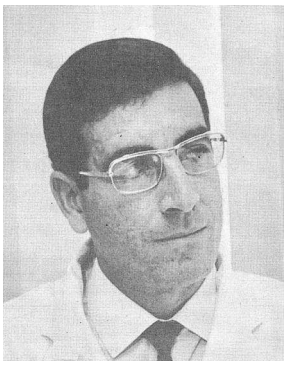
SOME BIOGRAPHICAL DETAILS ABOUT DINO BOUSSO

1933-1971



Dr. Dino Bousso was born in Alexandria, Egypt on January 21, 1933 to Salomon and Esther Bousso. He had three brothers, Victor, Joseph, and Raymond, and two sisters, Janine and Linda. Dr. Bousso attended the prestigious Victoria College of Alexandria, Egypt, famous for its notable alumni such as King Hussein of Jordan, the Crown Prince of Iraq, and Omar Sharif, to mention just a few. He earned several certificates from Oxford and Cambridge Universities in June 1949. Two years after his older brother Joseph immigrated to Israel Dr. Bousso followed his steps and arrived in Israel in January 1951. The rest of the family immigrated as well during the years 1952-1957.

Dr. Bousso died prematurely in 1971 following an open heart surgery at the age of 38. He was survived by his eight year old daughter Danielle from his first wife Esther, and his son Raphael from his second wife Christa, born six month after his father's death. The son, Professor Raphael Bousso is a well known physicist, currently at Berkeley University near San Francisco, California.

After being a member of Kibbutz Yiron for a few years, Dr. Dino Bousso studied Mechanical Engineering at the Technion in Haifa, Israel. He earned his B.Sc. degree in Mechanical Engineering in October 1958, his M.Sc. in Mechanics [1] - [3] June, 1960 and his D.Sc. in Mechanics [4] January, 1963 [60], [63]. Both M.Sc. and

D.Sc. theses were supervised by his advisor Professor Yachin Boaz Popper.

Dr. Bousso joined the Department of Mechanics at the Technion, Israel Institute of Technology, Haifa in October 1958. He taught numerous classes to include Statics, Strength of Materials, Dynamics, Vibrations and Dynamics of Machinery. He taught these and associated courses to students of Mechanical Engineering and Aeronautical Engineering. His class on the Dynamics of the Gyroscope to post-graduates was a very popular one. Following his academic progress, Dr. Bousso became a lecturer in March 1963, a senior lecturer in October 1964 and professor in 1971. In addition to his many researches in the Department of Mechanics at the Technion, he conducted research at the Department of Engineering Science, I.C.I., and the Department of Engineering Science, both at Oxford University during 10.1965-9.1967, and in the Dunlop Company, New Products Division, Coventry, England during 10.1969-9.1970.

Dr. Bousso specialized in dynamics. He was an exceptionally talented and enthusiastic lecturer, who always put his students first. He succeeded in explaining the complex dynamic phenomena of rotation and vibration, and making these difficult subjects understandable and interesting to his many students. In this way he encouraged many students to specialize and work in these challenging areas.

Dr. Bousso wrote textbooks on dynamics [11], [12] (1965), based on his lectures to students. A small part of one of his books [11] (1965) gives the first explanation to the gyroscopic effect, which was not published elsewhere.

Dr. Bousso was a talented researcher and inventor as well. He invented and constructed new mechanisms ([1] [3], [5] - [10], [15] [20], [28], [30], [35], [37], [47] - [52], [55], [59], [61], [62], [67]. Among many more unpublished mechanisms invented by him there are a new Cardan joint and improved opening of bus doors. He also applied his inventions to developing and building artificial upper limbs

[22], [24], [25], [29], [31] - [34], [36], [38] - [46], [49], [54], [56], [57]. Reference [38] describes a cosmetic palm hand prosthesis built and gas-power actuated, including actuating the fingers, with Bousso's rotary actuators. In his D.Sc. thesis [4], [60], [63], Bousso first explained among other things, the backward precession in turbines. His invention of achieving high speed rotation is presented in [30], [35], [59]. Papers [64] - [66] present a research supervised by Dino Bousso, detailing implications and applications of rotation. This research led to the necessary understanding after analyzing experiments that used Bousso's invention [30], [35], [59].

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Dino Bousso was awarded four prizes [26] for some of his inventions: Three gold medals in International Inventions Exhibitions, Brussels, Belgium:

Two in 1967 for his new pneumatic rotary actuator and for his tensor calculator,

One in 1968 for his gas powered artificial upper limb,
and the First Countess Marianne Bernadotte Prize, for the best invention for helping handicapped persons and alleviating human suffering in 1968, from the Swedish Fund.

