

CURRICULUM VITAE (Updated, March 2016)

Name: Jehuda Tirosh (i.d. 00587148-8)

Address: 143 Abba Hushi St., Haifa 34987, Israel, Tel: (04) 8348561

Birth and Education: Kibbutz Ayelet-Hashachar, Israel; Feb. 16, 1937

Marital Status: Married + two children

Military Service: 1955-1958: Israel Defense Forces (Paratrooper)

Academic Degrees:

1958-1962: B.Sc., in Mechanical Engineering, Technion-Israel
1962-1964: M.Sc., in Mechanical Engineering, Technion-Israel
1965-1969: Ph.D., in Mechanical Engineering, M. I. T. (U.S.A)
Massachusetts Institute of Technology, Cambridge, MA
Field: Plasticity and Fracture (with Prof. F. A. McClintock)
1992-2005 Henri Garih Chair in Material Processing. Faculty of Mechanical
Engineering, Technion, Haifa, Israel.
2006- Professor Emeritus (retiree).

Academic Positions:

1962-1964: Assistant, Faculty of Mechanical Eng., Technion, Israel
1964-1965: Instructor, Faculty of Civil Eng., Technion, Israel
1969: Postdoctoral, M.I.T. (with Prof. F. A. McClintock)
Field: Mathematical models in plastic behavior of metals
1969-1970: Research Associate, M.I.T., Dept. of Mech. Engineering
Field: Composite Materials and Fracture (with Prof. C. A. Berg)
1970-1971 Lecturer, Faculty of Mechanical Engineering, Technion, Israel
1971-1975 Senior Lecturer, Faculty of Mech. Eng., Technion, Israel
1975-1976 Visiting Scientist, U.S. Naval Research Laboratory, Washington, D.C.
1976-1988 Associate Professor, Faculty of Mech. Eng., Technion, Israel
1980-1981 Visiting Scientist, George Washington Univ. Washington D.C.
1986-1987 Visiting Scholar, Stanford University, CA, U.S.A (Sabbatical leave)
1988-present Professor, Faculty of Mech. Eng., Technion, Haifa, Israel
1990-1991 Visiting Scientist, Johns Hopkins Univ. Baltimore, MD
2002-2003 Visiting Scientist, Georgia Inst. of Technology, Atlanta, GA.
2005-2006 Visiting Scientist, M.I.T. Cambridge. Mass. USA
2006- Professor Emeritus (retiree).

Teaching Experience:

Machine Theory, Dynamics, Statics, Strength of Materials,
Metal-forming Processes, Fracture Mechanics, Elasticity, Plasticity.

Administrative Posts:

1974- ...	Head, Metal Forming Laboratory.
1975	Counselor of Undergraduate Students.
1977-1980	Deputy Dean, Faculty of Mechanical Engineering.
1982-1984	Head - Center for Manufacturing Systems and Robotics, Technion.
1996-1998	Vice Dean of the Graduate school of the Technion.
1999-2002	Vice Dean for Graduate study, Faculty of mechanical Engineering.
1999- 2004	Head of the inter-departmental graduate new program : M.Sc. and M.E in "Design and Manufacturing Engineering".
2003-2004	Head- Center for Manufacturing Systems and Robotics.

Professional Interest: Metal Forming processes, Applied Plasticity, Damage Mechanics.

Keynote Lectures (invited):

1. "Fracture Mechanics - The State of Arts". In the National Conf. of the Metallurgical Society of Israel. Haifa, Jan. 1975.
2. "Advance Problems In Metal Forming Processes". In the National Conf. of the Metallurgical Society of Israel. Tel-Aviv, Feb. 1977.
3. "Topics In Failure Analysis". In the National Conf. of the Metallurgical Society of Israel. Ramat-Gan. Oct. 1982.
4. "Extrusion of porous materials". Int. Conference on Extrusion processes", Athens, Ohio, U.S.A. Dec. 1989.
5. "Damage Evolution in Superplastic sheet Forming" : 2nd Int. Conf. on Sheet Metal. , Univ. of Ulster, Northern Ireland. April 12-13, 1994.
6. "Innovative Metal Forming Processes for Industry" The National Users Committee of Industry and Commerce , 24 in March , Tel -Aviv, Israel., 1998.
7. " Is it possible to 'ductilize' brittle-like materials?" ICC-10, New Orleans, Louisiana, USA. July 20-26, 2003
8. "On enhanced ductility of Magnesium Alloys". The National Organization for Industrial Magnesium . Application. Kibbutz Ein-Harod, 29th in Jan. 2004
9. Tirosch, J. "Innovated Methods in Hydro-forming" NumiSheet Conf. Detroit, 15-20, Aug. 2005.

