Storage:

Cocoon Storage: The cocoons must be dried to optimum level and may be conditioned for a minimum period of 7-10 days before taking up for reeling in order to achieve better reeling performance. The cocoon should be stored in an appropriate storage room for long duration storage. The cocoon storage should have 20 degree Celsius and below temperature in the centre of the room and the air inside the room should have 55% and below relative humidity so that fungus will not attack the cocoon. Cocoon sorting :In order to achieve better results in reeling the defective cocoon namely double cocoons, flimsy cocoon, melted cocoons, infected cocoon, urinated cocoon and malformed cocoons which are unsuitable for reeling of quality silk should be sorted out using CSTRI(Central Silk Technological Research Institute) cocoon sorting table.

Spinning and Reeling of Silk: The process for producing single yarn out of discontinuous filament of cocoon is known as Spinning.

Silkworms are for obtaining cocoons which form the raw material for producing raw silk, the technique of raw silk making was discovered many many years ago. Reeling is the unwinding of the silk thread from the cocoon, about 58% of the silk in each cocoon is reliable, and the remainder is used as silk waste and formed into spun silk. Traditionally reeling is mainly done by country **charkha**. The free ends of silk filaments of 5-10 cocoons are fixed on reeling appliances and twisted into a single thick thread. Raw silk is boiled, scour, steamed and purified. The cocoons are softened using hot water and silk filaments are drawn continuously. This uniform stick and strawn thread is used for manufacturing of fine silk fabrics; Silk reeling is the final and purely commercial sale of sericulture. It is concerned with unwinding of the Silk filaments of the cocoon.

Mainly two types of methods are used, **Cocoon drying**: It involves steam stifling (process of killing) of cocoon is done to kill pupae so that intact cocoon can be used for reeling. Hot air stifling and sun drying is also very common.

Cocoon boiling: It is a common practice for swelling, softening and to some extent dissolution and removal of sericin and gum; it is purified by acid and fermentation.

The term “raw Silk industry or commerce” is commonly understood to denote mulberry raw silk. It is the compact untwisted and undegumned silk thread that is formed by combining the required number of silk filament, drawn from as many separate cocoons by the special technique call reeling. This includes a series of skilled operations to transform the raw

material (cocoon) into a fine continuous silk filament of great length, unlike other aspects of sericulture reeling needs constant attention and care. Since, the process of releasing the cocoon filaments breaks continuously and the reeler must properly attach fresh filaments to make a continuous filament if not, the reeled silk results in the abrupt occurrence of thin lengths. The building in which cocoons are reeled for production of raw silk is called **filature**. It is carried with sophisticated automatic machines to ensure production of raw Silk of desired qualities. The importance of reeling industry was well established long ago. And the demand is increasing day by day. It is linked with the agricultural sector and industrial sector has good scope for solving unemployment directly and self-employment indirectly.

Spinning and reeling of Eri

Eri cocoons are spun since they are opening mouthed and not composed of continuous filament. Eri cocoons spinning are simple and the cocoons are spun using ‘Takli’ in almost all the production areas, however the spinning activities are largely concentrated in Palasbari, Bijoynagar, Goalpara, Kokrajhar and Udalguri. Of late, the Department of Sericulture, Govt. of Assam and Central Silk Board, Govt. of India intensified the Eri spinning activities after popularisation of the latest interventions. i.e. CSTRI spinning wheel and Ambar Charkha spinning wheel. The large quantities of the Silk yarn produced in the state is utilised within the production state and a small quantity of Eri yarn is sold outside the state. ‘Takli’ , the age-old device for Eri spinning, is still in vogue. About 57% of spinners are engaged in spinning yarn on ‘Takli’ and there is demand for such yarn or products in domestic as well as international markets. For increasing the productivity of ‘Takli’ type yarn, an improved Flier spindle type-spinning machine has been developed by Hindustan Machineries, Bhagalpur which is being evaluated for final recommendation. This machine can be used to meet the demand of ‘Takli’ type yarn suited for weft. The machine also can be used for wet spinning to produce yarn suited for warp purposes. The productivity of this device is 60-100 gm per day as compared to 40 gm per day on Takli.

