In the name of God

Pre-feasibility study form

Plan Name: Polyester staple fibers with batch process (from chips or granules)

Employer: Chaharmahal and Bakhtiari Industrial Estates Co.

Consulting Company: Kavosh Consultants Co.

Project Address: Shahrekord Industrial Estate

Date: 2023

Update 2 (2024)

SUMMARY OF THE FEASIBILITY STUDY

General information
Project title: Feasibility studies of Polyester staple fibers with batch process (from chips or granules) production
Project capacity: 5000 tons per year
Employment rate: 45 people
Working days: 289 days
Uses of the product: spinning process and yarn production (short and long fibers), non-woven textile production process and filling process
Market
Global price of the product: about 1-2 dollars
Domestic demand: about 800,000 tons in the next five years
Domestic production: about 547 thousand tons
Import: 19 tons
Export: 215 tons
Technical study
Land area: 8000
Building area: 3360
Main raw materials: chips, granules, packaging and others
How to supply raw materials: internal-external
Required electricity: 1/200/000 kWh
Required water: 85/000 cubic meters
Required fuel: 1,000,000 cubic meters
Financial and economic study
Fixed investment amount: 1023855 million rials- 1,864,945 euro
Working capital: 197747 million rials - 360,195 euro
Total investment: 1221602 million rials- 2,225,140 euro
Annual sales: 2000000 million rials-3,642,987 euro
Net present value (NPV): 1018002 million rials- 1,854,284 euro
Breaking point (BEP): 1220000 million rials - 2,222,222 euro
Internal rate of return (IRR): 63%
Payback period: 2 years
Investment Sources Ratio Equity: 30% Financing: 70%

Introduction

Feasibility studies are expert studies that are carried out before the implementation of economic investment plans. In these studies, the plan is analyzed from the market, technical, financial and economic point of view, and the results are used as a basis for investors to make decisions.

The present report is a technical and economic feasibility study for the Production of Polyester staple fibers with batch process (from chips or granules). These studies have been prepared in the form of feasibility study methodology, and according to the above methodology, the economic capacities and the amount of investment required for the implementation of the project will be estimated and presented so that investors and interested parties can use it to get all the required information. To acquire and make economic investments with an open vision and a clear path. It is hoped that these studies, even if small, will help in the development of our country.

1- Product Introduction

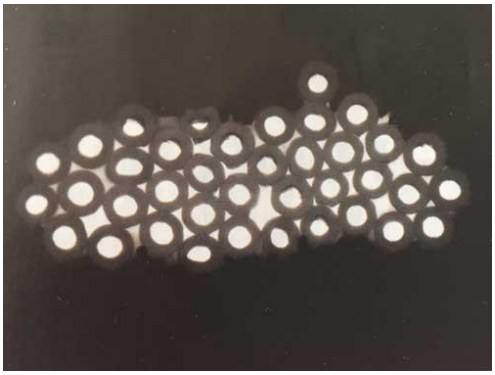
Currently, polyester is considered the most important polymer used in the textile industry. Although cotton fibers were considered the undisputed king of the world of textile fibers until the beginning of the 21st century, gradually polyester fibers in two forms, filament and staple, were able to take this title, so that now the amount of yarn production and consumption Filamentous polyester (even excluding polyester staple fibers) has also outperformed cotton fibers.

In today's world, increasing added value is one of the most important issues in all industrial fields, including the textile industry. Economically, the improvement of added value can be briefly defined as an increase in the amount of output or product in contrast to a decrease in the consumption of input or primary materials. In other words, to produce the most products by spending the least amount of resources. With this view, in the synthetic fiber industry, the production of lighter or finer fibers that can provide the same performance as the initial application can be considered as one of the ways to increase added value. In other words, in the production of these fibers, the desired final properties can be obtained by spending a smaller amount of raw materials. Of course, it should be kept in mind that this issue is not only important from the point of view of economy and efficiency, but also by creating new unique features, it can create a jump in the quality features of the product in terms of performance, which itself leads to the creation of value during sales. The addition is doubled. With this view, it is possible to examine solutions to increase the economic added value of polyester fibers, two of the most important of which are as follows:

-Production of fine fibers

-Production of hollow fibers

As it is clear, the purpose of providing these two solutions is to reduce the consumption of raw materials (chips or recycled polyester fluff) in the production of products that show characteristics at least similar to standard products during the final use.
Considering that different sources have given relatively different opinions about the standard characteristics of polyester staple fibers, here only the data contained in the reports of the European Disposable and Nonwoven Textile Association (EDANA = EUROPEAN DISPOSABLE AND NONWOVEN ASSOCIATION) which is for fibers Commonly written staple polyester is cited.
According to this information, the specifications of common staple polyester fibers are:
- Density: 1.39
- Strength: 6.1 grams per denier (G/D)
- Recycled moisture: 0.4-0.2%
- Elastic reversibility (at 5% strain): 65%
Behavior against fire:
-Relatively resistant and burning (melting) with a lot of smoke
- Behavior against ultraviolet rays:
- Moderate to good resistance
As it is known, many qualitative characteristics, especially the physical parameters of fibers can be improved to some extent during the production process. For example, they increase the strength of staple fibers by keeping the bundle of fibers for a certain period under constant heat and stress (annealing), which is done in the production line of staple fibers by numerous and relatively large hot rollers, until polyester fibers with Produce similar properties to cotton fibers, which are known as cotton type polyester fibers. The most important parameter affecting this issue is polyester density, which cannot be changed much in the fiber production process. Now we have to look for a solution to this issue.
In the non-woven textile industry, jackets, sleeping bags and quilts produced from fine fibers are not only lighter, but also more insulated than standard samples. In addition, the lower thermal shrinkage of these fibers compared to standard fibers greatly increases the useful life of these products. Another special application of fine fibers in the non-woven textile industry is the production of absorbent and cleaning wipes. Due to the high surface-to-weight ratio in non-textured layers prepared from these fibers, their better performance in absorbing dust and moisture during surface cleaning can be well justified.
In the field of home textile production, it is very important to create a soft and feather-like state in goods made from fine fibers, especially sleep goods. In applications such as furniture upholstery, these fibers are also used to create conditions similar to leather and artificial suede, which is mainly by performing physical finishing operations on fabrics produced from fine fibers.
As mentioned, the second way to create economic added value in the staple polyester fiber industry is the production of hollow fibers (Figure below). The most important characteristic that can be measured in hollow fibers is the ratio and amount of voids to the total fiber surface, which is usually around 20%, and its increase can lead to an increase in volume at the same weight, which is certainly very significant from the point of view of creating added economic value. .



