Section 4 :

Creating a Bespoke Training Programme

Section 4 : Creating a Bespoke Training Programme

This section of the training guide explains the basic principles of training and how to structure a training year. It provides all the information you need to create a bespoke training programme for you or your athletes, if you are a coach. When designing your own training programme you must decide your goal for the end of the programme and then, if possible, use one of the preset programmes in the next section of the guide to help you avoid missing anything out. Alternatively you can use the interactive programme to create a programme suitable as desired and then rearrange it to suit your own commitments.

Periodisation of Training

Most athletes, and elite athletes especially, start their preparation for a major event many months in advance (in the case of preparations for the Olympics this can be years in advance). Without breaking down the training into small manageable chunks they would very quickly become demotivated, and even if they did not, they would not easily be able to tell if they were improving or not. For this reason, training programmes are divided into small manageable sections called training cycles that can be varied in order to work different energy systems and to offset the problems of boredom.

There are three different types of training cycle. The macro-cycle is the longest of the cycles and can be up to a year in length. This is obviously too long a cycle to maintain concentration and improvement so this is broken down into four to eight week blocks called meso-cycles. This is becoming a more manageable size but is broken up to even smaller one to two week cycles called micro-cycles.

A stepped or wave approach to the meso-cycles has been found to be more efficient than a linear or continuous method of training. The wave principle requires that a training load increase is followed by a decrease to allow adaptation to take place in the body. An example is set out below:

If you have 18 weeks to the competition, then you have one 18 week macro-cycle that can be divided into 3 x 6 week meso-cycles. Your next step is to determine the training aim during each of the meso-cycles. Depending on your current level of fitness, you may decide to focus on general endurance during the first meso-cycle. This will mean that the majority of the training during this phase will be long intervals of 20 to 40 minutes low intensity work.

During the second meso-cycle the intensity should increase and the quantity decrease. This means the work intervals will become shorter, six to ten minutes, and the power output and heart rate will increase.

The third meso-cycle would be more specific race preparation. In the case of a 2,000m race the work intervals would be focused on part of the race e.g. 4 x 1,000m pieces or 12 x 250m. This meso-cycle concludes with a period of seven to ten days of tapering.

Structuring the Year

Serious competitors divide the year into four training periods; transition, preparation, pre-competition and competition. This enables them to be at their peak when required. The table below illustrates the training periods and their objectives for a twelve-month training programme.

Table 4.1

Training Periods & Objectives of a 12 month Training Programme				
Preparation (27 weeks)	**Pre-Competition (9 weeks)**	**Competition (12 weeks)**		**Transition (4 weeks)**
Development of general physical capacity, strength and cardiovascular (CV) fitness. Development of good technique. Mentally, athlete improves concentration to maximise technical improvement and build confidence for the coming competition.	Training becomes more specific. Athlete continues to work on good technique and mental preparation.	Intensity of training increases which, if unchecked, can lead to breakdown in technique. Identify weaknesses and work on them during low intensity sessions. This is the time to develop tactics and strategy for competition, as well as to stabilise competition performance.	**Taper Period** (the last seven to ten days of the Competition Period) Intensity and duration of training is dramatically reduced to allow the body to fully recover from the intense training of the Competition Period. Athlete focuses on race strategy and pre-race warm up, keeping the sessions short. This is also an opportunity to polish up technique.	Rest! This is the time for complete mental and physical relaxation and can include holidays. A minimal level of activity should be maintained using cross-training techniques. Time for evaluation, and to set objectives for the next year.
Stretching and psychological preparation are important components of all training periods				

Notes

i. Although the table reads left to right, to periodise your training you must work back from the date of your main competition.

ii. Transition period: four weeks after the main competition.

iii. Competition period: From the date of the competition you wish to peak at count back 12 weeks (4 x 3 week cycles). The last seven to ten days of this period will be a taper.

iv. Pre-competition period: Count back a further nine weeks (3 x 3 week cycles).

v. Preparation period: The remaining 27 weeks.

vi. To check how you are progressing, and the effectiveness of your training, you should keep a training log and do some baseline tests on a regular basis (see Baseline Tests in Section 12 : Tests).