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Bousso's gas-powered artificial upper limb was capable of six different movements. The gas was contained in the limb itself, and could be recharged in situ from a supply cylinder. The gas supplied the power for a new compact and light-weight rotary actuator, developed by Dino Bousso earlier. Bousso's upper limb weighed 400 grams - one-third lighter than less sophisticated conventional models existing at that time (1968). The main construction material was aluminum, and the future use of titanium and carbon-fibers might make it much lighter. See [22], [24], [25], [29], [31] - [34], [36], [38] - [46], [49], [54], [56], [57], on Bousso's artificial limb, and [16], [17] - [19], [29], [37], [47] [52], [55], [61], [62] on Bousso's gas powered rotary actuator.

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The aim of Bousso's upper limb prosthesis was to enable a somewhat easier life to thousands of thalidomide children all over the world. After Dino Bousso lectured about the prosthesis at the Technion, one participant suggested that maybe developing a different optimized prosthesis not necessarily so similar to the human arm could be more useful to handicapped people. This question was followed by many suggestions by other participants on how to modify hand actions and structure, and how to optimize modifying hand actions and structure, and caused a long discussion. Dino Bousso listened and then concluded:
"Nobody wants a hand that looks like a crane."
No participant of the discussion thought of or raised this point of view before Bousso said this, but everybody understood and accepted this conclusion, once he expressed it in his own strict to the point words. This episode was typical of Bousso's way of thinking differently.

Bousso started to develop the artificial limb and associated inventions at Oxford in 1965, and later continued at the Technion in Haifa, Israel. The work was sponsored by the Lady Hoare Thalidomide Appeal Fund and the Goudie Trust.

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Bousso invented and constructed two different first dual-flush water-saving Niagara mechanisms for bathrooms, one of which he asked the Technion to patent, but the Technion had no budget for patenting his invention. After Bousso received the top award and the outstanding design award in a competition organized by the Israel Hydraulic Institute for his dual-capacity flushing system in July 1965, and was awarded gold medals at the International Inventors Exhibitions at Brussels in 1967 and 1968, for three other inventions, (see above), the Technion agreed to get patents for Bousso's inventions, including the dual-flush Niagara. Bousso then asked a patent attorney to patent his Niagara, and was told that a few

days earlier a company from Europe already had requested him to get a patent for the same Niagara device. Bousso then abandoned both dual-flush Niagara devices that he already had invented and constructed, never published this, and concentrated on the artificial limb and other research, as well as teaching. Bousso's working dual-flush Niagara presented the idea and proved that it is possible, thus encouraging others to develop this widely used water-saving device, and contributed to world welfare.

My comments (NBA): Prompt patenting of Bousso's dual-flush Niagara by the Technion with the ownership of the Technion as suggested by Bousso could have solved budgetary problems of the Technion.

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In his short lifetime Bousso managed to accomplish many useful inventions. Unfortunately his premature death stopped the development of his inventions, including the artificial limb.

Boaz Popper, who was Dino Bousso's supervisor in both his M.Sc. and D.Sc. theses, commented at the memorial to Dino Bousso:
"Dino Bousso was my student, but also my teacher."

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Bousso's D.Sc. thesis (1963) [4] was translated (almost fully) into English by Bousso's supervisor B. Popper, following my suggestion (N.B.A.) to him after Bousso's death (which happened in 1971), and published as Bousso (1972) [60].

Tondl, in his review (1974) [63] of Bousso (1972) [60] wrote:

"The latter represents the most important contribution of the author," (that is, up to 1974 no other explanation to the backward precession in turbines was presented).

Tondl (1974) [63], mentioned "agreement with some results of recent papers which are not mentioned in the references." The paper was actually written without any update in 1972 after Bousso's death, based on Bousso's D.Sc. thesis submitted in 1963 [4]. Tondl did not know that. This explains the lack of references to papers

later than 1963. Actually the updated results of these papers were *predicted* by Bousso earlier, in 1963**!** These results mentioned by Tondl just confirmed Bousso's (1963) [4] analysis.

After reading the review on Bousso's paper (Tondl (1974) [63]), I met Professor Reiner. (Professor M. Reiner (1886-1976), one of the founders of the science of rheology, was the founder of the Department of Mechanics at the Technion, and Bousso's advisor to his M.Sc. thesis research (1960) [2]). I wanted to gladden Professor Reiner's heart, by telling him about the very positive review, and that Bousso's predictions of 1963 were confirmed by later papers. It was the first time I spoke to Professor Reiner. Professor Reiner answered me: "Soon I will tell him personally," and wept.

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Close to Professor Reiner's death in 1976, the Department of Mechanics was closed. People in the Department agreed that this would not have happened if Bousso were alive.

ACKNOWLEDGEMENTS

Many thanks to the Bousso family for their help, and in particular to Linda Bousso and Christa Bousso. Many thanks to Dino Bouso's former students Gideon Ishai and Joram Shenhar for their help. Joram Shenhar encouraged me to write this shortened biography of Dino Bousso.

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This biography is in preparation. Please email corrections, additions and more references to

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The reference list includes books, papers, theses and patents by Bousso, as well as some publications associated with Bousso. The order of references in this list is according to the year of publication.

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