Like fine staple fibers, hollow staple fibers can also be used in all three areas of spinning, producing home textiles and non-woven textiles. Although in the case of fine staple fibers, the field of spinning is considered as the first consumption market, but in the case of hollow fibers, the production of home textiles (especially for filling) is considered the first choice.

Nowadays, the use of hollow staple polyester fibers with denier in the range of 1.5 has become common in the ring and wheel spinning industry (OE = OPEN END). One of the most important advantages of fabrics made from these threads is their high resistance to wrinkle, which is very important in the production of wash-and-wear clothes (comfortable clothes).

In the non-woven textile industry, these fibers can be used in the production of absorption and diffusion layers (ADL = ACQUISITION DISTRIBUTION LAYER) used in the production of diapers. The hollow parts of these fibers play a very important role in the absorption and diffusion of liquids in this application. The ability to be insulated against temperature changes is also one of the very important characteristics of non-woven textiles made from these fibers.

The field of home textiles is the most important market for the consumption of hollow fibers. In applications such as filling the interior of furniture, cushions, pillows, quilts, etc., where fine fibers such as 15 and 20 denier are used, increasing the amount and surface of holes in the production of light goods is very important. Of course, increasing the amount of hollowness of fibers in these applications also brings other effects such as higher elasticity of manufactured goods (figure below).

Use of hollow fibers to fill the sleep product

1-1-Product Name and Code (ISIC 3)

According to the information obtained from the Ministry of Industry, Mining and Trade, the ISIC code of the Polyester staple fibers with batch process (from chips or granules) is 2430512354.

1-2-Customs Tariff Number

According to the Export and Import Regulations Book of 2022 and the Chamber of Commerce, Industries, Mines and Agriculture website, the customs tariff code of Polyester staple fibers with batch process (from chips or granules) is 5202.

1-3- IMPORT AND EXPORT CONDITIONS

Basic rights include customs duties, taxes, the right to register goods, various duties and other funds received from imported goods. The sum of these receipts and commercial profit, which is determined by the Cabinet of Ministers according to the relevant laws, is referred to as input rights. The entry fee for the products of this plan is 15%.

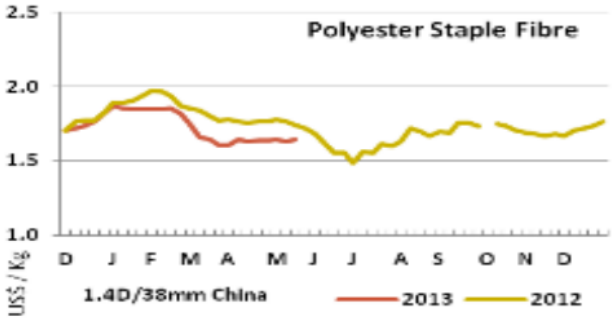
1-4- REVIEW AND PRESENTATION OF STANDARDS (NATIONAL OR INTERNATIONAL)

There is no direct standard related to lead covers, but some related standards are:

Standard Type	Standard Number	Issue
National standard	2739	Characteristics of polyester fibers used in cotton spinning system
National standard	9666-24	Textiles - Quantitative chemical analysis - Part 24 - Mixture of polyester fibers and other specific fibers
International Standard	ISO 1130:1975	Textile fibres — Some methods of sampling for testing

1-5- REVIEWING AND PROVIDING NECESSARY INFORMATION ON DOMESTIC AND GLOBAL PRODUCTION PRICES AS WELL AS GLOBAL PRODUCT PRICES

The global price for staple polyester fiber product with batch process (from chips or granules) is about 1 to 2 dollars per kilogram. Inside the country, the average is almost 40 thousand tomans per kilogram.



1-6- EXPLAIN THE USES OF THE PRODUCT

Staple polyester fibers are usually used in various applications, the most important of which are the spinning process and yarn production (short and long fibers), the nonwoven fabric production process, and the filling process.

According to the type of these downstream processes, it can be said that the production of fine fibers and hollow fibers, the final product produced from them (thread or non-woven fabric) has similar functional characteristics to the fabric made from conventional fibers can be a suitable solution for Consider creating added economic value.

The definition of the standard and common fineness of fibers has changed and evolved regularly with the increase in the knowledge of fiber production during the past few decades. After the industrial production of polyester staple fibers by the American DuPont company in the 1950s, for about 10-15 years, the fineness of staple polyester fibers was 2.25 denier, after that in the 1970s and subsequently in the 1980s, this The amount decreased to 1.5 and 1.2 denier, respectively. The trend of reducing the fineness of staple polyester fibers continued during the last 2 decades, so that now fine polyester fibers have a fineness of less than 0.9 denier, which are mainly used in industries such as spinning, production of home textiles and non-woven fabrics.

