SEASONAL TRAINING DESIGN

By Dr Genadijus Sokolovas
www.globalsporttechnology.org

Continuous improvement in swimming performances throughout a season depends on the swimming and dryland workload volume in the various energy zones, and the adaptation of athletes to this workload. Although there are many ways to develop faster swimmers, to attain the maximal effect of training, workload volume should be distributed during the season in optimal manner. Ideally, daily and weekly workload volumes should correspond to the training condition of the individual swimmers, and in order to evaluate the swimmers level of conditioning, swimming test sets should be done on a regular basis.

When planning training sequences, coaches should first determine the number of training seasons within the current training year. Since there is a paucity of scientific investigation into the number seasons a coach should conduct in one year, coaches have traditionally divided this period into 1-4 seasons or training sequences per year, and have based their decisions on personal experience or anecdotal evidence gained from information provided by other coaches. It is also traditional to use a "major meet" as the focus of each season, and to prepare for a "peak" performance at the end of each sequence of training.

Several investigations were done in former Soviet Union attempting to answer the question as to the optimal number of seasons in a calendar year /Gordon, S.M., 1983; 1989; Priluckij, P.M., 1985; Sokolovas, G., 1987; 1988; Siruc, A., L., 2000 etc./. In order to answer this question, scientists analyzed the progression of working capacity in athletes when placed in two different training strategies. These strategies were:

1. Strategy 1 – Increasing the workload volume in various energy zones. This strategy is typical during the first phase of the season (aerobic endurance development), when it's the coaches aim to increase workload volume and the duration of workouts with constant intensities in the various energy zones.
2. Strategy 2 – Increasing the intensity with the same workload volume. This strategy is typical during the second phase of season (speed or peaking phase), when athletes aim to swim faster and increase intensities in various energy zones with constant or even lower workload volumes.

During the investigations, athletes completed test sets and were tested in various physiological/ biochemical parameters during strategy 1 and 2 sequences. The goal of investigation was to determine the duration each strategy could maintain a constant improvement until the athletes in the study hit a plateau or declined. Test sets were selected based on training strategy. In strategy 1 they swam test sets with a constant intensity in four energy zones every week. Examples of test sets in Strategy 1:

N x 200m with :15 seconds rest – in aerobic energy zone
N x 100m with :15 seconds rest – in mix aerobic-anaerobic energy zone
N x 50m on a 1:30 interval – in anaerobic energy zone
N x 12.5m on a :40 interval – in creatine phosphate energy zone (sprint)

After pre-season conditioning athletes swam the initial test sets with a constant number of repetitions using "all-out" efforts. The test set average time was calculated and was then set as the goal (or training) time for the subsequent training weeks in the season. Holding this average time each week,

the goal was to increase the number of repetitions that the athlete could maintain prior to the onset of failure. Since test sets with constant swimming velocities indicate changes in work capacity in various energy zones during the season, a greater number of repetitions would indicate an increased working capacity in those athletes who advanced the test set (increased the number of repetitions prior to failure).

During strategy 2 athletes swum test sets with a fixed number of repetitions and attempted to increase the swimming velocity every week. Examples of test sets in Strategy 2:

4 x 100m with :30 sec rest - in mix aerobic-anaerobic energy zone
6 x 50m on a 1:30 interval - in anaerobic energy zone
4 x 25m on a :40 interval - in creatine phosphate (non-aerobic metabolism) energy zone (sprint)

The investigations revealed different adaptations to the workload when the athletes trained in strategy 1 versus strategy 2. During strategy 1 the number of repetitions in each test set progressed (increased in number) for 16 to 18 weeks. It showed that athletes using this strategy could increase their working capacity for approximately 16-18 weeks. Beyond this period the number of repetitions stayed the same or increased at a very slow rate, and indicated that the use of Strategy 1 was limited to a maximum of 18 weeks. The investigation indicated that Strategy 1 was effective in creating a foundation (potential) for future swimming velocity in various energy systems, and was best used during the first phase of each season.

Strategy 2 test set progressions reached a plateau between 6 and 8 weeks and beyond that period, times remained the same or increased very slowly. Therefore strategy 2 showed it has limitations when it was employed for longer than 8 weeks. This strategy is best used in concert with Strategy 1 as the second phase during a season. During strategy 2, athletes maximize the potential swimming velocity developed during Strategy 1.

Based on these investigations, scientists developed the rationale that the optimal duration of any season should be a combination of these two training strategies. In order to utilize the full potential of both strategies, athletes would need to utilize strategy 1 for 16 to 18 weeks and strategy 2 for 6 to 8 weeks. The total duration of the season would run between 22 to 26 weeks in length.

Subsequent investigations focused on how sprinters, middle distance swimmers and distance swimmers adapted during training sequences involving the two strategies. Athletes between ages 10-25 were involved in these studies, and the following important practical conclusions were developed:

1. A combination of Strategy 1 and Strategy 2 affords the athlete the best progression potential in connection with swimming performances.
2. Strategy 2 should follow Strategy 1 during seasonal training.
3. In general the optimal duration of Strategy 1 should be from 16 to 18 weeks for senior and adults swimmers.
4. Age group swimmers (10-12 years old) increase the number of repetitions in test sets during Strategy 1 at almost twice the rate than senior swimmers (16-18 years). Therefore, for age group athletes the optimal duration of Strategy 1 is 12 to14 weeks.
5. The duration of Strategy 1 for adult sprinters should be 14 to 16 weeks versus 16 to 18 weeks for adult distance swimmers.

6. During Strategy 2 test sets, age group swimmers (10-12 years old) increase their swimming velocity faster than senior swimmers (16-18 years), and therefore their optimum development period is 2 to 4 weeks.
7. The duration of strategy 2 for adult distance swimmers should be shorter than for sprinters – 6 to 8 weeks for adults sprinters versus 4 to 6 weeks for adults distance swimmers.
8. Test sets are an effective training and monitoring tool for swimmers.
9. A transition period should follow each Strategy 1/Strategy 2 training sequence, allowing the athletes to recovery from their training loads. The duration of the transition period should depend on the fatigue level of the athletes and normally lasts about 1 to 3 weeks.

Over a period of 25 years, programs that employed this system of athlete development were tracked, and the records from thousands of athletes were collected to develop a comprehensive understanding of athlete adaptation. The data has enabled Dr. Genadijus Sokolovas to develop computer programs that focused on training design, and software programs are able to create the ideal adaptation parameters (based on the Strategy 1&2 system) for athletes of less than average talent, average talent and elite talent

To enable the program, a coach supplies input in a number of areas in order to determine the workload distribution in four energy zones. These are:

- The swimmers present condition.
- The swimmers age & sex
- The swimmers specialty, seasonal goal, past peak performances
- Length of seasonal macrocycle
- Desired peak volume,
- Frequency and distribution of training sessions
- Workload volume during the previous training season

Software programs use the data to design and describe the workloads in the four energy zones (swimming portion), and the dryland workload volume (general and specific) during both the preparation phase (Strategy 1) and the competitive phase (Strategy 2). In addition, the computer programs design the anticipated progression in selected test sets during the strategy 1 and strategy 2 phases. The progression of test sets is a design based on the expected changes of each athletes working capacity and swimming velocity during the season. This knowledge enables coaches to track athlete progression during test sets and make the necessary changes to the workload when needed.

The advantage of these programs over similar programs is being able to relate the workloads in each energy zone to the conditioning level of the swimmers. This allows the programs to make individual plans for every swimmer or group of swimmers. Achievement of the best results with minimum efforts is the main purpose behind these programs.