Professional consulting:

1. Israel Defense Industry, (TA'AS): developing a new process for higher productivity and more secured operation.
2. Research and Development in the Office of Defense
 - a. Examination of fracture phenomena
 - b. Searching for an improved forming process for higher quality of a unique product.
3. U.S. Naval Research Lab. Washington D.C.
 - a. Damage of Composite Materials.
4. RAFAEL - Armament Development Authority:
 - a. Analysis of fracture disasters.
 - b. Applying new methods in deep drawing.
 - c. Strengthening metal composites by rigid particles

Professional referee to:

- 1) Int. J. of fracture.
- 2) Int. J. Mech. Sci.
- 3) J. Mech . Phys. Solids.
- 4) Int. J. Solids Structures

Editorial board (1995-2000): Journal of Engineering Manufacture, I Mech E (Part B)

Public Professional Activity:

1. Organizer and chairman of the 1978 Annual Symposium on "Metal Forming Processes", sponsored by the Met. Society of Israel, Avia, Savion, April 17, 1978.
2. Organizer of the 1979 Annual Symposium on "Innovations in Metal Forming", sponsored by the Metallurgical Society of Israel, Avia, Savion, January 1, 1979.
3. Organizer of the 1980 Annual Symposium on "New Technology in Metal Forming Processes", Avia, Savion, Feb., 1980.
4. Organizer and Chairman of the 1983 Annual Symposium on "Recent Development in Metal Working Processes", Kfar A-Macabia , Feb. 1983.
5. Organizer and Chairman of the 1986 Annual Symposium on "Advances in Metal Working Processes", Kibbutz Shfaim, Feb. 1986.
6. Organizer and Chairman of the 1989 Annual Symposium on "Advances in Metal Working Processes", Kibbutz Shfaim, Feb. 1989.
7. Organizer and Chairman of the 1992 Annual Symposium on "Progress in Metal forming Processes", Kibbutz Shfaim, 24. March. 1992.
8. Numisheet 2005 (Int. Conf.) Organizing Committee. Detroit,USA, Aug.15-19, 2005

Awards:

- | | |
|-----------|--|
| 1960-1961 | Stipend (Technion) based on academic record. |
| 1965-1969 | A special Grant (Technion) to study for Ph.D at M.I.T, Mass. USA |
| 1981 | Publication Award from U.S. Naval Research Lab. (NRL),
Washington, D.C., USA. |
| 1992 | Henry Garih Chair in Materials Processing. |
| 2002 | The Henry Taub award for Academic Distinction, Technion. |

LIST OF SCIENTIFIC PUBLICATIONS**A. Thesis:**

1. "Hydrostatic Extrusion", M.Sc. Dissertation. Faculty of Mech. Eng. Technion (1964).
2. " Stress and Strain in Elasto-Plastic Cracked Bar Under Torsion and Longitudinal Shear." Ph.D. Dissertation. Faculty of Mech. Eng. M.I.T. Cambridge , MA , (1969).

B. Original papers in professional Journals, with referees:

1. Elata, C. and Tirosh, J.: Frictional Drag Reduction, *Israel J. Tech.* 3, No. 1, 1-6, (1965).
2. Tirosh, J.: Analysis of Tube Piercing, *Israel J. Tech.* , 3, No. 3., 198-202, (1965).
3. Tirosh, J.: Direct Numerical Determination of Elastic Stress and Stress Intensity Factor in Twisted Cracked Bar with Applied Longitudinal Shear, *ASME Trans., J. Appl. Mech.*, **37**, Series E., No. 4, 971-976, (1970).
4. Tirosh, J.: On the Dead Zone Formation in Plastic Axially Symmetric Converging Flow, *J. Mech. Phys. of Solids*, **19**, 39-47, (1971).
5. Tirosh, J. and Berg, C.A.: The Role of Confining Pressure in Arresting Shear Cracks, *Israel J. Tech.* , **9**, No. 4, 333-336, (1971).
6. Tirosh, J. Carson, J.W., and Berg, C.A.: On the Stress Intensity Factors by Finite Element Method, *Israel J. Tech.*, **10**, No. 4, 265-270, (1972).
7. Berg, C.A. Tirosh, J., and Israeli, M.: Analysis of Short Beam Bending for Fiber Reinforced Composites, *Composite Materials Testing and Design*, ASTM STP **497**, 206-218, (1972).
8. Tirosh, J. and Berg, C.A.: On the Shear Toughening by Stiff Fiber Reinforcement, *Int. J. Fracture*, **9**, No. 1, 1-8, (1973).
9. Tirosh, J.: The Effect of Plasticity and Crack Blunting on the Stress Distribution in Orthotropic Materials, *ASME Trans., J. Appl. Mech.*, **40**, Series E., No. 4, 785-790, (1973).
10. Berg, C.A., Batra, S., and Tirosh, J.: Wear and Friction of Two Different Types of Graphite Fiber-reinforced Composite Materials, *Fibre Science and Technology*, (international journal), **6**, No. 3, 159-185, (1973).
11. Tirosh, J., and Stein, P.: The Elastic Interaction of a Crack with a Stiff Fiber in Mode III Loading (brief note). *Int. J. Fracture*, **9**, 363-365, (1973).
12. Tirosh, J. and Berg, C.A.: Experimental Stress Intensity Factors in Orthotropic Materials, *Composite Materials Testing and Design*, ASTM, STP **546**, 663-673, (1974).
13. Tirosh, J., Assa, A, and Ladelsky, A.: Photo-elastic Experiments and Potential Field Approach to Residual Stress Induced by Fatigue Cracking, *Israel J. Tech.*, 13, No. **4**, 325-329, (1975).
14. Tirosh, J. and Kobayashi, S.: Kinetic and Dynamic Effects on the Upper-bound Loads in Metal Forming Processes, *ASME Trans., J. Appl. Mech* ,**43**, Series E. No. 2, 314-318, (1976).
15. Tirosh, J. and Tetelman, A.S.: Fracture Conditions of a Crack Approaching a Disturbance, *Int. J. Fracture*, **12**, No. 2, 187-199, (1976).