1-7-EXAMINE ALTERNATIVE PRODUCTS AND ANALYZE THEIR EFFECTS ON PRODUCT CONSUMPTION

Due to the high price of cotton fibers and the problems of its cultivation, and on the other hand, the easy and cheaper production of polyester fibers, the production of these fibers has grown significantly, and for this reason, in the staple fiber system, the fibers are similar to cotton or wool fibers in a discontinuous and They produce with limited length so that they can be replaced by the mentioned fibers.

Carpet manufacturing is one of the most important textile sectors of the country. In the past, acrylic fibers were used to prepare carpet yarn, but due to its high cost and the problems and environmental issues of its production, polyester fibers, as a serious and growing competitor, quickly replaced acrylic fibers and Now 100% polyester and acrylic-polyester mixed carpets are produced.

One of the alternatives is conventional fibers, but one of the expected characteristics of fine polyester staple fibers is their relatively high strength compared to conventional fibers. Another special feature of fine fibers is their softness, which creates a noticeable softness in the textiles produced from them. Of course, among these characteristics, it should be mentioned the ability to produce lighter and finer textiles from these fibers, which is actually intended as the primary goal in order to create added economic value. Comparing the physical properties of fine polyester staple fibers with 1.2 and 1.6 denier staple polyester fibers can prove the above claims well.

The results of the physical properties tests performed on staple polyester fibers with 1.6 denier are as follows:

- Strength: 6.0-5.8 g/denier
- Increase in length until breaking: 20%
- Thermal shrinkage: 10%

The results of these tests on staple polyester fibers with 1.2 denier, which were produced by the same machines, are as follows:

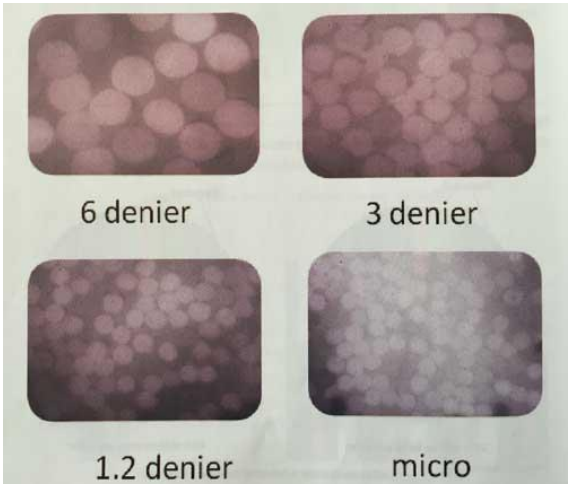
- Strength: 6.7-7.0 g/denier
- Elongation up to breaking point: 14%
- Thermal shrinkage: 9%

Now, if we produce fine polyester staple fibers with denier less than 1.0 on the same production line, the physical characteristics of the produced product are as follows:

-Strength: 7.6 grams per denier
- 10% increase in length up to tear
- Thermal shrinkage: 9%

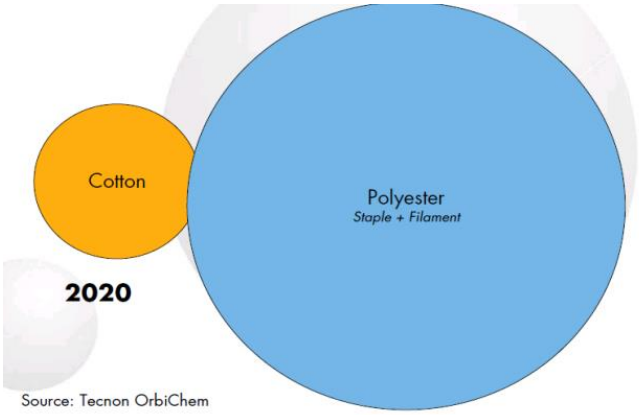
As it is known, in the case of fine fibers, the physical properties are noticeably better than those of common fibers.

Examining the microscopic images indicates that the number of fibers placed in the cross section of the yarn at the same weight is much higher in the case of using fine fibers than in the case of using common fibers, which also affects the final characteristics of the yarn and the product (Fig. Under).



The number of fibers with different finenesses in the same cross section

Global production of polyester fibers versus cotton



1-8-STRATEGIC IMPORTANCE OF GOODS IN IRAN AND COUNTRIES OF THE REGION

Staple polyester fiber is one of the best fibers available in the market, which has high quality compared to other fibers. This product is a type of synthetic fiber that has many colors, and this fiber is also very durable. Each of the produced products have good quality and luster and are considered to be part of the so-called wash and wear fabrics. These products are made of plastic and fibers, which are used in the production of products such as carpets and rugs, clothes, furniture and some plastic accessories. Clothes and fabrics prepared using this product are anti-wrinkle and do not need to be ironed.

The most important type of this product is the empty and delicate type.

One of the important characteristics of this product can be mentioned its quality and extraordinary use. These fibers, having the ability to absorb extreme moisture, as well as being extremely soft and supple, provide optimal comfort for the product.

