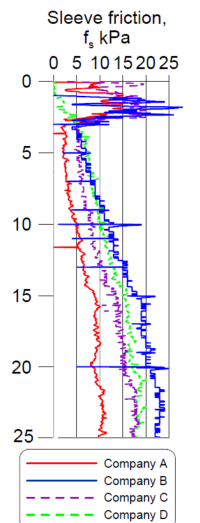


IN 2009 MAYNE et al. (SOA – 17 ICSMGE) SUBDIVIDED THE INVESTIGATION METHODS IN “OLD” AND “NEW”.

Mayne et al. recommended, as preferable for everyday design, the direct push “NEW” methods (CPT and DMT). This subdivision had two robust basis: (1) many of the “OLD” methods are adequate, but in today’s world they are intolerably slow (2) Modern multiparameter push-in tests have the ability to provide quickly and economically a variety of reasonably accurate soil parameters.

SOME NOTIONS EMERGED AT SYMPOSIUM CPT'10 (Los Angeles)

1. **CPT is the fastest, most economical, most widespread** (spt??) investigation method.
2. **CPT predictions of settlements may be in large error.** This indication, frequently pointed out in the past – e.g. by Terzaghi and Peck 1967, Schmertmann 1970, Jamiolkowski et al. 1988, Leonards 1988, Schnaid’s book 2009 – was reconfirmed by Been at CPT’10 : “*CPT can easily mislead in terms of soil type, strength and particularly modulus*”.
3. **Sleeve friction f_s is unreliable.** This indication, frequently pointed out in the past – e.g. by DeJong & Frost 2001, Schnaid 2009, Long 2010 – was reconfirmed by Lunne at CPT’10 “*with the present large variations in f_s values, it is not possible to utilize this measurement*” for soil parameters. The diagrams, comparing f_s by 4 companies, do not leave many doubts.
4. **CPTU is an improvement vs mechanical CPT**, but at a high cost (u -measurement). It introduced the necessity - even for a reliable q_t – of a reliable u , for the area correction. This has made even q_t vulnerable to de-airing errors.
5. **Still unresolved N_k (S_u from q_t).** To the point that Lunne indicated at CPT’10 that the best S_u is not from q_t but from B_q . B_q requires however a reliable u (de-airing errors ?). Moreover S_u from B_q is highly empirical (u is measured in a highly remoulded clay zone).
6. **Soil parameters.** Been at CPT’10 : If the purpose is parameters, then “*CPT cannot be used in isolation*”. Hence, for estimating parameters, CPT has to be supplemented by lab (or by other methods, or by DMT)
7. **Important jobs require CPTU precision class #1.** This reduces productivity, requires qualified supervision, substantially increases the cost.



Lunne at CPT'10

ADVANTAGES - DISADVANTAGES OF DMT

DMT has the disadvantage, compared with CPT, of being somewhat slower and more expensive. DMT is however still far faster than most other methods.

DMT has an excellent track record in predicting settlements/ operative moduli.

DMT is a truly two-parameter test, one of which is K_d (Stress History Index). DMT is uniquely sensitive to stress history and aging, factors difficult to sense by other methods, yet indispensable for correctly evaluating settlements and liquefaction.

DMT interpretation is based on a rational framework. The initial OCR- K_d 1980 correlation in clay was reconfirmed experimentally by Kamei and Iwasaki (1995), and, theoretically, first by Finno 1993, then by Yu 2004. Finno and Yu used two different theoretical models. Once having OCR, S_u was derived from OCR based on Ladd’s SHANSEP approach.

Any operator gets the same results, not due to the device simplicity or good will, but to the physical construction. No classes of accuracy. Short training time. Required skill : ability to inflate a car tyre. No de-airing problems. Can be providential in remote areas, or where poor workmanship is available. Eliminating dubious data avoids the designer’s dilemma : how to handle dubious quality data, reducing cost and time.

PLANNING AN INVESTIGATION

In simple jobs, requiring only profiling soft/ hard layer and qualitative information, CPT alone may suffice. Being faster and more economical, CPT may be preferable.

If the objective is quantitative parameters, then CPT “*cannot be used in isolation*”, hence it has to be supplemented either by lab or by DMT.

This writer (and many colleagues) consider – overall – more informative a DMT than a CPT. Hence, if the investigation consists of say 10 soundings, then the writer would use DMT.

On the other hand, if the number of sounding is say 80, the investigation may be rendered faster and more economical by running say 10 DMTs and 70 CPTs, using DMT to calibrate CPT.