The next table sets out how you should plan your training if you have six to 48 weeks before your major competition. The table is used by working out how many weeks you have till the competition, and then reads from the left hand column across. For example, if you have six weeks till competition this whole time should be spent in the period called competition and is all competition preparation. If you have 24 weeks until competition then you should do a three week preparation cycle followed by nine weeks of pre-competition and 12 weeks of competition.

Table 4.2

Training Periods (weeks)			
Weeks until Race	**Preparation**	**Pre-Competition**	**Competition**
6	-	-	6
7	1	-	6
8	2	-	6
9	3	-	6
10	3	1	6
11	3	2	6
12	3	3	6
13	3	4	6
14	3	5	6
15	3	6	6
16	3	4	9
17	3	5	9
18	3	6	9
19	3	4	12
20	3	5	12
21	3	6	12
22	3	7	12
23	3	8	12
24	3	9	12
25-48	3-27	9	12

Notes

The last seven to ten days of the competition period will be a taper, however, if you only have six weeks until competition a shorter taper of three to seven days would be adequate.

Tapering

For seven to ten days prior to an important competition you should taper off your training. Some people think that to reduce training doses at this time will lead to a loss of fitness but this is not true. Training is a combination of overload and super-compensation. This means that during exercise the body is brought to the point of exhaustion and, during the recovery period, the body recuperates to a point of greater capacity than before. The super-compensation period lasts for seven to ten days after the end of a training regime and so any fears of a loss of condition are groundless. The best use of this time is to focus on race strategy, getting the pre-race warm-up right, and polishing up technique. It is important to avoid the build up of lactic acid close to competition. The longest single piece of high intensity work should not exceed 90 seconds. A couple of these at the beginning of the final week should be okay, cutting back to bursts of 30 seconds in the days immediately preceding competition. If preparing for a 2,000m race, we recommend that the total number of hard strokes during the whole of the tapering period should not exceed 300.

An example of a week of tapering is shown below. This is the last week before a 2,000m race and assumes that you have trained conscientiously for the event. You should find that you are able to do much more work than is on the schedule. This is a good sign but do not give into the temptation to do too much. You are tapering and should be getting rested and ready for your race, not making yourself overtired.

Table 4.3

Tapering Based on Training Sessions per Week								
3 sessions or less	No Taper Needed							
4 sessions	1x3'TR	2x1.5'AN	3x4secsAN	RACE				
5 sessions	25'UT2	1x3'TR	3x1.5'AN	45secsAN	RACE			
6 sessions	30'UT2	1x3'TR	2x8'UT1	3x1.5'AN	45secsAN	RACE		
7 sessions	1x15'UT1	5'AT	1x3'TR	20'UT2	2x2'TR	3x45secsAN	RACE	
8 sessions	OFF	1x15'UT1	5'AT	1x3'TR	20'UT2	2x2'TR	3x45secsAN	RACE

Notes

i. 25'UT2 means row for 25 minutes at UT2 heart rate.

ii. 15'UT1 means row for 15 minutes at UT1 heart rate.

iii. 5'AT means row for five minutes at AT heart rate.

iv. 3'TR means row for three minutes at TR heart rate.

v. 2x1.5'AN means row for one and a half minutes at AN heart rate, then repeat once fully recovered.

Body Adaptation

Perhaps surprisingly, a training session itself does not actually bring about an improvement in performance. It is during periods of rest and recovery that the body adapts to demands made on it from exercising. As your physical performance improves, you can increase the training volume that in turn will change the type of training you do. People training four or five times a week will benefit from a high percentage of high intensity sessions, whilst those training twice a day may only complete 20 to 30% of their total training programme at high intensity. An individual's heart rate at different workloads will define the training intensity, therefore people training at the same workload could be training at different intensities. Training sessions that cause the heart rate to increase to near maximum are high intensity. Sessions that can be completed at moderate heart rate are low intensity.