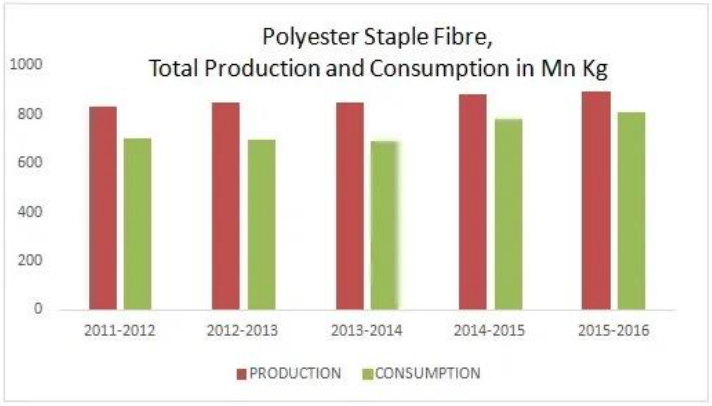
Title	Description
Property	Super soft and gentle
Application	Clothing and bedclothes
sex	polyester
type	artificial

This is despite the fact that this product, in addition to increasing strength and durability, and the ability to paint, is completely economical and suitable. Due to the quality of this product, it can be

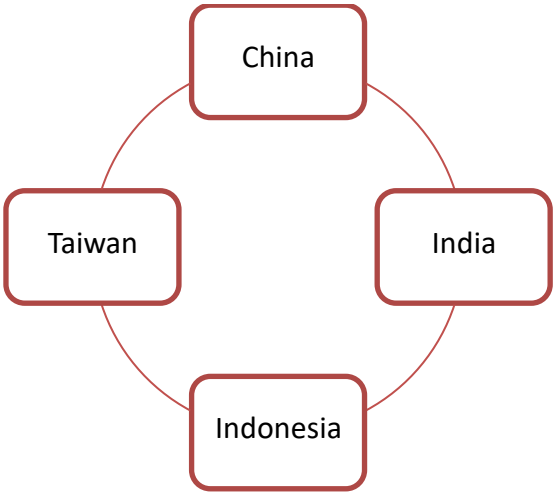
used as clothing fabric, bedspread, etc. Also, this product is very resistant and durable against ultraviolet rays and chemicals.

1-9-MAJOR MANUFACTURING AND CONSUMER COUNTRIES

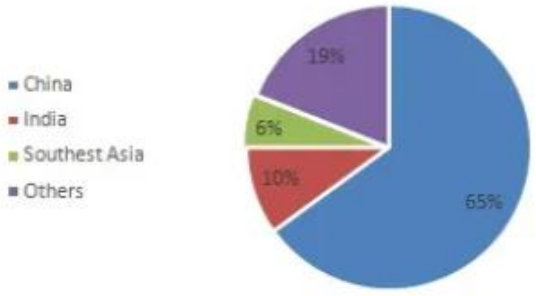
Global demand and production of polyester staple fibers



The largest producing countries in this field are shown in the figure below:



The largest consumer markets are:



The list of some manufacturing companies in the world is shown in the following table:

1. TORAY INDUSTRIES, INC.
2. W. Barnet GmbH & Co. KG
3. Alpek S.A.B. de C.V.
4. Bombay Dyeing
5. Reliance Industries Limited

2- SUPPLY AND DEMAND SITUATION IN IRAN AND COUNTRIES IN THE REGION

2-1-AN EXAMINATION OF EXPLOITATION CAPACITY AND PRODUCTION PROCESS FROM THE BEGINNING OF THE THIRD DEVELPOMENT PLAN TO NOW

The following figure and table show the specifications and capacity of units active in the field of Polyester staple fibers with batch process (from chips or granules) based on the statistics of the Ministry of Industry, Mines and Trade:

Unit Name	State	Capacity	Employment permit	Unit of Measurement
Mehdi Maghzi	Esfahan	10780	24	Ton
Aliaf Zarlif Isfahan	Esfahan	15000	30	Ton
Aliaf Bon Jahan	Esfahan	4500	23	Ton
Iran Nowbaft	Esfahan	22000	204	Ton
Yekta Aliaf Shargh	Khorasan Razavi	8500	50	Ton
Aliaf Zagros Peyman	Khorasan Razavi	4000	190	Ton
Zarif Mosavvar	Chaharmahal and Bakhtiari	5000	18	Ton
Khavaran Aliaf Parsian	Khorasan Razavi	18000	58	Ton

Aliaf Sazan Fars	Fars	12000	60	Ton
Davar Aliaf Fars	Fars	12000	71	Ton
Pars Caspian	Guilan	2600	31	Ton
Pars Moket	Guilan	10800	165	Ton
Termeh Sadaf Delijan	central	48000	29	Ton
Aliaf Shahkar Narmineh	central	8064	9	Ton
Aliaf Sina Delijan	central	13000	101	Ton
Shargh Gostar Jouybar	Mazandaran	11612	200	Ton
Saina Delijan	central	36000	260	Ton
Taban Baft Delijan	central	12000	50	Ton
Shayan Delijan	central	3500	64	Ton
Shiva Delijan	central	20000	60	Ton
Termeh Sadaf Delijan	central	17000	71	Ton
Savis Delijan	central	45000	112	Ton
Kia Polyester Delijan	central	16000	61	Ton
Pars Baft Delijan	central	3000	36	Ton
Baftineh Pars Dorsa	central	13600	55	Ton
Asia Delijan	central	56000	178	Ton
Kaveh Aliaf	central	8500	105	Ton
Atieh Novin	Hamedan	7000	35	Ton
Aliaf Shokouhieh	Qom	9656	41	Ton
Tondgouyan Lif	Qom	6500	30	Ton
Diba Aliaf Arian	Qom	7750	60	Ton
Moket Hamedan	Hamedan	5000	129	Ton
Amin Moket	Qazvin	6000	133	Ton
Soren Polymer Caspian	Golestan	12000	79	Ton
Aliaf Gostar Yazd	Special Economic Zone	25000	162	Ton
Pars trade and production	Alborz	18000	848	Ton
Pars synthetic fibers	Alborz	14000	39	Ton

