on the port side in a standard rigged boat. Reading the table down from stroke to bow designates A, B, C and D as starboard side athletes. Some coaches allow athletes to decide the crew's seating arrangement, while others assign seats.

Figure 4.5.9.2a

Fours Matrix

Race 1	
Boat 1	Boat 2
2	3
B	C
1	4
A	D

Race 2	
Boat 1	Boat 2
4	3
D	C
2	1
B	A

Race 3	
Boat 1	Boat 2
2	1
B	A
3	4
C	D

Race 4	
Boat 1	Boat 2
1	3
C	A
2	4
D	B

Race 5	
Boat 1	Boat 2
4	1
A	D
2	3
C	B

Race 6	
Boat 1	Boat 2
2	4
D	B
3	1
A	C

As shown above, the athletes designated with letters row in both boats an equal number of times. Athletes that are designated with numbers row in one boat four times and the other boat twice, except for athlete number 2. Athlete 2 will row in the same shell for all six races while 1, 3 and 4 row in the other boat for four races and in athlete 2's boat twice. For this reason, it is important to use boats of the same size and rigging. If the boats are not exactly the same, a straight comparison can be made between athletes 1, 3 and 4, while further analysis of the results should be made to review athlete number 2. A spreadsheet to calculate results is available on the [purcerverance.ca](http://purcerverance.ca) website.

**4.5.9.3 Pair Matrix**

This Pair Matrix rotates six athletes using three pairs over three races, as shown in Figure 4.5.9.3a. Typically, the athletes steering the shells do not switch boats, as adjusting the footstops may interfere with the rudder

alignment. Every effort must be made to have similar shells in quality, size and rigging.

Figure 4.5.9.3a

Pair Matrix

Race 1		
BOAT	BOAT	BOAT
1	2	3
A	B	C

Race 2		
BOAT	BOAT	BOAT
3	1	2
A	B	C

Race 3		
BOAT	BOAT	BOAT
2	3	1
A	B	C

As in other matrix racing, the total times allow a comparison between athletes on each side of the boat. As all pair combinations have an opportunity to row together, the fastest time over the three races may show the best combinations, provided the conditions do not change.

#### 4.5.9.4 Doubles Matrix

The Doubles Matrix allows all athletes to race with and against each other the same number of times. It is also advisable that athletes switch boats and seats to mitigate any shell advantage. Figure 4.5.9.4a rotates four athletes (sculling) through two double shells over three races, as shown in Figure 4.5.9.4a. The results will be the total time for each athlete and allow a comparison with the lowest time representing the fastest boat-mover.

Figure 4.5.9.4a Doubles Matrix (four athletes)

Race 1	
Boat 1	Boat 2
A	C
B	D

Race 2	
Boat 1	Boat 2
A	B
C	D

Race 3	
Boat 1	Boat 2
D	B
A	C

Figure 4.5.9.4b Doubles Race Martix shows six athletes rotating through three boats over five races. The five races allow all athletes to race together once.

Figure 4.5.9.4b Doubles Matrix (six athletes)

Race 1		
BOAT	BOAT	BOAT
A	C	E
B	D	F

Race 2		
BOAT	BOAT	BOAT
B	F	D
C	A	E

Race 3		
BOAT	BOAT	BOAT
C	A	B
E	D	F

Race 4		
BOAT	BOAT	BOAT
E	F	D
A	C	B

Race 5		
BOAT	BOAT	BOAT
F	B	C
D	E	A

The matrix results are the total times for each athlete and can be compared to determine the fastest boat-mover. Racing with a matrix format allows further analysis by using the times from all races. Section 3.5.10 Seat Racing Spreadsheet provides some examples of advanced calculations from spreadsheet analysis.

### 4.5.10 Seat Race Spreadsheet

Spreadsheets can provide complex analysis of matrix seat race data. Figure 4.5.10a is an example of a pairs matrix for four athletes in two pairs. The top section of the spreadsheet includes athlete names, boat names, date, program, race distance and GMS speed for the boat class. The spreadsheet must include the start and finish times for each boat in every race. The analysis section of the this spreadsheet provides in-depth data to review to allow coaches to analyze the data.

- Athletes overall time
- Time difference between athlete’s overall times

- Percentage of athlete’s time differences
- Athletes average GMS percentage
- Fastest crew with the biggest win
- Fastest time of the days racing

Figure 4.5.10a Seat Race Spreadsheet

Seat Racing Pairs																																																																																																								
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Figure 4.5.10a Seat Race Spreadsheet shows letters to the right and bottom of the spreadsheet. These letters will reference the rows or columns and are explained below:

Rows

- A** – [Start Time] the start time of each boat in the seat race.
- B** – [Finish Time] the finish time of each boat in the seat race.
- C** – [Raw Time] is the overall time the boat is in the race between start and finish times.
- D** – [Place] is the finish place in the race (1<sup>st</sup> or 2<sup>nd</sup>).
- E** – [Diff] is the difference in race times between 1<sup>st</sup> and 2<sup>nd</sup> for each race.
- F** – [% GMS] is the finish time percent of the Gold Medal Standard (GMS).
- G** – [Projected] is the predicted time for the crew in the race based on the athlete's average times for all races. It is the athletes' average times [Q] combined to determine the crew's projected time. Compared to the finish time, the projected time reflects the consistency of athletes' performances and weather conditions.
- H** – [Crew] is the difference (in seconds) between race time and projected time [G]. If the race time is faster than projected, the difference is negative and slower results are positive.
  - i. Total consistency from all athletes and conditions in all races would result in zero seconds.
  - ii. Negative numbers (time faster than projected)
    - might reflect better conditions such as tailwind.
    - might reflect the ability of the athletes in the boat to row together (good combination).
  - iii. Positive number (time slower than projected)
    - may reflect that conditions have changed with headwind or rough water.

- may reflect fatigue in one or more athletes.
  - may reflect the inability of the athletes in the boat to row together (poor combination).
- I** – [Compared] is the difference between race time and projected time minus the other crew's race to projected difference.
- significant differences greater than four seconds should be reviewed as they highlight inconsistencies between race and projected times for both crews.
  - this difference provides an insightful analysis of the crew's performance compared to that of the other crew in the race.
  - this time is not a reflection of conditions as both boats row in the same conditions.
- J** – [RANK] is the most significant margin of winning time compared to the other crew(s) in the race.
- this may indicate the fastest combination of athletes.
- K** – [RACE] in seconds, is the margin of winning in each race. Negative times are the winning times.
- L** – [RANK TM] is the overall placing of the crew's race time compared to all other race times.
- M** – [OVERALL] is the difference between the crew's race time and the fastest time from all races.
- this time will be affected by conditions or athlete fatigue.

### Columns

- N** – [RANK] is the rank for the athlete based on their times for all races. Lower times reflect that the athlete has helped their boat go faster in racing.
- O** – [Athlete] athlete's name.
- P** – [TOTAL] athlete's total time from all races.
- Q** – [DIFF] the difference between the athlete's time and the fastest athlete's time on their side of the boat.

- R** – [% Diff] the percentage difference of the athlete's time and the fastest time.
- S** – [AVG Time] athlete's average time from the races. This is used to project times in racing.
- T** – [AVG GMS] athlete's average GMS from the races.

Seat racing results are not always repeatable. Additionally, seat racing results are boat class specific, as different boat classes reflect different skill levels. Athletes are different and have their skill sets and physical potential.