To ensure the desired adaptation takes place a number of factors need to be considered:

- Training needs to be regular to stimulate adaptation in the body.
- There needs to be enough time between sessions for the adaptation to take place.
- The amount of training needs to be increased as adaptation takes place.
- The training programme needs to be specific to the needs of the individual.
- Training needs to be tailored to the specific physical demands of a particular sport.
- There must be a system for monitoring progress within the programme.

Recovery Time Between Intervals

Full recovery between intervals can be considered as taken place when the heart rate has fallen to warm up level (twice resting rate).

The intensity of interval-training can be increased by working to 90% or even 80% of full recovery.

Example - resting heart rate = 60bpm. Warm up rate = 120bpm

100% recovery = 120bpm, then repeat.

90% recovery = 132bpm, then repeat.

80% recovery = 145bpm, then repeat.

Reduced recovery is most effective at the beginning of an intensive interval-training period when intensity takes precedence over quality. Close to competition quality takes precedence over intensity and therefore full recovery is advisable.

Structuring the Programme

The number of training sessions per week you are prepared to commit to will have a profound impact on the mix of training you will do. In simple terms, if you are only training three or four times a week the intensity of your programme will be proportionally higher than if you are training seven or eight times a week.

To make some sense of this Table 4.4 outlines a suggested mix of training based on the number of training sessions per week, the training bands and the period of the year that you are training in. Table 4.5 illustrates the type of work, stroke rate and heart rate appropriate to each training band.

By referring to tables 4.1, 4.2, 4.4 and 4.5 and using the wave principle of training you will be able to start constructing your own programme.

The table overleaf shows how to divide the training sessions between the different training bands, depending on how many sessions you wish to train each week.

Table 4.4

Training Bands Mix (Based on Training Period & Training Sessions per Week)										
	Preparation		**Pre-Competition**			**Competition**				
No. of Sess.	**UT2**	**UT1**	**UT2**	**UT1**	**AT**	**UT2**	**UT1**	**AT**	**TR**	**AN**
3	-	3	-	1	2	-	-	-	2	1
4	-	4	-	2	2	-	-	1	2	1
5	1	4	1	2	2	-	1	1	2	1
6	2	4	1	2	3	-	1	1	2	2
7	3	4	1	3	3	-	1	2	2	2
8	4	4	2	3	3	1	1	2	2	2

Notes

Select the number of sessions you wish to train each week, taking note of the number of sessions required in each training band.

Table 4.5

Work in Each Training Band						
1	**2**	**3**	**4**	**5**	**6**	**7**
Band	**Time**	**Type of Work**	**Recovery**	**Example**	**% MHR**	**SPM**
UT2	60-90 mins	Long intervals 20-90 mins	10-20%	60 mins steady state	55-70	18-20
UT1	30-60 mins	Long intervals 10-30 mins	25-50%	3 x 10 mins: 5 mins rest	70-80	20-24
AT	18-24 mins	Medium intervals 6-10 mins	50%	3 x 6 mins: 3 mins rest	80-85	24-28
TR	12-18 mins	Short intervals 2-5 mins	100%	6 x 2 mins: 2 mins rest	85-90	28-32
AN	9-12 mins	Bursts 45-90 secs	100%	6 x 90 secs: 90 secs rest	90-100	Max

Notes

i. Band: the training band in which the athlete is working.

ii. Time the duration of training within each training band.

iii. Type of Work: the type of work for the training session.

iv. Recovery: the recovery time, expressed as a percentage of the work time.

v. Example: an example of the work.

vi. %MHR: the percentage of maximum heart rate appropriate for the type of work.

vii. SPM: strokes per minute.