Spinning & Reeling of Muga Silk

The larvae after maturation crawl down the tree at dusk, which are then handpicked and placed in “Jali” (cocoonage) for spinning of cocoons. For continuation of generations 5% seeds cocoons are selected and kept in the grainage hall for emergence of moth and production of eggs. Rest 95% of good cocoons are stifled for reeling purposes. Normally 1kg of raw silk can be obtained from 4500-6000 cocoons depending upon the quality, compactness and weight of the shell.

Extraction of silk filament from cocoons by employing a set of processes is known as silk reeling. Muga silk is generally reeled by traditional ‘Bhir’ reeling process. In recent years, pedal driven reeling machines (RMRS type, Choudhury type) and motor driven machines (CSTRI reeling cum twisting machine) are also practiced in some areas.

The bulk of the cocoon used for reeling is obtained from the “katia” (autumn) crop. The leaves at this time are quite suitable, the seasonal temperature wasps and flies etc. are much less and cocoons produced are comparatively richer in silk. The “jura” (winter) crop is raised for producing seed cocoons only. During the winter the worms take more than one month to spin cocoons, which are also very poor in silk content. The “jethua” (spring) crop is also important crop. The golden colour of the silk from cocoons of this crop is higher than the “aherua” and “bhodia” crop. The “aherua” (summer) and “bhodia” (late summer) crop are raised mainly for seed cocoons.

Generally, the muga reeling is done by the rearers themselves. Boiling and reeling is carried out by all classes of people in a corner of the household. But there is a large section of people, for whom muga reeling is a good trade. In some places of Assam, muga reeling is done extensively as a profession. All the cocoons produced are converted into silk-yarn and fabric within the state of Assam.

In case of Muga reeling about 56% production is done on “Bhir ", the traditional age-old device and remaining 44% is coming from CSTRI motorized cum peddle

operated machine. The productivity of “Bhir" is very low (80 gm per day) and the quality of yarn is also not uniform. However, the weavers prefer to use the untwisted yarn produced on “Bhir " for weft, which accounts for 60% of the total requirement. Therefore, there is a need for an alternative technology to fulfill the need of weft yarn. Central Silk Board has developed a ‘Bani’ reeling machine particularly for production of better quality untwisted weft yarn. The productivity of “Bani" is much higher (150 gm/day) as compared to “Bhir”. The technology may be popularized to enhance the production of quality yarn and also remuneration of the reelers. It may help in replacing “Bhir" in future. Besides, efforts are also required to reduce the high cost of production by utilizing reeling wastes and production of value added products.

The cocoons are processed within the state to produce Muga raw silk & Eri Spun silk. The Mulberry reeling is done in Govt as well private sector by using Multi-end reeling machines located in Mangaldoi, Sibsagar and Jorhat districts. Muga reeling activities are mainly concentrated in Kamrup, Kokrajhar, Goalpara, Sibsagar, Tinsukia, Lakhimpur & Dhemaji districts. Sualkuchi & Bamundi are the main reeling and weaving clusters of Muga silk. Before reeling, the Muga cocoons are cooked in an alkaline solution of soda ash for an hour. This helps to soften the natural gum, sericin, which holds the filaments together. After deflossing the true end of the continuous filament is found and a number of cocoons are transferred to the reeling basin containing tepid water. Two methods of reeling are prevalent - the traditional on Bhir, which involves two persons, and a recent one that employs a fast operating machine with the operator using both hands for reeling i.e. CSTRI Reeling cum Twisting machine. About half of the silk in each cocoon could be reeled and the remainder, used as silk waste, noil, is further processed to spun silk. After the reeling, the Muga threads are dried in the shade for three-four days, following which they are wound into skeins on a ‘Sereki’. The sizing of the skeins involves the application of a mixture of powdered rice and water.