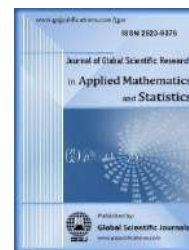




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Using a Success Tree Technique to Produce a Standard Nano powder With Ideal Size Via the Top-Down Method

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ABSTRACT

The technique of Nano is one of the important pointer according to it the countries according to it the countries are classification A big evolution is happening in the last years in Nano tolls and Nano procedures. In current study a success tree for the production of auxiliary Nano materials by using a Top- down method to product a standard powder with ideal size (1-100 nanometer) for the produced particles. Our study is an analysis for the constructed success tree.

1. Introduction

Physicist Richard Feynman wrote, "There's plenty of room at the bottom." [1] American Physical Society at a 1959 meeting at Caltech it is the beginning of the era of nanotechnology. This latter term was introduced by Professor Norio Taguchi in 1974, and it means the processing of substances, atom by atom or molecule by molecule [2].

The dimensions are produced with precision between 0, 1 and 100 nanometers. It also includes nanotechnology in the medium term. The study is on a microscopic scale ($1\text{nm} = 1 \times 10^{-9}\text{m}$). It can be compared to this, and one should realize that a human hair is 80,000 nanometers thick and also

that the diameter of the double helix of DNA is 2 nanometers. Between 1997 and 2003, the development and investment in modern technology increased by 40% to reach 35,000 million euros [4]. Some estimates predict that tonnage technology-related products and services could reach €1,000,000/year after 2015 [5] as well as RILEM TC 197-NCM Report, "Nanotechnology in Building Materials" [6]. Due to its advanced electronics capabilities in developing complex 3D micro/nano architectures it has sparked tremendous research interest [7-10]. Spider silk is another example that has a strength/mass ratio that exceeds that of steel [11-13]. Among the potential benefits of

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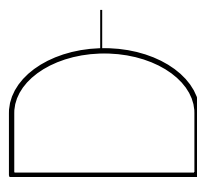
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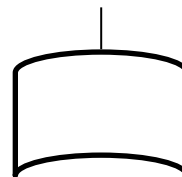
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nanotechnology, which is entering many industries, and commercial products manufactured, such as aerospace, pharmaceutical and chemical electronics. Developments through basic and applied research in chemistry, biology, physics, engineering and materials science. The applications of nanotechnology in the food industry are rather limited. These achievements and discoveries started in the field of nanotechnology and have an impact on the food industry and allied industries; Affects the important aspect of food safety to the molecular synthesis of new food products and ingredients[14]. Boolean gates AND and OR are used. Boolean algebra rules. Events can be considered as binary variables that take the values 0 or 1[15,16]. However, the minimum sets of pieces equal to zero are also specified because they are the main causes of system failure[17,18]. This small number of specialists in different technologies enables it to solve junk parts kits for different tire sizes. Some methods rely on graph theory and concepts of Boolean algebra[19,20]. Fault tree analysis is one of in the our study we deal with the dual of a fault tree i.e the success tree . Issue examination (FTA) is utilized is one as of the significant instruments or exercises among the dependability errands a thing plan. It's anything but a hierarchical deductive examination to show that down occasions prompts the event of the top occasion i.e (the framework disappointment) FTA is likewise helpful for leading a framework wellbeing investigation.

2- Some Concepts and Definitions [18,19]



(a) AND gate



(b) OR gate

Fig(1) the gates AND , OR

Definition success tree(5)

A denoted by the complement or dual of fault tree and focuses on what must occur for the top- level event to be a success we can get ST from FT by

Definition (1) :Fault Tree

A shortcoming tree is a diagrammat portrayal of all conceivable flaw occasions , their sensible blends , and their relationsmp to the framework disappointment.

Definition (2) :Basic Event

An essential occasion is a fundamental initating deficiency occasion that requires no further turn of events . It is represented by circle.

Definition (3) :Intermediate Event

A halfway occasion is a deficiency occasion which happens as a result of at least one predecessor causes acting through rationale entryways .All transitional occasions are represented by square shapes.

The logical gates(4)

There are two sorts of shortcoming tree gates:

- 1- The OR gate which is utilized to show that the yield occasion happens just on the off chance that at least one of the information occasions happen.
- 2- The AND gate which is utilized to show that the yield flaw happens just if every one of the info shortcomings happen.

The symbols of AND and OR gates are displayed in the accompanying figure separately . for more detail see [2],[5].

1- Changing OR gate to an AND gate

2- AND gate to OR gate ,with the same logic symbols of FT .