Personalising Your Programme - the Danish Programme

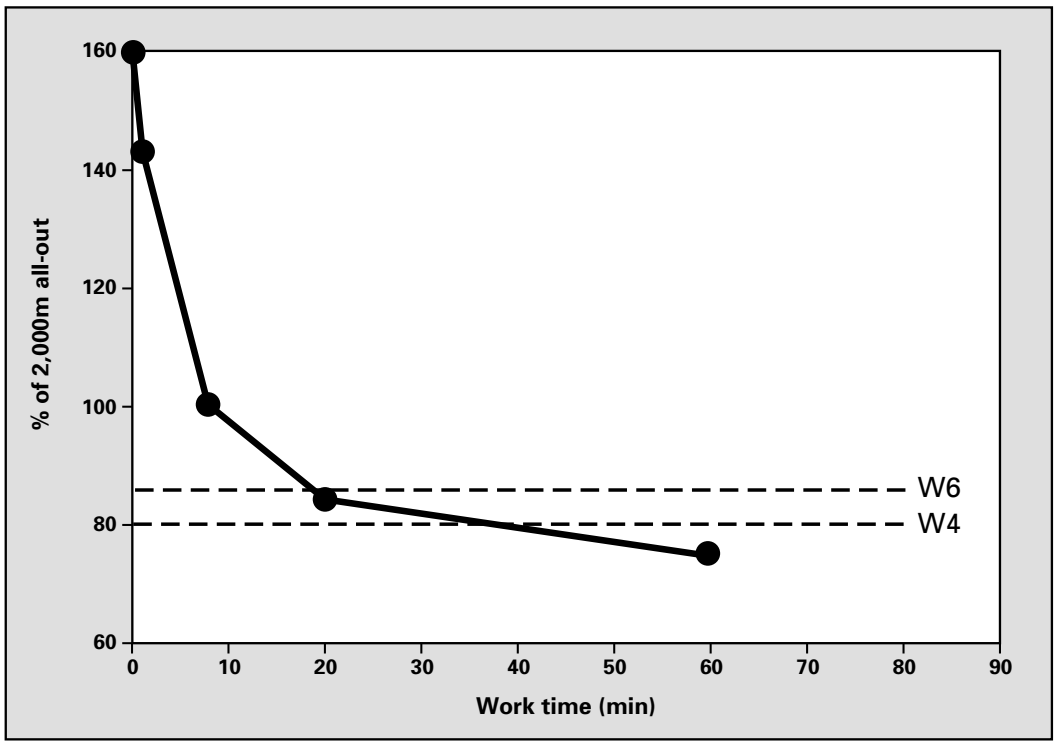
by Kurt Jensen

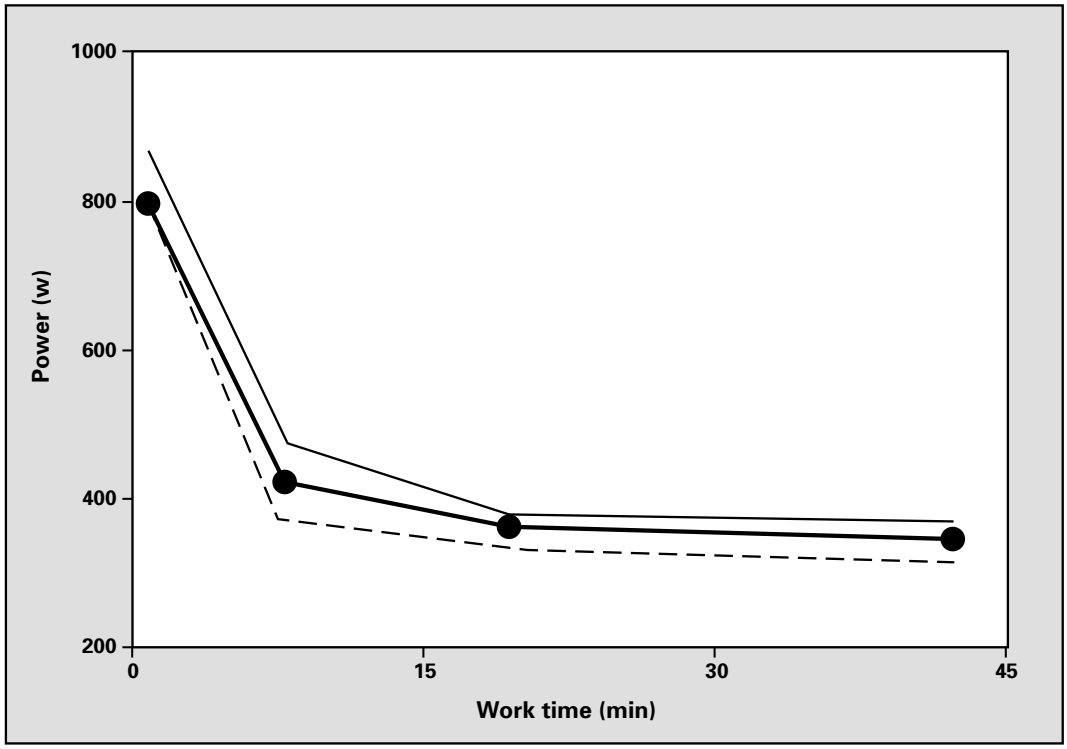
Denmark does not have many rowers and so it is vital that we provide a tailored training programme to meet their individual needs. This extends beyond physical training to encompass psychological and nutritional support.