16. Tirosh, J. and Grossman, G.: Continuous Extrusion by Viscous Drag, *ASME Trans.* **99**, *J. Eng. Mat. and Tech.*, Series H, No. 1, 52-58, (1977).
17. Tirosh, J.: Incipient Fracture Angle and Fracture Criterion for Mixed Mode Loading, *Eng. Fracture Mech.*, **9**, 607-616, (1977).
18. Tirosh, J. and Iddan, D.: Upper Bound of Deep Indentation (technical note), *ASME Trans.*, **99**, *J. Eng. for Ind.*, Series B, No. 3, 804-806, (1977).
19. Tirosh, J.: On the Tensile and Compressive Strength of Solids Weakened (Strengthened) by an Inhomogeneity, *ASME Trans.*, *J. Appl. Mech.*, **44**, Series E No. 3, 449-454, (1977).
20. Tirosh, J., Yossifon, S., Eshel, R., and Betser, A.: Hydroforming Process for Uniform Wall Thickness Products, *ASME Trans.* **99**, *J. Eng. for Ind.*, Series B, No. 3, 685-691, (1977).
21. Tirosh, J., and McClintock, F.A.: "Numerical Procedure for 2D Elasto-plastic Stress Analysis by Impositions of Dislocations", *AMD*, Vol. **28**, *ASME*, 155-161, (1978).
22. Tirosh, J., and McClintock, F.A.: Finding Elasto-Plastic Stress and Strain in Cracked Bars Under Torsion and Shear by Assembling Screw Dislocations, *Eng. Fracture Mech.*, **11**, No. 3, 563-572, (1978).
23. Tirosh J., Grossman, G. and Gordon, G.: Theoretical and Experimental Study of the Conform Metal Forming Process, *ASME Trans.*, **101**, *J. Eng. for Ind.*, Series B, No. 2, 116-120, (1979).
24. Tirosh, J., Katz, E., Lifshitz, G., and Tetelman, A.S.: The role of Fibrous Reinforcements Well-Bonded or Partially debonded on the Transverse Strength of Composite Materials, *Eng. Fracture Mech.*, **12**, No. 2, 267-277, (1979).
25. Tirosh, J.: On the Mixed Mode Fracture of Unidirectional Fibrous Composites, *Eng. Fracture Mech.*, **13**, 119-127, (1980).
26. Tirosh, J. and Ladelski, A.: On Residual Stress Induced by Fatigue Cracking, *Eng. Fracture Mech.*, **13**, 453-461, (1980).
27. Tirosh, J., Mast, P., Beaubien, L., Mulville, D., Sutton, S., and Wolock, I.: Fracture Criteria of Fibrous Laminated Composites Under In-Plane Multi-Directional Loading, *ASME Trans.*, **103**, *J. Appl. Mech.*, 48, Series E., 309-318, (1981).
28. Tirosh, J. and Katz, L.: Mixed-Mode Fracture Angle and Fracture Locus of Materials Subjected to Compressive Loading, *Eng. Fracture Mechanics*, **14**, 27-38, (1981).
29. Gur, M. and Tirosh, J.: Instability of Contained Plastic Flow in Shear Spinning Process, *ASME Trans.*, **104**, *J. Eng. for Ind.*, Series B, No. 1, 17-23, (1982).

30. Mast, Beaubien, Clifford, Mulville, Sutton, Thomas, Tirosh, Wolock: A Semi-Automated In-Plane Loader for Materials Testing, *Experimental Mechanics*, **23**, 236-241, (1983).
31. Tirosh, J.: Assessments of the Kinematic and Dynamic Loads Sustained by Stationary Tools during High Rate Plastic Forming, *Int. J. Mech. Science*, **26**, 73-82, (1984).
32. Yossifon, S., Tirosh, J., and Kochavi, E.: On Suppression of Plastic Buckling in Hydroforming Process, *Int. J. Mech. Sci.*, **26**, 389-402, (1984).
33. Tirosh, J., Iddan, D., and Pawelski, O.: The Mechanics of High Speed Rolling of Viscoplastic Materials, *ASME Trans.*, **107**, *J. Appl. Mech.*, Series E., 309-318, (1985).
34. Yossifon, S. and Tirosh, J.: Buckling Prevention by Lateral Pressure in Deep Drawing, *Int. J. Mech. Sci.*, **27**, 177-185, (1985).
35. Yossifon, S. and Tirosh, J.: Rupture Instability in Hydroforming Deep Drawing Process, *Int. J. Mech. Sci.*, **27**, 559-570, (1985).
36. Tirosh, J. and Konvalina, P.: On the Hydrodynamic Deep Drawing Process, *Int. J. Mech. Sci.*, **27**, 595-608, (1985).
37. Altus, E., Haber, O., and Tirosh, J.: An Engineering Failure Envelope for Adhesive Joints, *Experimental Mechanics*, **31**, 267-274, (1986).
38. Iddan, D., Tirosh, J., and Pawelski, O.: Strip Rolling of Hardening, Rate-Sensitive Solids, *Annals CIRP* **35/1**, 151-155, (1986).
39. Tirosh, J. and Sayir, M.: High Speed Deep Drawing of Hardening and Rate Sensitive Solids with Small Interfacial Friction, *J. Mech. Phys. Solids*, **35**, 479-494, (1987).
40. Yossifon, S. and Tirosh, J.: On the Permissible Fluid Pressure Path in Hydroforming Processes, *ASME Trans.*, **110**, *J. Eng. for Ind.*, 146-152, (1988).
41. Tirosh, J. and Miller, A.: Damage Evolution and Rupture in Creeping of Porous Materials, *Int. J. of Solids and Structures.*, **24**, 567-580, (1988).
42. Tirosh, J. and Hazut, M.: Hydrodynamic Deep Drawing of Blanks with non-Uniform Thickness. *Int. J. Mech. Sci.* **31**, 121-130, (1989).
43. Tirosh, J., Segal, H. and Yossifon, S.: Hydroforming of Polygonal Boxes. *NAMRC VII, Vol. 17*, (1989).
44. Tirosh, J., Iddan, D.: Technological Implications of Fast Forming Processes. *Annals CIRP* **38/1**, 235-239, (1989).
45. Shafry, D., Tirosh, J. and Ber, A.: CAD/CAM of 3D Dies for Optimized Extrusion. *Manufacturing Review. ASME/CIM.* 60-65, (1989).