The methods for Top – down procedure(6)

There exist five methods to Top – down procedure as below

1. Mulling method
2. Etching method
3. Electro – chemical method
4. Ablation method
5. Sputtering method

Formore detail see[3]

3- The Application

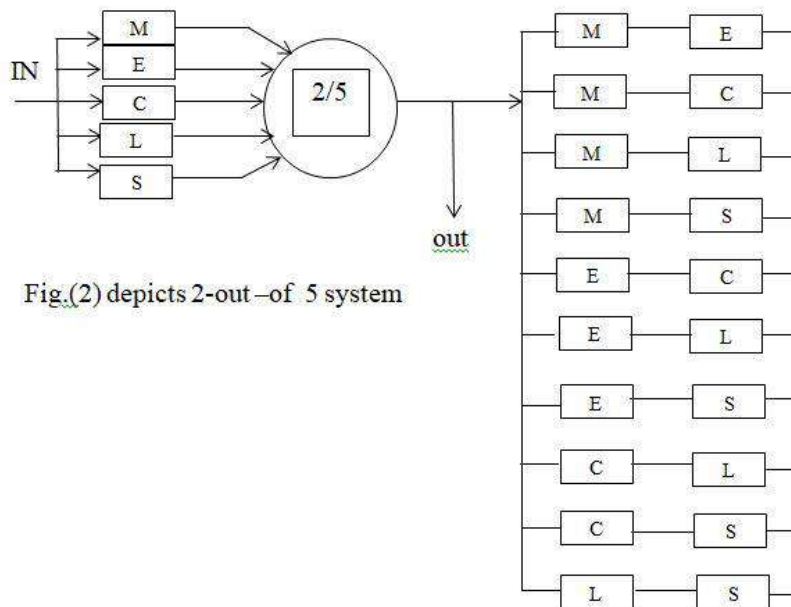


Fig.(2) depicts 2-out-of 5 system

Fig.(3) Represent the 10 possible choices for a system in fig 2

The possible choices are determined from the combination $(5/2)=10$ as shown in figures(2) and (3) respectively. Assume from the 10 choices two researchers A choose method M and K choose method L by taking the same amount of bulk and the by begins at the same time they working in the advance laboratory of physics in the basic College in Babylon University.

Represent the common property i.e. ideal size the product (1-100 nanometer) for any particle (t-d) top-down success Tree