One of the methods used to define individual training intensities is to produce a power/endurance curve on the Indoor Rower for each athlete. Five key points are established as a result of this test, which is carried out over one week:

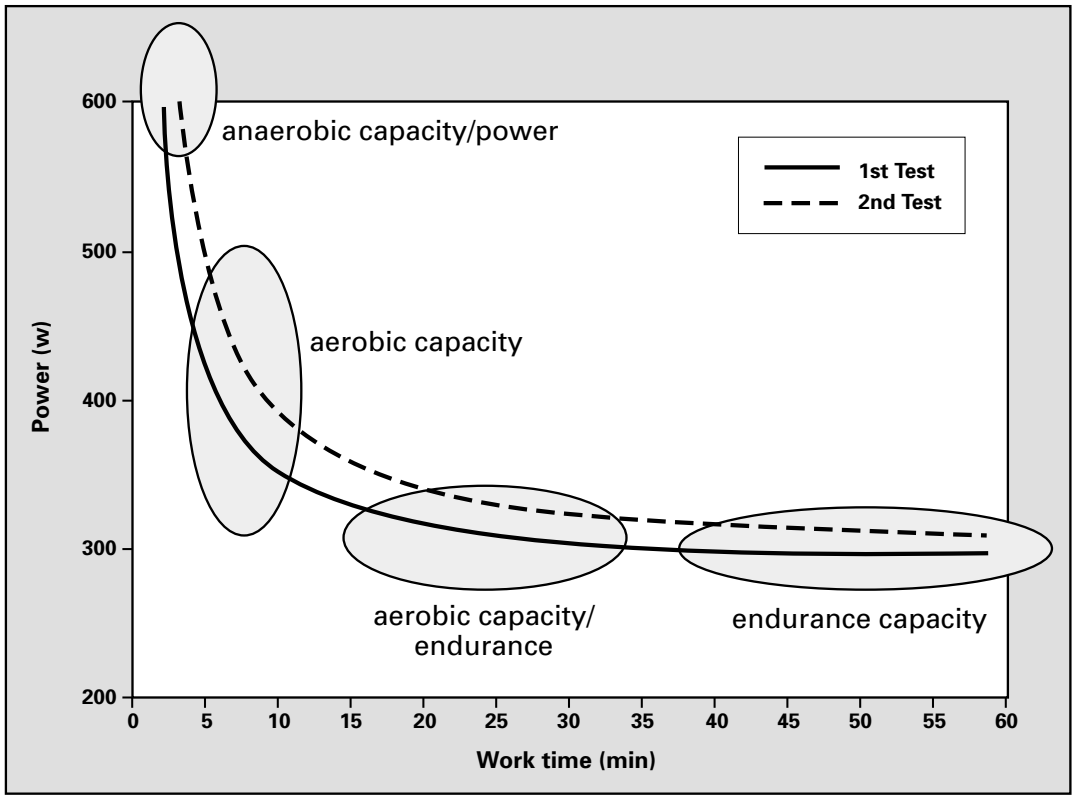
1. Maximum power output over ten seconds.
2. Anaerobic capacity over 60 seconds, stroke rate 36 to 46.
3. Race pace over 2,000m, stroke rate 30 to 34.
4. Aerobic capacity over 6,000m, stroke rate 26 to 28.
5. Endurance over 60 minutes, stroke rate 22 to 24.