Source: Ministry of Industry, Mining and Commerce - Statistics and Information Center

2-2-CHECK THE STATUS OF NEW PROJECTS AND ONGOING DEVELOPMENT PLANS

By referring to the industrial database of the Ministry of Industry, Mines and Trade, the status and specifications of new projects creating Polyester staple fibers with batch process (from chips or granules) have been collected and entered in the following table:

Unit Name	State	Capacity	Employment permit	Unit of Measurement
Sepehr Textile Complex, Nikan, Kashan	Esfahan	24000	230	Ton
Aftab West fibers	Esfahan	8000	205	Ton
Isfahan Zarlif fibers	Esfahan	7000	20	Ton
Zarlif Arya	Esfahan	32000	110	Ton
Jafar and Mohammad Hossein Hassan Khani	Western Azerbaijan	350	10	Ton
Maisam Nakhai	Tehran	200	20	Ton
Tos Layi Sazan Sharq	Khorasan Razavi	200	10	Ton
Mahdi Amiri	North Khorasan	300	10	Ton
Arghavan Gostar Sepid	Semnan	7000	50	Ton
Arya Masir Pars	Fars	40000	40	Ton
Zarrin Aliaf Atlas	Fars	6000	15	Ton
Kashbaf Mehr Tehran	Qazvin	22000	300	Ton
Tosee Gostar Datis Sharq	Qazvin	2000	43	Ton
Maisam Nakhai	Qom	200	5	Ton
Atlas Mehr synthetic fibers	Qom	9000	200	Ton
Aria Ris, Mehestan, Qom	Qom	50000	700	Ton
Mehbod Selfchagan	Qom	40000	200	Ton
Mandana Kokalani	Golestan	4500	22	Ton
Shargh Gostar Joibar	Mazandaran	10000	0	Ton
Setare Baft Sanat Delijan	central	20000	70	Ton
Pars Baft Delijan	central	3000	26	Ton
Baftineh Pars Dorsa	central	12000	130	Ton
Zabih Allah Khorasani	central	12000	30	Ton
Hamedan carpet industries	Hamedan	5000	21	Ton
Yusuf Yagoubi	Hamedan	10000	150	Ton

2-3-REVIEWING THE PROCESS OF PRODUCT IMPORTATION

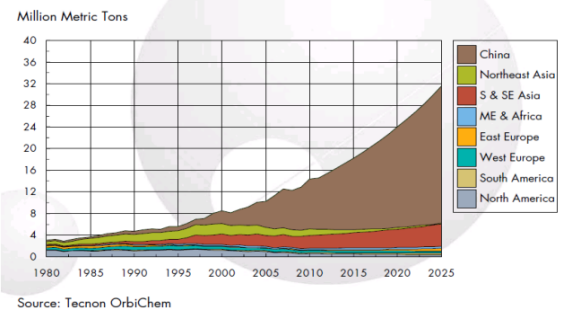
According to the Chamber of Commerce, Industries, Mines and Agriculture, the import statistics for the last five years are as follows:

Year	Weight (kg)	Rial value	Dollar value
2018	13،240	289،167،645	6،885
2019	15،000	787،875،000	6،303
2020	0	0	0
2021	20،360	373،246،720	8،887
2022	16،960	26،063،351،572	117،217

Source: Tehran Chamber of Commerce, Industries, Mines and Agriculture http://www.tccim.ir

2-4-MONTORING CONSUMPTION TRENDS

The global consumption of polyester staple fibers is increasing rapidly, so that in 2025 it is estimated to be around 32 million tons.



According to the latest statistics available in 1401, the amount of import was about 19 tons, and the amount of export was about 215 tons, and we had 547,362 tons of production. The consumption of this product has been on the rise in recent years due to the country's industrial development, and it is expected to reach 800,000 tons per year in the near future.

2-5-INVESTIGATE THE EXPORT PROCESS OF THE PRODUCT AND THE POSSIBILITY OF ITS DEVELOPMENT

According to the Chamber of Commerce, Industries, Mines and Agriculture, the export statistics for the last five years are as follows:

Year	Weight (kg)	Rial value	Dollar value
2018	51،440	3،494،108،045	63،364
2019	73،297	1،530،609،438	12،245
2020	19،555	2،828،631،490	11،927
2021	329،822	63،496،047،781	264،721
2022	215،551	62،128،108،637	248،253

Source: Tehran Chamber of Commerce, Industries, Mines and Agriculture http://www.tccim.ir

2-6- PRODUCT REQUIREMENT CHECK WITH EXPORT PRIORITY

Surveys show that during the past few years, the demand for the use of fine and hollow polyester staple fibers has grown a lot. According to the trade statistics published in the European continent, between 2011 and 2013, the demand of the countries in this area for fabrics weighing more than 150 grams per square meter decreased by 8%, while the demand for fabrics weighing between 70 and 100 grams decreased by 8%. 150 grams per square meter increased by 17.6%, fabrics weighing 25 to 70 grams per square meter increased by 42% and fabrics weighing less than 25 grams per square meter increased by 63%.