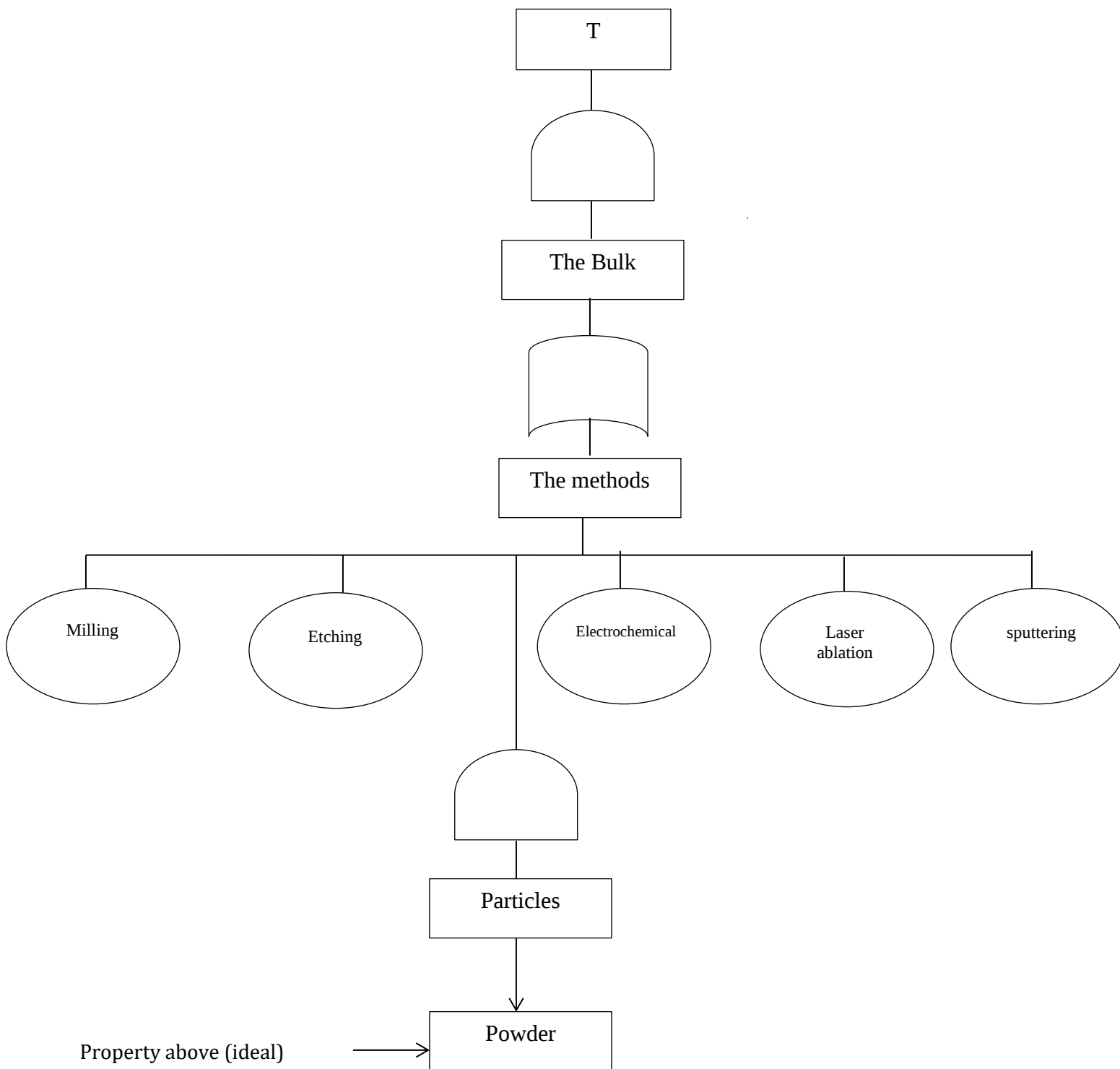


Fig (4) represent the success tree for the methods of Top-down procedure

Let p represent the powder and
 Let M stand for Milling method
 E stand for Etching method
 C stand for Electro- chemical
 L stand for ablation method
 S stand for sputtering

So the top event (T) is method

$$T = (M \cup E \cup C \cup L \cup S) \cap P = (M + E + C + L + S) * P$$

4. Conclusion

1. The two researchers A and K getting same quality via the two different methods they used i.e the product is a standard powder with ideal size .
2. The time needed for obtaining the product is not equal since it depends on time to dissolve the material at according to its differed .
3. Any two researcher if they chose a nother two method then the result is the same as in 1 and 2 above conclusions

5. References

- [1]. Feynman, Richard. "There's plenty of room at the bottom." Feynman and computation. CRC Press, 2018. 63-76.
- [2]. Komanduri, R., D. A. Lucca, and Y. Tani. "Technological advances in fine abrasive processes." CIRP annals 46.2 (1997): 545-596.
- [3]. Drexler, K. Eric. "Molecular engineering: An approach to the development of general capabilities for molecular manipulation." Proceedings of the National Academy of Sciences 78.9 (1981): 5275-5278.
- [4]. Munch-Andersen, Maj, et al. "NanoByg: A survey of nanoinnovation in Danish construction." (2007).
- [5]. Roco, Mihail C., and William Sims Bainbridge. "Societal implications of nanoscience and nanotechnology: Maximizing human benefit." Journal of Nanoparticle Research 7.1 (2005): 1-13.
- [6]. Zhu, Wenzhong, Peter JM Bartos, and A. Porro. "Application of nanotechnology in construction." Materials and structures 37.9 (2004): 649-658.
- [7]. Ko, Heung Cho, et al. "A hemispherical electronic eye camera based on compressible silicon optoelectronics." Nature 454.7205 (2008): 748-753.
- [8]. Ahn, Bok Y., et al. "Omnidirectional printing of flexible, stretchable, and spanning silver microelectrodes." Science 323.5921 (2009): 1590-1593.
- [9]. Xu, Sheng, et al. "Assembly of micro/nanomaterials into complex, three-dimensional architectures by compressive buckling." Science 347.6218 (2015): 154-159.
- [10]. Yan, Zheng, et al. "Mechanical assembly of complex, 3D mesostructures from releasable multilayers of advanced materials." Science advances 2.9 (2016): e1601014.
- [11]. Porter, David, and Fritz Vollrath. "Nanoscale toughness of spider silk." Nano Today 2.3 (2007): 6.
- [12]. Lee, Seung-Mo, et al. "Greatly increased toughness of infiltrated spider silk." Science 324.5926 (2009): 488-492.
- [13]. Harrington, Matthew J., et al. "Iron-clad fibers: a metal-based biological strategy for hard flexible coatings." Science 328.5975 (2010): 216-220.
- [14]. Chen, Hongda, Jochen Weiss, and Fereidoon Shahidi. "Nanotechnology in nutraceuticals and functional foods." Food technology (Chicago) 60.3 (2006): 30-36.
- [15]. Al Ghurabi, Kareem Abass, et al. "Utilizing Logical Gates and Boolean Algebra Rules for Qualitative Fault Tree Analysis." Journal of Global Scientific Research 7.2 (2022): 2046-2057.
- [16]. Deo, Narsingh. Graph theory with applications to engineering and computer science. Courier Dover Publications, 2017.
- [17]. Medjoudj, Rabah, Hassiba Bediaf, and Djamil Aissani. "Power system reliability: mathematical models and applications." System Reliability 279 (2017).
- [18]. Lewin, D. (1976) Logical Design of Switching Circuits. second edition, Thomas Nelson and Sons LTD
- [19]. W.E.Vesely, F.F. Goldberg, N.H.Roberts and D.F.Hassl, "Fault Tree Handbook", V.S Nuclear Regulatory Commission Washington, (2002), D.C.20555.
- [20]. Abdulrazzak.U.S, Khalaf.A.A. Rasheed "Construction of a fault tree for Physical mixed Systems using logical gates associated with algebraic expression of top event via Boolean algebra rules to determine minimal cut sets for the system " ISSN 2225-0522. Vol.4, No.6, 2014.
- [21]. Ahmed, S. (2022). Preparation, Characterization and Heat Transfer Analysis Car Radiator Performance by Using TiO₂-Water Nanofluid. Journal of Global Scientific Research. 7(2): 2058-2079.