



Ever since the early seventies, many people and institutions have learned about the Verax Compact Flange System (= VCF System). Some as researchers, some as customers and other ones just from their interest in modern engineering. Here follows a list of references to those having experience from applications, their research work, studies and such:

1. **Norges Tekniske Högskole**, Trondheim, Norge, <http://www.ntnu.no>, In 1964, professor **Åge Walöen**, (deceased in 1996), at that time head of the Materials Testing Lab at ASEA, Västerås, Sweden, supervised an experiment exposing a VCF-joint to pulses from zero to 30% above max. working pressure. After 1,8 million cycles it was concluded, that there was no risk for failure from fatigue in the bolts. Prof. Walöen in 1989 was the expert, who recommended the use of flanged joints designed by Jan Webjörn for the riser required to save the Ekofisk 2/4 14 near blow-out well. The application of the VCF System became a complete success, although operations lasted four times longer than originally estimated. In an interview on the Norwegian TV in 1994 Dr.-ing **Hans-Petter Hildre**, the NTH Dept for Mechanical Engineering, tfn: +47 7359 3768 declared, that the conventional flanged joint design is a misconception, that ought to become declared unacceptable for installations carrying dangerous fluids.
2. In 1988 professor **G E O Widera**, now at the **Marquette University**, Milwaukee, WI, USA, <http://www.mu.edu>, tfn: +1 (414) 288 7259, tfx: +1 (414) 288 1647, formerly Chairman of the ASME Pressure Vessel and Piping Division and Head of the Mech Engg Dept at the **Univ of Illinois**, Chicago, <http://www.mie.uiuc.edu>, supervised researchers **J M Kremer** and dr **Z F Zang** (from China) reproducing and verifying the major study of bolt force versus external load, i.e fluid pressure.
3. At **UMIST** (= the University of Manchester Institute of Science and Technology), dr **Graham Thomp-son**, tfn: +44 161 200 3849, tfx: +44 161 200 4537, editor of the Proceedings of the IMechE, Part E, Journal of Process Mechanical Engineering, in his lectures now is teaching his students the modern engineering of pipe joints.
4. The **University of Strathclyde**, Glasgow, Scotland, <http://www.strath.ac.uk>, tfn: +44 441 552 4400, tfx: +44 141 552 5105, is the prime institution in the UK studying the engineering of pressure vessels and piping. Professor **T G F Gray**, Head of the Mech. Engg Dept in 1989 supervised mr **W J Fyvie**, reproducing and verifying the same study as mentioned above.
5. Professor **Toshiyuki Sawa** of the **Yamanashi University**, Japan, tfx: +81 552 20 8438 in September 1995 visited Verax for to get first hand information regarding the VCF System. Prof. Sawa is a member of a committee appointed to develop recommendations for the design of earthquake resistant LNG-pipelines.
6. **ABB STAL**, Finsspång, Sweden, <http://www.abb.se/stal>, tfn: +46 122 81000, tfx: +46 122 13357, ref: **Rolf Asklöf**, Dept. UM, since 1979 has been using VCF-joints in large steam turbines installed in the nuclear power units Oskarshamn 2, Barsebäck 1 and Barsebäck 2. Also since 1983 in Forsmark 3 and Oskarshamn 3, where appr. 28 VCF-joints have been installed in each turbine.
7. **ABB STAL**, ref: **Göran Stångberg**, Dept DS, tfn: +46 122 81379, tfx: +46 122 12170, for their VAX steam turbines, operating at up to +530°C and 115 bar are using VCF-joints. Now more than 200 such turbines are in operation. After hundreds of thousand hours of service, those joints never have caused any problem.
8. **Statoil**, Stavanger, Norway, <http://www.statoil.com>, tfn: +47 5180 8080, in 1986 ordered **ABB ATOM** to perform a study evaluating the VCF System. This was performed by

	<p>VERAX Reference</p>	<p>Application references</p>	<p>Dnr J9809.01 Edition 2 / F78 Ratified by: Jan Webjörn 1998-04-28</p>
---	-----------------------------------	--------------------------------------	--

Anders Furn Engineering, Västerås, Sweden, tfn: +47 2141 7197, tfx: +47 2141 2213. The full report, ASEA ATOM ref: RUD 86-91 is available from Verax by courtesy of Statoil.

9. **ABB ATOM**, Västerås, Sweden, <http://www.abb.se/atom>, ref: **Jan Möller**, tfn: +46 2134 7985, tfx: +46 2114 6350, in 1995 built a "re-combinator" with VCF-joints, which was installed in the primary reactor circuit, System 321, Barsebäck 1. After a series of experiments having been completed, it now has been bypassed but remains installed.
10. **Kvaerner Turbin**, Kristinehamn, Sweden, ref: **Thomas Nilsson**, tfn: +46 550 84874, tfx: +46 550 18998, rebuilt their facility for the testing of hydraulic servo units, raising its working pressure from 40 to max. 100 bar. A batch of VCF-joints were installed in the piping system during the Spring of 1996.
11. **Kvaerner Corporate Staff**, Lysaker, Norway, ref: **Erlend Langsrud**, tfn: +47 6751 3122, tfx: +47 6751 3120, in 1998 built a prototype KLC diesel engine, using VCF-joints in its exhaust system. A device for the testing of bolts and for the calibration of torque wrenches were used, in preparation for the assembly.
12. **Kvaerner Oilfield Products**, Oslo, Norway, ref: **Michael Hilditch**, tfn: +47 2266 6977, tfx: +47 2266 6400, in 1998 built a prototype device for sub-sea service, using miniature VCF-joints having M4 bolting.