These numbers and figures are well indicative of the prevailing trend in the polyester staple fiber industry market and also with a more general view of the textile industry. If this trend continues, the production of fine and hollow staple polyester fibers will soon turn from a special product to a standard product in demand even for ordinary markets, and newer solutions should be sought to meet the growing needs of the market.

Currently, prominent Japanese fiber companies that have long withdrawn from the field of competition in the production of staple polyester fibers, but have focused on the production of staple polyester fibers of 0.3 denier, which, of course, in the next few years, the market of this They will conquer the area.

According to this issue, the producers of polyester staple fibers in Iran, who have grown exponentially in the last few years and have paid less attention to quality issues and innovation in the product, should invest more in technical knowledge in order to survive in the market. Do not fall behind this caravan.

The most important issue for any country like Iran is achieving economic development and having a productive and export-oriented economic system. To achieve this, first of all, it is necessary to meet the domestic needs of the country and to develop the export of goods and services in excess of domestic consumption. In order to reach a society where there is no poverty, unemployment and backwardness, efforts should be made for its economic growth. Along with economic growth, justice and empowering the people of the society to manage their lives should also be done.

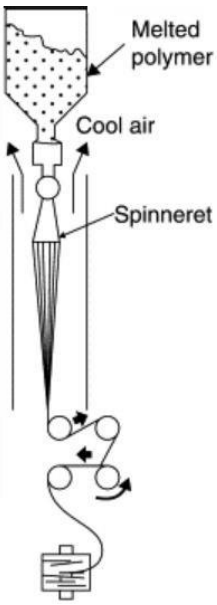
Export plays an important role in production and employment, so it requires a lot of attention to expand and actively participate in global markets. Exporters in the economic field should also be encouraged.

Currently, we can witness a very good export of polyester staple fibers with the batch process (from chips or granules). Because there is a lot of demand in different countries and each of them is trying to communicate with the first-hand producers. This issue can greatly help Iran's non-oil exports and boost production in the country.

3-OVERVIEW OF TECHNOLOGY AND METHODS OF PRODUCTION AND SUPPLY IN THE COUNTRY AND COMPARISON WITH OTHER COUNTRIES

Synthetic or man-made fibers are produced in different ways.

Melt Spinning This method is used to produce and make polyester fibers. In this method, first the polymer in the form of granules or chips enters the extruder through a funnel. In this part, the polymer is melted and transferred into a measuring pump. In this way, the molten polymer goes into the spinning chamber with a controlled and very accurate speed and passes through the cooler, cools and solidifies. Then, in order to improve the physical structure and mechanical properties, they are transferred to the stretching process and wrapped around suitable packages. Spinneret, it becomes a thread.



the polyester polymer used to produce textile fibers is made from the polymerization of terephthalic acid and ethylene glycol inside the reactor under control with a certain temperature and pressure and with the presence of a suitable catalyst. from the polymerization of these materials, polyester is produced, and the resulting polymer is solidified in a machine and chopped into small pieces called chips. the polymer chips are washed and dried to remove the moisture and ready to be fed to the spinning melting machine. polyester fibers are produced by melt spinning. then, from the preparation of polyester chips, they are poured into the feeding tank of the spinning melting machine. while the chips are melted, they pass through a special filter with pressure and the molten polymer enters the thread making machine. the filaments coming out of the filament machine are immediately cooled to freeze. after freezing, the filaments are wound on bobbins. finally, the produced filaments are stretched about 5 to 7 times their length so that the diameter and grade of the fibers reach the desired level while the molecular arrangement in the fibers. filaments produced in this way can be used both as filaments in the textile industry and as cut

fibers that are cut into short lengths (the length of cotton fibers) or long (the length of wool fibers). in addition, polyester filaments have uses other than fabric production, such as industrial uses.

if cut polyester fibers are to be prepared, the method of production is the same as the production of polyester filaments, with the difference that the number of short fiber filaments is more than that of filament yarns, and the other difference is that in the production of filament yarns, single-stranded filaments are wound separately on bobbins, but in the production of chopped fibers, multi-stranded filaments are gathered together and made into wicks (tau or tow) in coming. then the resulting filament wick after stretching is directed to the cutting machine and the filaments inside the wick are cut to the desired length.

4-DETERMINING THE STRENGTHS AND WEAKNESSES OF CONVENTIONAL TECHNOLOGIES IN THE PRODUCT MANUFACTURING PROCESS

The advantages of this process are:
- No need for purification process, because no solvent is used.
- Very high production speed, which ranges from several hundred meters per minute to several thousand meters per minute.

Important and influential parameters in this process are:
Hole shape, dimensions and thread count
Extrusion temperature
The mass flow rate inside each hole of the thread
The speed of collecting strings
The length of the spinning path
Cooling conditions
During the production process, these parameters must be carefully controlled to achieve the desired structure and properties for the fibers. To understand how to control these parameters, we need an engineering analysis of the melt spinning process, which includes the polymer melt flow, the balance of forces and energies, and the growth of molecular orientation and crystal structure.