46. Tirosh, J. and Iddan, D.: Forming Analysis of Porous Materials. *Int. J. Mech. Sci.* **31**, 949-965, (1989).
47. Yossifon, S. and Tirosh, J.: The Maximum Drawing Ratio in Hydroforming Deep Drawing Processes. *ASME Trans, 112, J. Eng. for Ind.* 47-56, (1990).
48. Tirosh, J.: Bulk Forming by Densification of Dilatant Time-dependent Materials. *Mechanics of Materials (Int. Journal)* ,**9**,121-128, (1990).
49. Tirosh, J. and Iddan, D : Explosive Forming (Extrusion and Wire drawing) of Porous Solids. *J. Materials Processing Technology*, **30**, 203-212, (1990).
50. Tirosh, J. and Gutfinger R. : Damage Evolution and Ductile Fracture in Strain Hardening Materials. In "Damage Mechanics in Engineering Materials" *ASME, AMD-109, MD-24* (Ed. Ju, Krajcinovic, Schreyer) 129-141, (1990).
51. Yossifon, S. and Tirosh, J.: On the Dimensional Accuracy of Deep Drawing by Hydroforming Processes. *Int. J. Mech. Sci.* **33**, 665-675, (1991).
52. Tirosh, J. and Iddan, D.: On the Limit Analysis of High Speed Forming Processes in Hot and Cold Conditions. In 'Advances in Continuum Mechanics' (Ed. S. Bruller et.al.) Lippman Anniversary Volume, Springer-Verlag 371-386, (1991). (invited)
53. Tirosh, J., Iddan, D. and Silviano, M.: Hydrostatic Ironing: Analysis and Experiments. *ASME Trans, 114, J. Eng. for Ind.* 237-243,(1992).
54. Tirosh, J. Altus, E. and Ifrach, Y.: A New Method for Evaluating Fracture Toughness of Hard Materials. *Int. J. Fracture.* **58**, 211-222, (1992).
55. Tirosh, J. : Evolution of Structural Anisotropy in Metal Forming processes. *J. Materials Processing Technology* **32**, 355-364, (1992).
56. Yossifon, S. and Tirosh, J.: Deep Drawing with Fluid Pressure Assisted Blankholder. *J. Eng. Manufacture (Part B) IMechE*, 206, 247-252, (1992).
57. Tirosh, J. and Iddan, D. :On the Rate Effects in Metal Forming Analysis Via an Extended Lower Bound Approach. *ASME, MD-Vol. 39, PED-Vol. 61*, (Ed. J. S. Gunasakera), 129-145, (1992).
58. Shirizly, A., Yossifon, S. and Tirosh, J.: The effect of Die and Punch Curvatures on Deep Drawing with Fluid Pressure Assisted Blankholder. *Int. J. Mech. Sci.* **36**, 121-135, (1994).
59. Tirosh, J. and Iddan, D.: The Dynamics of Fast Metal Forming Processes. *J. Mech. Phys. Solids*, **42**, 611-628, (1994).
60. Tirosh, J. Nachlis ,W. and Hunston, D. :Strength Behavior of Toughened Polymers by Fibrous (or Particulate) elastomers. *Mechanics of Materials (Int. Jour.)* **19**, 329-342 (1995).