A graph of power/time is then plotted and the individual's power output at blood lactate levels of four and six mmol/l are superimposed. We call these points W4 and W6 respectively. They would have been collected from a standard sub maximal step test. The work time at these two key points can then be read off directly from the graph. Below are two graphs, the first showing the results of an individual with the power represented as the percentage of power produced in the 2,000m test. The second is a graph of power against work time.





The average power is the thick line and the maximum and minimum values are also indicated. The graph below shows the four areas of anaerobic capacity/power, aerobic capacity and aerobic capacity/endurance and endurance capacity.



Training intensities were defined as follows:

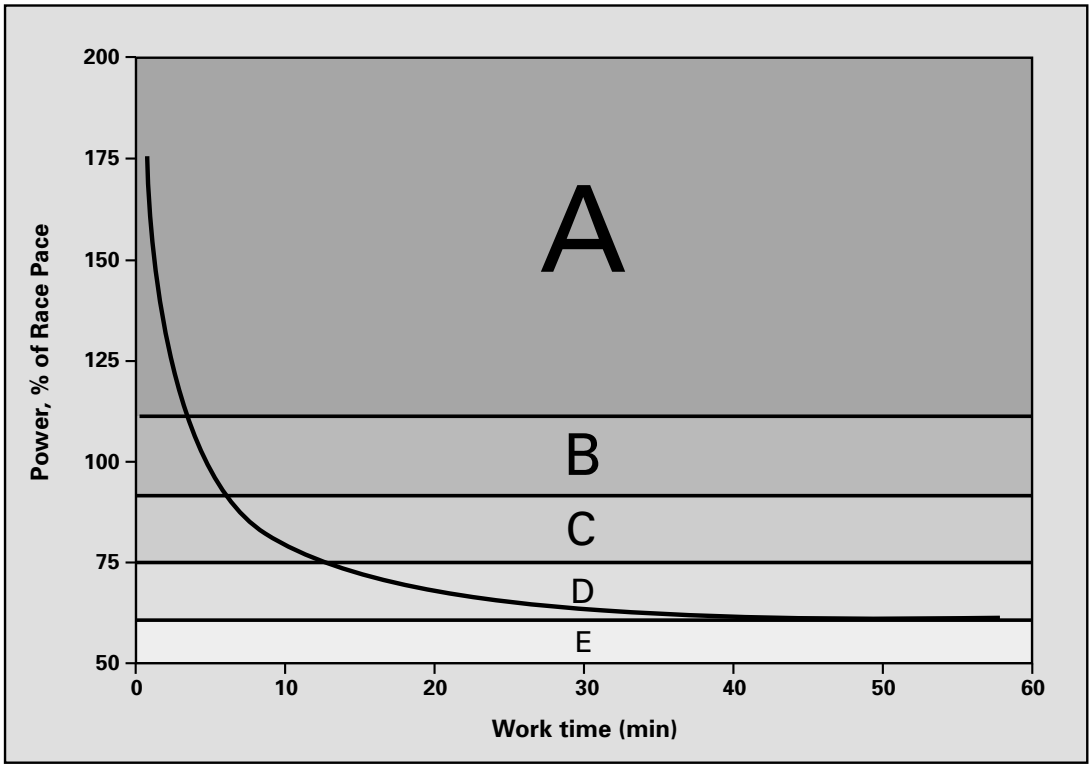
Table 4.6

Training Intensities					
Training Intensity	**Level**	**% of Max**	**Stroke Rate**	**Time in Range**	**Heart Rate**
Anaerobic Capacity/Power	A	110%+	36-46	3-5 mins. Short intervals	100%
Aerobic Capacity	B	90-100%	30-34	20-25 mins. Med intervals	95-100%
Aerobic Capacity/Endurance	C	70-78%	26-28	40-45 mins. Long intervals	80-90%
Endurance	D	60-70%	22-24	60 mins	65-75%
Recovery/Technical Improvement	E	<60%	-	-	<65%

Notes

Max refers to output for 2,000m piece.

The levels can be represented by a power graph. This shows the power output for each level. The training time in this level can then be read from the table above.



Traditionally, Danish rowers have not been able to train on the water in winter and so training is land based. Six to eight hours a week are spent on the Indoor Rower out of a total of eight to 12 hours. Training based around the rowing machine is far more efficient than training on the water. Some of the athletes measured are fitter in the winter than summer when the training becomes more water based. When the rowers move from the land to water the training time increases to 16 hours a week. This is less than the time spent training by British lightweights who tend to row right through the winter. An explanation for this is, because the Danes are fitter when they move onto the water, they are able to train at a higher intensity. However, not all the Danish rowers are able to transfer their fitness gains into boat speed and so specific onboard tests are being carried out to see exactly where this power is being lost.

In recent years climate change has meant it would be possible for the Danes to train on the water in winter but they don't see any advantage because far more time would be required to achieve the same fitness levels. When they do move onto the water, the volume of training increases and this increase plus the rise in ambient temperature, is all that is needed to bring down the weight of the rowers from a winter high of +6 kilos.

