

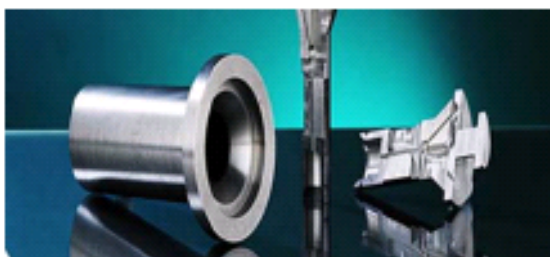
Tungsten Alloy Collimator

Tungsten alloy collimator is a device that narrows a beam of particles or waves. It belongs to input and output element of optical fiber communication devices. Tungsten alloy collimator can be adopted as linear accelerator and cyclotron in medical treatment. It has a simple structure, through which the fiber radiate light can be converted into parallel light (gaussian beam). So its main function is to efficiently maximize the light coupling into the device.

Radiotherapy destroys cancer by directing beams of radiation directly onto the tumor. The beams of radiation require a very fine focus to avoid harming the surrounding healthy tissue. This focus is achieved by using a multi-leaf tungsten alloy collimator, consisting of two rows of very thin tungsten heavy alloy plates, which can be configured to match the dimensions of the tumor exactly. Tungsten alloy collimator and tungsten alloy X-ray target are made of groundbreaking tungsten alloy X-ray targets components in the medical industry. Tungsten alloy collimator contributes significantly to successful radiotherapy through their high density and high shielding capability against X-rays and gamma rays.

The Classification of Tungsten Radiation Collimators:

There are two kinds of tungsten collimators, tungsten panoramic collimators and tungsten directional collimators. Collimators contain and direct the beam of radiation during exposure. This results in improved radiograph quality and safer operating conditions. Tungsten panoramic collimators consist of a stainless steel housing containing two tungsten inserts. The panoramic collimator is constructed with two shields designed to provide a 30 degree panoramic radiation beam. Tungsten directional collimators direct the radiation beam from a side port as a 60° conical side throw. Tungsten alloy shielding for the directional collimator is designed to provide a 50 degree radiation beam and is encased with stainless steel and totally sealed by argon arc welding. The shields are encased with stainless steel and totally sealed by argon arc welding. A wide range of collimators have been developed to meet the variety of applications and techniques used.



Advantages of tungsten alloy collimator:

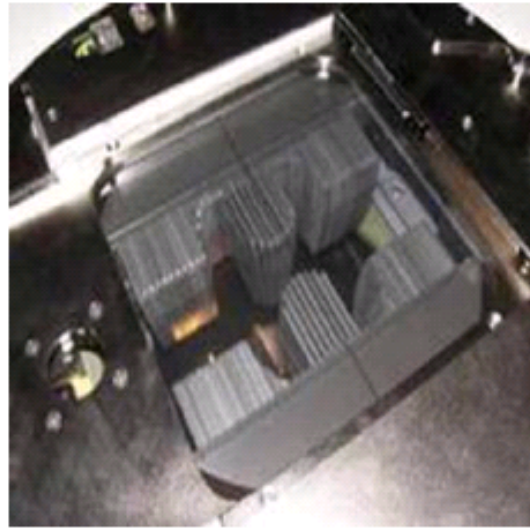
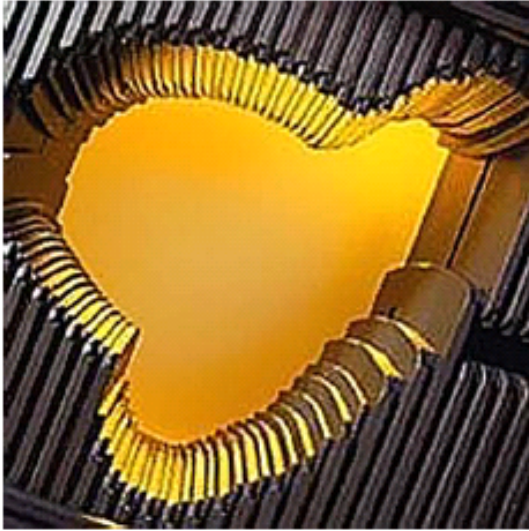
1. One of the most effective devices for reducing the radiation levels on a job site;
2. Increasing the quality of radiography shots by reducing the scattering radiation around the film;
3. Providing a safer operating conditions for radiographers;
4. Tungsten alloy material is a more effective shielding material than lead. It is an easy handle, non-licensed and very effective shielding material;
5. Do not spark, it is a ideal material for plant operations.



Tungsten Multiple Layer Multileaf Collimator

Tungsten Multiple Layer Multileaf Collimator

Tungsten multiple layer multileaf collimator for using in a radiation system providing a radiation beam in a given beam direction, including a first layer of a plurality of radiation blocking tungsten leaves, the leaves being arranged adjacent one another so as to form two opposed rows of adjacently positioned leaves and being movable in a longitudinal direction, which is generally transverse to the beam direction, defining a radiation beam shaping field between the opposed ends of the leaves. A second layer of a plurality of radiation blocking tungsten leave, the leaves of the second layer being arraigned adjacent one another as to form two opposed rows of adjacently positioned leaves and being movable in a cross-over direction, which is generally transverse to the beam direction and angled with respect to the longitudinal direction, defining a radiation beam shaping field between the opposed ends of the leaves of the second layer.