61. Tirosh, J. :Evolution of Structural Anisotropy in Metal Forming processes. in 'Material Processing Defects' (Editors: S. K. Ghosh and M. Predeleanu), Elsevier Science, (1995).
62. Iddan, D. and Tirosh, J. : Analysis of High Speed Rolling with Inertia and Rate Effect. ASME Trans, **116**, *J. Appl. Mech.* **63**, 27-36, (1996).
63. Tirosh, J., Noiberger, A. and Shirizly A. "On tube expansion by internal fluid pressure with additional compressive stress. *Int. J. Mech. Science.* **38**, 839-851, (1996).
64. Tirosh, J. and Kambour, R. P. " Dependence of crack trajectories and stress distribution in the surface of injection moldings produced under high packing pressure" , *Polymer Engineering and Science.* **36**, 2876-2880, (1996).
65. Tirosh, J. "On the Shakedown Conditions for Dilute Reinforced Composite", *J. Mech. Phys. Solids*, **46**, 167-185, (1998).
66. Tirosh, J. "Bounds on the Endurance Limit in Fatigue of Dilute Fibrous Composites by the Shakedown Theorems" In 'NonLinear Singularities in Deformation and Flow', D. Durban and J.R.A. Pearson (Eds.), Kluwer Academic Publ.,349-360, (1999).
67. Shirizly, A., Tirosh, J. and Rubinski, L. "Open die Forging of Porous Materials." *Materials Science and Engineering A*, **249**, 55-61, (1998).
68. Shirizly, A., Rittel, D., Rubinski, L. and Tirosh, J. "On damage distribution in the upsetting process of sintered porous materials". *Int. J. Fracture*, **99**, No. 1/4, 55-69. (1999).
69. Tirosh, J., Shirizly, A. and Rubinski, L. "Anisotropy changes in the compliances of porous materials during plastic stretching or rolling- Analysis and experiments". *Mechanics of Materials* (Int. Jour.) **31**, 449-460, (1999).
70. Tirosh, J., Rubinski, L., Shirizly, A. and Harvey D. P. " Damage evolution in Creep Bulging of Thin Sheet Metals". *Int. J. Mech. Sci.* **42**, 163-184, (2000).
71. Tirosh, J., Shirizly, A., Ben-David, D. and Shtanger, S. "Deep Drawing of Hardening and Rate Sensitive Materials with fluid Assisted Pressure". *Int. J. Mech. Sci.* **42**, 1049-1067, (2000).
72. Tirosh, J. and Peles, S. "Bounds on Fatigue Threshold in Metals" *J. Mech. Phys. Solids*, **49**, 1301-1322, (2001).
73. Dejmal, I., Tirosh, J. and Shirizly, A. "On Optimal Die Curvature in Deep Drawing Processes". *Int. J. Mech. Science.* **44**, 1245-1258 (2002)
74. Tirosh, J. and Peles, S. "Shakedown Bounds to Fatigue of Two Phase Materials" *Int. J. Frac.* **119**, 65-81, (2003).

75. Peled, A., Rubin, M. B. and Tirosh, J. "Analysis of Blank Thickening in Deep Drawing Processes using the Theory of Cosserat Generalized Membrane" *J. - Mech. Phys. Solids*, **52**, 317-340, (2004).
76. Shirizly A. , Rubinski, L. and Tirosh, J. "On the Densification of Porous Materials" *Int. J. of Damage Mechanics*, **16**, 427-455, (2007).
77. Tirosh, J. and Abraham, O. "Ductility Enhancement of Solids by Confining Hydrostatic Pressure", *Mechanics of Materials (Int. Journal)*, **79**, 760-772, (2007).
78. Tirosh, J. "Extended Fatigue Life by Shot Peening Process via Shakedown Analysis", *J. Appl. Mech*, ASME Trans, **75**, 11005-11013, (2008).
79. Tirosh, J., Tylis, A. and Davidi, G. "Upper and Lower Bounds to Indentation of Rigid Ball into Semi -Infinite Solid. *Int. J. Mech. Sci.* **50**, 328-341, (2008).
80. Tirosh, J. and Peles, S. "Shakedown Fatigue Limits for Materials with Minute Porosity" *J. Appl. Mech*, ASME Trans, **76**, 0310169/1-9, (May 2009).
81. Tirosh, J. , Tylis, A. and Davidi, G. "Foreign object damage: Penetration of Rigid Projectile into Solids", *Mechanics of Materials (Int. Jour.)*, **41**, 535-544, (2009).
82. Tirosh, J. , Shachak, N.,Rubinski, L. and Shirizly, A. "Thermal-history effect on the yield strength of particulate Metal Matrix Composite". *Int. J. Mech. Sci.* **78**, 52-59, (2014).

Papers submitted to conferences and published in the proceedings:

1. Oron, M., and Tirosh, J.: Study of Micro-fractures Mechanisms in Fibrous Composite Materials by Continuous in-situ Observation in SEM. Presented at "SEM-73" Conference, Newcastle-upon-Tyne, England, July 3-5, 1973.
2. Iddan, D. and Tirosh, J.: Analysis and Design of Disposable Plastic Dissipative Fuse for Energy Absorption, ASME Design Engineering Tech. Congress, September 17-29, 1976, Montreal, Canada, Paper No. 76-DET-105, ASME , 1976.
3. Tirosh, J. and McClintock, F.A.: "Finding Elasto-plastic Stress and Strain in Cracked Bars Under Torsion and Shear by Assembling Screw Dislocations". International Conference on Numerical Methods in Fracture Mechanics", SWANSEA, U.K., January 9-13, 595-606. 1978.
4. Mast, P.W., Beaubien, L.A., Clifford, M.F., Mulville, D.R., Sutton, S.A., Thomas, R.W.,Tirosh, J. and Wolock, I.: "Predication of Fracture Initiation in Composite Structures", ICCM/2. Second Inter. Conf. on Composite Materials, Toronto, Canada, April 16-20, 1979.
5. Beaubien, L.A., Clifford, M.F., Mast, P.W., Mulville, D.R., Sutton, S., Thomas, R.W., Tirosh, J., Wolock, I., and Hunston, D.L.:"Failure Criteria for Composite Structures", High Performance Composites and Adhesives for V/STOL Aircraft, 2nd Annual Report 3721, 103-148, 1978