Lightweights should not reduce their food intake as this leads to negative energy levels where the athlete is unable to train at a high intensity. Positive energy levels are achieved by having enough fuel to cope with the demands of the training regime. When you enter negative energy your percentage body fat will actually increase as a result of reduced food intake. In some cases, additional nutritional advice is needed to help rowers meet their target weight. Young rowers, those under 21 years, should be actively discouraged from dieting to make the lightweight limit.

There is no reason why heavyweights and lightweights should not follow the same training regime. The only exception is in the area of weight training to develop strength. Here the heavyweight has the advantage of being able to increase muscle mass whereas the lightweight is limited by total body weight constraints. Beyond a certain strength level however, there is no evidence that more strength results in improved performance over 2,000m. A number of athletes were tested for strength by fixing the chain on the Concept 2 Indoor Rower and introducing a strain gauge to the handle. The strength difference in the athletes tested ranged from 160kg to 280kg, a difference of 80%. However, when they were then asked to row 2,000m, the rower with the lowest score was able to maintain a power output of 400 watts and was near to the top of the group.

Although a heavyweight rower has a higher VO_2 max in absolute terms, when body weight is taken into account there is no difference. Aerobic capacity is directly related to VO_2 max and so aerobically heavyweights and lightweights are equal. Rowing is not just an aerobic sport and where the heavyweight has the advantage is in anaerobic capacity. This means that on the rowing machine, when all other things are equal, the heavyweight will always beat the lightweight. This is not always the case on the water where under certain conditions the heavyweight's physical advantage is balanced by greater drag on the hull than that on a lightweight crew.

If asked why Denmark has been successful at lightweight level it would not be because of the training programme or because of the athletes. The key is to match the right training programme to the right athlete. This can be difficult for individuals rowing in a crew boat, but can be done during winter training on the rowing machine.

How is this Information Useful for Me?

The information presented above is collected and prepared by a professional sports physiologist. That does not mean that it is of no use to people who are not in national teams and do not have access to the testing facilities like those used by the Danes. All of the information used to create the graph, except the W6 point, can be easily found with no specialised equipment other than a Concept 2 Indoor Rower and a heart rate monitor as the following five points can be determined:

1. Maximum power output over ten seconds.
2. Anaerobic capacity over 60 seconds, stroke rate 36 to 46.
3. Race pace over 2,000m, stroke rate 30 to 34.
4. Aerobic capacity over 6,000m, stroke rate 26 to 28.
5. Endurance over 60 minutes, stroke rate 22 to 24.