5- INVESTIGATE AND DETERMINE THE MINIMUM ECONOMIC CAPACITY, INCLUDING ESTIMATING THE VOLUME OF FIXED INVESTMENT IN RIAL AND FOREIGN CURRENCY

EXPLANATION: EURO EXCHANGE RATE BASED ON THE NATIONAL EXCHANGE - August 2024 - AMOUNT: 549,000 RIALS (± 1%)

Project Investment Schedule:

Description	Cost (Million Rials)	Cost (Euro)
Land	60000	109,290
Landscaping	28260	51,475
Construction	287400	523,497
Production line machinery and equipment	550000	1,001,821
laboratory equipment	5000	9,107
Utilities	12800	23,315
transportation	26600	48,452
Office equipment	5040	9,180
Miscellaneous and unforeseen	48755	88,807
Total	1023855	1,864,945

The ground specification of the project implementation is as follows:

Description	Area (m 2)	Unit Price (Rials)	Total (Million Rials)	Total (Euro)
Land	8000	7/500/000	60000	109,290

The cost of landscaping is as follows:

Description	Area	Unit Price (Rials)	Total (Million Rials)	Total (Euro)
Digging and leveling	8000	3000000	24,000	43,716
Fencing	360	4500000	1,620	2,951
Asphalt and pavement paving	400	4000000	1,600	2,914
Green space and lighting	400	3500000	1,400	2,550
Total			28,620	52,131

Building Information:

Description	Building type	Area	Unit Price (Rials)	Total (Million Rials)	Total (Euro)
Production	Niches	2000	80000000	160,000	291,439
Raw materials and supplies	Niches	1000	80000000	80,000	145,719
Office building and services	Official	250	140000000	35,000	63,752
Utilities	Niches	70	120000000	8,400	15,301
Guard		40	100000000	4,000	7,286
Total		3360		287,400	523,497

Utilities:

Description	Cost (Million Rials)	Cost (Euro)
Power Supply	4500	8,197
Water and Wastewater	800	1,457
Fuel	1200	2,186
Heating and cooling equipment	4200	7,650
Protective equipment and security system	600	1,093
Compressed air supply	1500	2,732
Total	12800	23,315

Transportation:

Description	Technical Specifications	Cost (Million Rials)	Cost (Euro)
Forklifts	3 ton	15000	27,322
Pickup	Nissan	6000	10,929
Riding	Samand	5600	10,200
Total		26600	48,452

Equipment and Machinery:

Production machinery is considered the most important part of industrial investments. The machines of each production complex determine the quality and variety of products, production technology, raw materials and many methods and production costs and even the final price of the product. The selection of machines is a serious and

influential issue in the macroeconomic indicators of the project. The cost of production line machinery and equipment is estimated based on inquiries made from important manufacturing companies or reputable agencies. Also, the side costs of providing machines, including transportation costs, installation and commissioning, customs duties, etc. are also calculated. The prices of all companies are almost in the same range and finally with a difference of 10%. The price of machines for this process is shown in the following table:

Number	Name	Required amount	cost (million rials)	Currency (Euro)	supply (domestic / foreign)
1	Spinning process machines	1	250000	455,373	Local-Foreign
2	Stretching process machinery	1	200000	364,299	
3	Testing and inspection process machines	1	50000	91,075	
4	other	1	50000	91,075	
Total (million rials)			550000	1,001,821	

laboratory equipment:

Number	Name	Currency (Euro)	Rial Cost (Million Rials)	Rial sum (million rials)
1	laboratory equipment	9,107	5000	5000
2				
Total		5000		

Office equipment:

Number	Name	The required amount	Rial cost per unit	Rial Cost (Million Rials	Currency (Euro)
1	All kinds of tables and chairs	20	150	3000	5,464
2	All kinds of computers, printers and scanners	5	150	750	1,366
3	Phone and fax	5	50	250	455
4	Fingerprint attendance device	1	120	120	219
5	Wireless network and internet equipment	1	70	70	128
6	Office stationery	5	20	100	182
7	Central control system	1	250	250	455
8	other	-	400	500	911
Total (Million Rials)		5040			9,180

Working Capital Costs:

Name	Description	Cost (Million Rials)	Cost (Euro)
Raw materials and packaging	with a period of 90 days	187500	341,530
salary	with a period of 30 days	6082	11,078
Energy costs	with a period of 30 days	749	1,364
revolving fund	with a period of 15 days	3416	6,222
64499		197747	360,195

Production costs:

Description	Cost (Million Rials)	Cost (Euro)
Cost of raw materials and packaging	750000	1,366,120
Salary Cost	72980	132,933
Energy costs	8985	16,366
Cost of maintenance	74587	135,860
Unforeseen cost of production	9711	17,689
Administrative and sales costs	9163	16,690
Costs of financial facilities	9254	16,856
Insurance costs	10239	18,650
Depreciation cost	500	911
Depreciation expense before operation	7459	13,587
Total	952878	1,735,661

6-THE AMOUNT OF RAW MATERIAL NEEDED ANNUALLY AND WHERE IT IS SUPPLIED

Number	Description	Consumption per unit product	Unit of consumption	Amount of Consumption Required for Total Capacity	Currency prices (Euro)	Million Rial equivalent (per unit)	Place of supply	Cost (Million Rials)
1	chips	0.5	Ton	2500	240	132	Internal	330000
2	granule	0.5	Ton	2500	219	120	Internal	300000
3	packing	1	Unit	5000	18	10	Internal	50000
4	other	1	Unit	5000	26	14	Internal External	70000
Total (Million Rials)								750000
Total (Euro)								1,366,120

7-RISK ANALYSIS OF PROJECT IMPLEMENTATION

Studies show that in the next year the market will be in short supply and there will be a greater need for imports. So it can be said that the implementation of new projects in this field is not very risky because in addition to the domestic market there is easily good potential to export this product to neighboring countries and if for any reason the applicant intends to undertake this plan, it is necessary to act with caution and superiority over other industrial units and by examining further the weaknesses and strengths as internal factors as well as opportunities and opportunities. Threats as external factors minimize project risk.