6. Mulville, D.R., Tirosh, J., Mast, P.W., Vaughan, W., and Macander, A.B.: "Failure of Bonded Joints Under Complex Loading", Int. Conference on Bonded Structures, London, Sept. 5-6, 1978.
7. Tirosh, J., Mulville, D.R., Mast, P.W., and Wolock, I.: "Interlaminar Shear Stress and Delamination Test of Orthotropic Beam Under Point-Load Bending", Int. Conf. (UTAM) of Theoretical & Applied Mech., Toronto, August, 17-23, 1980.
8. Mast, P.W., Beaubien, L.A., Mulville, D.R., Sutton, S.A., Thomas, R.W., Tirosh, J., and Wolock, I.: "Fracture Behavior of Graphite/Epoxy Composites Under Complex In-plane Loading", Third Int. Conf. of Composite Materials, ICCM 3, Paris, August 26-29, 1980.
9. Sutton, S.A., Tirosh, J., Thomas, R.W., Mast, P.W., and "The effect of Loading Rate, Temperature and Moisture on the Fracture Toughness of Polycarbonate". 27th National SAMPE Symposium, May 4-6, 1003-1021, 1982.
10. Tirosh, J., Mast, P.W., Nash, G., Sutton, S.A., Thomas, R.W., Wolock, I.: "The Effect of Moisture on Fracture Toughness and Thermal Relaxation of Stretched Acrylic Plastic", 14th Conference on Aerospace Transparent Materials and Enclosure, Scottsdale, Arizona, July 11-14, 1983.
11. Tirosh, J. and Konvalina, P.: Deep Drawing with Hydrodynamic Lubrication, Proc. of the 24th Int. Machine Tool Design and Research Conference (MTDR), (Held in Manchester, England, July '83) 105-111, 1983.
12. Tirosh, J. and Dayan, A.: On the Impact Engraving of Metal Bands, Proc. NAMRC XV, Manufacturing Research Conf., (Lehigh Univ. May '87) , 358-363, 1987.
13. Tirosh, J.: Damage Arrest by Closure of Voids in Dilatant Solids During Plastic Forming, Proc. of Computational Methods for Predicting Material Processing Defects, Cachan (France) , 195-205, 1987.
14. Shafry, D., Tirosh, J. and A. Ber : CAD/CAM of Optimized Dies for 3D Extrusion. Proc. of the 3rd Int. Con. of Computer Aided Production Engineering. (Ed.S. K. Samanta), Ann - Arbor, MI., 490-498, 1988.
15. Tirosh, J. and Hazut, M.: Hydrodynamic Deep Drawing of Blanks with non-Uniform Thickness Proc. of the 3rd Int. Con. of Computer Aided Production Engineering. (Ed.S. K. Samanta), Ann -Arbor, MI ., 499-507, 1988.
16. Tirosh, J., Iddan, D.: Technological Implications of Fast Forming Processes. Annals CIRP 38/1 , 235-239. Trondheim, Norway, Aug.1989.
17. Iddan, D and Tirosh, J.: Extrusion of Porous Solids. Presented (invited Keynote) in the Int. Conf. on Extrusion, Dec. 1989. Athens , Ohio state Univ.

18. Tirosh, J. Iddan, D. and Bauman, Y.: On Higher Utilization of the Detonated Gas Pressure in by a (suggested) Modified Sealing Bands of Projectiles. Proc. of the 23th National Conf. of Mechanical Engineering, Technion, 21-23 May, 1990 (Ed. M. Perl)
19. Tirosh, J. and Iddan, D : Explosive Forming (Extrusion and Wire drawing) of Porous Solids. Presented in the Int Conf. on Metal forming Processes, Caiscase , Portugal, 12-14 Sept, 1990.
20. Tirosh, J. and Gutfinger R. : Damage Evolution and Ductile Fracture in Strain Hardening Materials. In "Damage Mechanics in Engineering Materials" AMD-Vol.109, MD-VOl. 24 pp. 129-141, (Ed. Ju, Krajcinovic, Schreyer), Presented at the ASME Winter Annual conf. Dallas, 25-30, Nov. 1990.
21. Tirosh, J. :Evolution of Structural Anisotropy in Metal Forming Processes. Presented in the 24th Israel Cof on Mech Engineering. Technion City, May. 18-19, Haifa, ISRAEL, 1992.
22. Tirosh, J. and D. P. Harvey : Damage Evolution in Superplastic sheet Forming. Presented in the 2nd Int. Cof on metal processing defects. 1-3 July, Siegburg, GERMANY, 1992.
23. Tirosh, J. and Ben-David, D.: Conditions for Unlimited Drawing Ratio in High Rate Sheet Forming. : Presented in IUTAM , XVIIIth international congress of theoretic and applied mechanics Aug. 22-28, Haifa, ISRAEL, 1992.
24. Tirosh, J. and Iddan, D.: Dual bounds in Metal forming analysis. ASME Winter Annual meeting Nov. 2-9, Anahaim CA, 1992.
25. Amir, Y., Yarnitsky, Y. and Tirosh, J. : Computerized Milling Machine for Manufacturing dies for Three Dimensional Extrusion. ME Research Bulletin, 2 , 27-46, (1994).
26. Tirosh, J. and D. P. Harvey : Damage Evolution in Superplastic sheet Forming : 2nd Int. Conf. on Sheet Metal. April 12-13, Univ. of Ulster, Northern Ireland. 1994.
27. Tirosh, J. and Ben-David, D.: Fluid-Pressaure Assisted Deep Drawing at High Speeds. Presented in the 25th Israel Conf. on Mech. Engineering, Technion City, May. 25-26, Haifa, ISRAEL, 1994.
28. Shirizly, A., Yossifon, S. and Tirosh, J.: The effect of Die and Punch curvatures on Deep Drawing with Fluid Pressure Assisted Blankholder. Presented in the 25th Israel Conf. on Mech. Engineering, Technion City, May. 25-26, Haifa, ISRAEL, 1994.
29. Neuberger , A. Tirosh, J. and Yossifon, S. "Bulge Forming of Thin Walled Tube". Presented in the 25th Israel Conf. in Mech. Engineering, Technion City, May. 25-26, Haifa, ISRAEL, 1994.
30. Tirosh, J. and Shirizly, A. "Progress in Deep Drawing Processes". Presented in the 27th Israel Conf. in Mech. Engineering, Technion City, May. 21-22, Haifa, ISRAEL, 1996.
31. Shirizly, A. and Tirosh, J. "Forging of Porous Materials". Presented in the 27th Israel Conf. in Mech. Engineering, Technion City, May. 21-22, Haifa, ISRAEL, 1996.