The Applications of Tungsten Multiple Layer Multileaf Collimator

The tungsten multiple layer multileaf collimator is an important tool for radiation therapy dose delivery. It was originally used as a surrogate for tungsten alloy block field shaping and is now widely used for Intensity Modulated Radiation Therapy. For conformal radiotherapy the tungsten multiple layer multileaf collimator allows conformal shaping of the linear accelerator (LINAC) beam to match the borders of the target tumour. For intensity modulated treatments the tungsten alloy leaves of a multi-leaf collimator can be moved across the field to create Intensity Modulated Radiation Therapy distributions (tungsten alloy multi-leaf collimator's really provide a fluence modulation rather than intensity modulation).

The Advantages of Tungsten Multiple Layer Multileaf Collimator

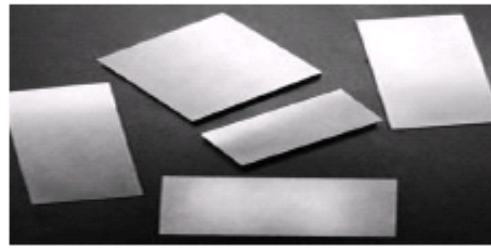
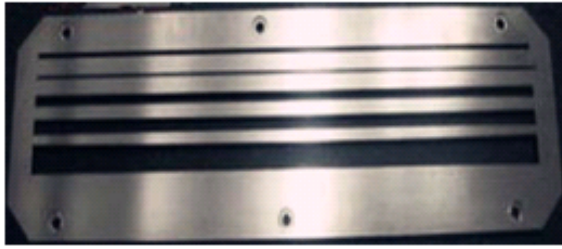
Fast tracking: for parallel tungsten alloy leaves, aperture motion is determined by the time required to cover/uncover target edges parallel to leaf motion and by leaf speed. Since there aren't any such target edges for cross leaf - aperture formation, time is consequently several times faster than that of a parallel tungsten leaf collimator. In addition, cross tungsten alloy leaves smaller weight and lower friction enable higher leaf speed and reliability than conventional MLCs.

Improved conformity: cross tungsten leaf conforms better to complicated targets (e.g., doubly concave) and eliminates collimator rotation. Conformity is significantly improved even for a regular shape. Due to tungsten alloy materials has high density, which is 60% higher than lead, reduces the size of tungsten alloy ray shields, without affecting the radiation shielding effect the excellent radiation absorption of tungsten alloy. Since the environmental friendly characteristics of tungsten alloy, tungsten alloy for radiation shielding better than lead for radiation shielding in environmental protection. During design of shielding, tungsten alloy radiation shielding is calculated according to requirements of shield to abate the multiple shielding materials' thickness.

Formula: $K = e^{0.693 d / 1/2}$

K: Shield weakened multiple

1/2: The tungsten alloy radiation shielding material of the half-value layer values



Why Need Tungsten Alloy Multi-leaf Collimator?

When people in the tumor or cancer treatment, more and more hospital commonly uses CT simulation system for image acquisition and patient respiratory motion analysis, and then radiation therapy is required. Tungsten alloy multi-leaf collimator is usually used for protect patient from unnecessary radiation. As we know, tungsten heavy alloy could provide the same energy absorption as lead using 1/3 less material, besides, it is environmental friendly, high density from 17.0 g/cm³ to 18.6 g/cm³ make tungsten alloy multi-leaf collimator an excellent ability for radiation absorption, as it is dense enough to absorb radiation from the radiation therapy machine, so as to make patient safe. How is Tungsten Alloy Multi-leaf Collimator Radiation Ability?

Compared to traditional radiation shielding materials such as lead and boron carbide, tungsten alloy provides excellent density with small capacity. With the same weight, high-density alloy can provide the same energy absorption as thinner than other materials, tungsten alloy is a favorable material for somewhere needs great radiation absorption but allow only very small space . Guangxi Chentian Metal Products Co. Ltd could not only offer tungsten alloy collimator based on the international standard, but also could design and make tungsten alloy collimator as per clients' requirement. Usually, radiation ability could be calculated basing on the following formula:

Formula: $K = e^{0.693 d / T_{1/2}}$

K: Shield weakened multiple

$T_{1/2}$: The shielding material of the half-value layer values

d: Shielding thickness, with the half-value layer thickness of their units, people need to half-value layer thickness of the quality of translation into the thickness of the material, divided by the density of the material can be obtained. How Tungsten Alloy Multi-leaf Collimator to Make Radiation Protection According to the lesion target period of the motion, in the allowed setting range of motion, radiation ray beam from treatment machine triggers automatically, out and off, so as to control the movement of the couch, then it is followed with the movement of tumor (target), in this way, to make a real-time dynamic precise radiotherapy. This method is applicable for the treatment with the movement caused by respiratory motion in a larger degree of lung, liver, breast, etc. The whole process for treatment of cancer or tumors, such as chest, abdomen, is an infrared tracking the motion waveform of the surface reflection markers, through surface infrared reflective markers , using fluoroscopic image, so as to do the verified or treatment of disease, this would produces a certain radiation of the radioactive material. If there is no high performance material of radiation shielding as tungsten alloy collimator the treatment device, then other parts of the patient is almost to be simultaneously exposed to radiation damage. It will be very terrible. Therefore, when the radiation source movement, then tungsten alloy multi-leaf collimator could absorb radiation to protect the patient.