We have already found that it is possible to find the anaerobic threshold (W4) - see Physiological Tools in Section 3 : Physiology. This power output at AT should then be added to the graph at 44 minutes. If your point for W4 lies above the line and not on it as in the graphs above, this shows that your endurance is not as good as it could be and should be a point to focus on.

Once you have created your graph you should use it to create a table, replacing the split, power and heart rates at the different levels with the values from your graph. This will then allow you to train at the correct intensity for any time stipulated by your training programme. It is however important that, as you get fitter and stronger, you adjust your graph so that you are always training at the correct level to maximise improvements.

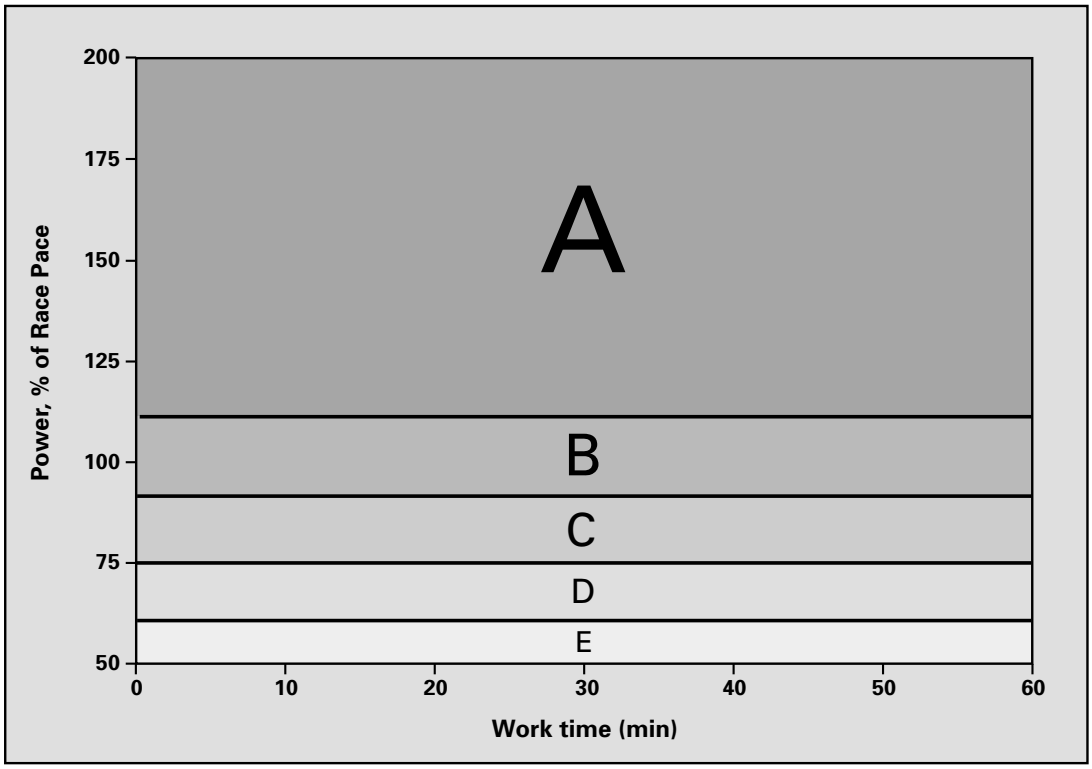


Table 4.7

Training Intensities				
Training Intensity	**Level**	**Split**	**Power (Watts)**	**Heart Rate**
Anaerobic Capacity/Power	A			
Aerobic Capacity	B			
Aerobic Capacity/Endurance	C			
Endurance	D			
Recovery/Technical Improvement	E			

Notes

Complete the table using the information from your graph.