32. Tirosh, J. "On the Shakedown Conditions for Dilute Reinforced Composite" (published in J. Mech. Phys. Solids, 1998). Presented in IUTAM , Int. Symposium of theoretical and applied mechanics March. 17-21, Haifa, ISRAEL, 1997. The IUTAM Proceeding (in Press).
33. Tirosh, J. "Open Die Forging of Porous Materials". Presented in the ASME conf.(McNU 97), Northwestern Univ, Evanston, June 29- July 2, IL USA , 1997.
34. Shirizly, A., Tirosh, J. and Rubinski, L. "The densification Process of Porous Materials". Presented in the 'International Symposium of Plasticity' Juneau, ALASKA . July, 14-18, 1997. In "Finite Plastic and Viscoplastic Deformation" (ed. A. S. Khan) 329-330, 1997.
35. Tirosh, J., Shirizly, A. and Rubinski, L. "Anisotropy changes in the compliances of porous materials during plastic stretching or rolling- Analysis and experiments". 1st Israel France Bi-National Workshop on Failure of Materials (Edit. D. Rittel). Kiriath Anavim, 11-12 in May, Israel . 1998.
36. Tirosh, J., Rubinski, L. and Shirizly, A. " Damage evolution in Creep Bulging of Thin Sheet Metal" Presented in the 'International Symposium of Plasticity' (Plasticity '99) Cancun, Mexico, January, 5-13, 1999.
37. Tirosh, J. and Peles S. "Bounds on the Fatigue Threshold in Metals" Presented in 'Nonlinear Mechanics' J.M. Belfer Symposium, Haifa Israel. 11 th of June 2000.
38. Tirosh, J. "Is it Possible to 'Ductilize' Brittle-like Materials without Heating". Univ. of Texas at Austin, 23. Dec. 2002. (Univ. Seminar)
39. Tirosh J. "Ductility enhancement of Solids by hydrostatic pressure". Georgia Ins. of Technology (Gatech), Atlanta, GA, 19. Jan. 2003. (Invited Seminar)
40. Tirosh J. and Peles, S. "Shakedown bounds for two-phase structural materials". Int. Conf. on Composite/Nano Engineering. ICCE-10, July 20-26, 2003, New Orleans, Louisiana, USA. Proceeding (Edit: David Hui) p. 727
41. Tirosh J. and Offer, A. "Ductility enhancement of Solids by hydrostatic pressure". 5th EUROPEAN SOLID MECHANICS CONFERENCE. August 17-22, 2003, Aristotle University of Thessaloniki, GR-541 24 Thessaloniki, Greece, Proceeding (Edit: Elias C. Aifantis).
42. Tirosh J. , Peled, A. Stanger, S. Rubinski, L. and Shirizly, A. "On 'smart' hydroforming processes". Int. Conf. 'Numisheet' in Engineering. Aug. 10-14, 2005, Detroit, USA
43. Tirosh, J. "Innovated Methods in Hydroforming" NumiSheet Conf. Detroit, 15-20, Aug. 2005. (invited Keynote Lecture)
44. Tirosh, J. and Abraham, O. "Ductilization of Brittle materials by Hydro-Pressure". NumiSheet Conf. Detroit, 15-20, Aug. 2005.
45. Ben-Simon Y. Rubinski L. and Tirosh J. "Hydroforming with Differential Temperature". NumiSheet Conf. Detroit, 15-20, Aug. 2005.

46. Ben Simon, Y. Raz, D. Tirosh, J. and Rubinsky, L. Deep Drawing by Hydro-rim Forming Process with Differential Temperature. ISTAM Conf. Tel Aviv , 9th Dec. 2012.

SIGNIFICANT PROFESSIONAL PROJECTS

- 1) Participate in implementing a new metal-forming process (classified) in a defense installation (near Dimona) 1972/3.
- 2) Participate in implementing 'hydrostatic extrusion' process in TA'AS, 1977/8.
- 3) Participate in implementing a certain type of Deep Drawing process in RAFAEL, 1982/3.