8- HUMAN RESOURCES AND NUMBER OF JOBS

One important aspect of any industrial unit is its job creation, which is thoroughly examined in the market segment. Due to the nature of the industry and the need for 2 shifts to work, it has been attempted to select the number of personnel in a manner that addresses the production needs of the two shifts. It has also been tried to use related specialties in different parts of production.
To calculate the amount of annual salaries and benefits, three shifts and other benefits have been added to the annual salary. For this purpose, the annual salary is set at 16.4 months per year
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Description	Gender	Number	Monthly salary per person (Million Rials)	Monthly salary (Million Rials)	Annual salaries (Million rials)	Annual salaries (Euro)
Managing Director	Man	1	300	300	4920	8,962
financial manager	Man	1	170	170	2788	5,078
Marketing Manager	Man	1	170	170	2788	5,078
Financial, sales and administrative personnel	Female	2	130	260	4264	7,767
warehouse keeper	Man	2	120	240	3936	7,169
Line Administrator	Man	2	120	240	3936	7,169
skilled worker	Man	5	100	500	8200	14,936
Semi-skilled worker	Man	8	90	720	11808	21,508
worker	Man	15	80	1200	19680	35,847
Service	Female	2	80	160	2624	4,780
Guard	Man	2	85	170	2788	5,078
Driver	Man	2	85	170	2788	5,078
Secretary	Female	2	75	150	2460	4,481
Total		45			72980	132,933

9- CHECK AND DETERMINE THE AMOUNT OF WATER, ELECTRICITY, FUEL AND...

Description	Unit	annual consumption	Cost per unit in Rials	Total Cost (Million Rials)	Total Cost (Euro)
Power Consumption	KWh	1/200/000	939	1127	2,053
Water Consumption	Cubic meters	85/000	33622	2858	5,206
Gas	Cubic meters	1/000/000	5000	5000	9,107

Total	8985	16,366

10- CONDITIONS OF ECONOMIC AND COMMERCIAL SUPPORT

10-1- CUSTOMS TARIFF SUPPORT (PRODUCTS AND MACHINES) WITH GLOBAL TARIFFS

The customs tariff support includes two parts of the import tariff for machinery and materials required by the export customs rights plan for the products of the production unit, which should be selected and applied for the growth of the industry. The import duty of foreign machines required by the project is about 10%, like most industrial machines, which is a suitable tariff and does not impose a high cost on investors. On the other hand, in recent years, the government has provided incentives for products that have the ability to compete in international markets and can be exported abroad, and gives export awards to these units, this has caused the volume of non-oil exports to increase. The country has enjoyed good growth in recent years despite the problems and obstacles. Therefore, if this product is produced with good quality and reasonable price, you can benefit from government incentives.

10-2- FINANCIAL SUPPORT (EXISTING UNITS AND PLANS) OF BANKS - INVESTOR COMPANIES

Financial support for production units includes the granting of bank facilities and how to repay them, as well as tax exemptions, which, if appropriate, facilitate the implementation of the plan and provide conditions for the investment of entrepreneurial people. Some of these conditions are discussed below.

- One of the important banking facilities for production units is the payment of bank loans up to 70% of fixed investment by the country's state banks. This amount can be increased for deprived areas.

- The interest rate of riyal facilities in the industrial sector is 12%, and for some cooperative companies and units built in deprived areas, a part of the facility interest is paid to banks by the government as a subsidy.

- The repayment period of long-term bank facilities is up to 8 years depending on the nature of the production plan, the type of technology and the possibility of exporting the product, and it is also possible to use a one- to two-year breathing period for repayment of installments.
- Another important banking facility is short-term bank loans (6 to 12 months) to be used as working capital needed to carry out production processes, which the banking network provides up to 70% of. Obtaining short-term facilities up to this amount depends on winning the trust of the operating banks and having a favorable record in repaying the previously received facilities.
- In addition to the bank facilities that exist for the construction of new production units, to encourage investors and guide them to build factories, tax exemptions have been considered as follows:
- Tax exemption for up to 10 years for project implementation in deprived areas
- Tax exemptions for up to 4 years for project implementation in industrial towns
- The tax for normal areas is defined as 25% of gross profit.

11-ANALYZING AND PRESENTING FINAL CONCLUSIONS AND PROPOSALS FOR THE CONSTRUCTION OF NEW UNITS

- According to the details of the studies, it can be concluded that the creation of new units for the production of this product is justified, the causes of which can be stated as follows:
- - The market situation in the future is evaluated as a lack of supply.
- - Every year, a part of the country's needs is met through imports.
- - In the past years, exports have enjoyed a good increasing trend, and therefore it is expected that due to the existence of a relative advantage in our country compared to some countries in the region, the amount of exports can continue to increase in the coming years.
- The plan is to start operating at 60 percent capacity in the first year and increase below capacity in the following years, respectively.
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Year	First Year	Second Year	third year	forth year	Fifth year
Capacity(%)	60 %	70 %	80 %	90 %	100 %
Production capacity (ton)	3000	3500	4000	4500	5000

prime cost	244 million rials/Per Unit –444 Euro
Selling prices of products	400 million rials/Per Unit 729 Euro
Total Sales (Million Rials)	2,000,000 million rials-3,642,987 euro
Percentage of sales at the point head to head	61
Profit (Million Rials)	780,000 million rials - 1,420,765 euro
Gross Value Added (Million Rials)	778,398 million rials - 1,417,847 euro
Net Value Added (Million Rials)	703,811 million rials - 1,281,987 euro
Ratio of gross value added to total sales	0/39
Ratio of net added value to total sales	0/35
The ratio of gross value added to investment	0/64
Return of capital	2