GRADUATE STUDENTS

No.	Name	Subject	Degree
1.	Shmuel Yossifon:	<u>Classified subject</u> (jointly with R. Eshel and A. Betzer)	M.Sc. 1973
2.	Asher Ladelski :	<u>Determination of residual stresses induced by fatigue.</u>	M.Sc. 1974
3.	Dov Iddan:	<u>Plastic indentations as a mechanical fuse (a device for decreasing damages in colliding cars).</u>	M.Sc. 1975
4.	Gabi Gordon:	<u>Theoretical and experimental study of the conform metal forming (with Prof. G. Grossman)</u>	M.Sc. 1976
5.	Gad Lifschetz :	<u>The role of fibrous reinforcement on transverse strength of composite materials.</u>	M.Sc. 1978
6.	Eli Katz:	<u>Fracture by compression of heterogeneous materials</u>	D.Sc. 1978
7.	Avraham Sella :	<u>The limits of deep-drawing by hydroforming</u>	M.Sc. 1980
8.	Micha Gur:	<u>Analysis and experiments in shear spinning process. (with Prof. D. Brandon)</u>	D.Sc. 1980
9.	Peter Konvalina:	<u>An hydrodynamic deep drawing process</u>	M.Sc. 1984
10.	Avraham Dorogoi:	<u>Delamination in bonded structures (with Prof. E. Altus-principal)</u>	M.Sc. 1985
11.	Offer Haber:	<u>Fracture of adhesive structures (with E. Altus)</u>	M.Sc. 1985
12.	Ami Dayan:	<u>Extrusion of sealing bands by explosion</u>	M.Sc. 1986

- | | |
|---|------------|
| 13. <u>Ariel Hazut: Deep drawing of cups with Non-uniform Wall Thickness.</u> | M.Sc. 1988 |
| 14. <u>Haim Segal: Hydroforming of blanks to polygonal cups.</u> | M.Sc. 1988 |
| 15. <u>Dov Iddan: Dynamic effects in forming processes.</u> | D.Sc. 1988 |
| 16. <u>Dan Shafri: CAM/simulation of optimal dies for extrusion.</u> | M.Sc. 1989 |
| 17. <u>Amir Jona: CNC milling machine for producing dies for 3D extrusion (with Prof. Y. Yarnitski)</u> | M.Sc. 1990 |
| 18. <u>Ron Gutfinger: Damage evolution and rupture in strain hardening materials</u> | M.Sc. 1990 |
| 19. <u>Yuval Boumal: Sealing band in projectiles by high speed extrusion</u> | M.Sc. 1991 |
| 20. <u>Yzhak Ifrach: New Toughness measurement method (with Prof. E. Altus)</u> | M.Sc. 1991 |
| 21. <u>Amnon Shirizli: Hydromechanical deep drawing process (with Dr. S. Yossifon)</u> | M.Sc. 1992 |
| 22. <u>Avi Noiberger: Pipe bulging by hydrostatic pressure (with Dr. S. Yossifon)</u> | M.Sc. 1995 |
| 23. <u>Amnon Shirizli: Forging of porous materials</u> | Ph.D. 1997 |
| 24. <u>Reuven Ankori: Deep Drawing with hydrostatic rim pressure</u> | M.E. 1998 |
| 25. <u>Yehuda Borstein: Optimal Die in deep drawing processes.</u> | M.E. 1998 |
| 26. <u>Yaron Ben-Simon: Deep Drawing of Rate sensitive materials</u> | M.Sc. 1998 |
| 27. <u>Iris Degmal: Optimal Die Curvature in deep drawing processes.</u> | M.Sc. 1999 |
| 28. <u>Shmuel Stanger: The role of the punch/product friction on the limit drawing ratio in deep drawing processes.</u> | M.Sc. 2000 |
| 29. <u>Sharon Peles: Bounds to fatigue of metals (with Prof. M. Weiss)</u> | Ph.D. 2001 |
| 30. <u>Alon Peled: Intelligent Deep Drawing process</u> | Ph.D. 2001 |
| 31. <u>Yaakov Lieberman: Forming Limit Diagram</u> | M.Sc. 2002 |
| 32. <u>Avraham Ofer: Pressure induced plasticity</u> | M.Sc. 2002 |

- | | | | | |
|-----|-----------------------|--|-------|------|
| 33. | <u>Vered Levy:</u> | <u>Fatigue Crack Growth in a Conical Asperity</u> | M.E | 2003 |
| 34. | <u>Dan Raz:</u> | <u>Deep Drawing by rim-pressure and Temp. effects</u> | M.Sc | 2007 |
| 35. | <u>Arie Tylis:</u> | <u>On Dynamic Projectile Penetration</u> | M.Sc. | 2007 |
| 36. | <u>Dina Dvorkin:</u> | <u>Optimal angle in Multy -outlet Extrusion Process</u> | M.E. | 2010 |
| 37. | <u>Nativ Shachak:</u> | <u>Strengthening of light Metals by Solid Particles</u> | M.Sc. | 2011 |
| 38. | <u>Irene Pinto:</u> | <u>Autofrettage optimization</u> | M.Sc. | 2011 |
| 39. | <u>Avraham Ofer:</u> | <u>Fatigue Wear by Shakedown Bounds</u> | Ph.D. | 2012 |
| 40. | <u>Lev Misiuk:</u> | <u>On the Relation Between Impact Speeds and
Depth of Penetration By Rigid Projectiles</u> | M.Sc. | 2016 |

Competitive Research Grants (with total budget of about 1,500.000 \$)

Sources : BSF (USA), VOLSWAGEN FUND (Germany), NEIDERSACHSEN FUND (x2)

(Germany), Defense Institutions (Israel), NRL (US Naval Research Lab.) via Ill. Ins. of Tech. at Chicago), Ministry of Science (Israel).